A Comprehensive Analysis of Pedestrian Environments

The Case of Cairo City Centre

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Doctor of Philosophy

By

Mohamed Abdel-Karim Salheen

Heriot-Watt University

Edinburgh College of Art

Faculty of Environmental Studies

School of Architecture

Edinburgh

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DECLARATION

This thesis is my original work and has been composed solely by myself

Mohamed Salheen

D E D I C A T I O N

To those who I love most:

My great **parents**,

my loving and supportive **wife**, and

my tender and wonderful **son**.

TABLE OF CONTENTS

PART TWO CASE STUDY BACKGROUND

Chapter Two. STRUCTURE AND REPRODUCTION OF THE PEDESTRIAN ENVIRONMENT

Chapter Three. CAIRO AND ITS CITY CENTRE

Chapter Four. REVIEW OF LITERATURE ON RESEARCH METHODS

Chapter Eight. PLANNING FOR THE PEDESTRIAN ENVIRONMENT IN CAIRO CITY CENTRE

PART FOUR CONCLUSION

Chapter Nine. RETHINKING THE COMPREHENSIVE APPROACH

List of Figures

List Of Tables

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A Comprehensive Analysis of Pedestrian Environments
The Case of Cairo City Centre

Abstract

The discourse of urban design suggests that the pedestrian environment is an important factor for the vitality of urban areas specifically in city centres. However, much literature argues that the pedestrian environment is one of the less studied topics, reflecting its complexity and the dominance of vehicular movement on city planning. The pedestrian environment in Cairo City Centre shows much evidence of this lack of understanding.

Guided by observations of the pedestrian environment in Cairo City Centre the research develops a 'comprehensive' model, derived from Giddens' *Structuration* theory (1984), to investigate spatial, perceptual, cognitive, theoretical and managerial aspects. Cairo City Centre becomes a case study for this model. Four research methods (questionnaire, cognitive mapping, space syntax, document analysis) cover the four main components of the proposed model. After reviewing the relevant literature on the pedestrian environment and Cairo City Centre, literature on the selected research methods is critically reviewed.

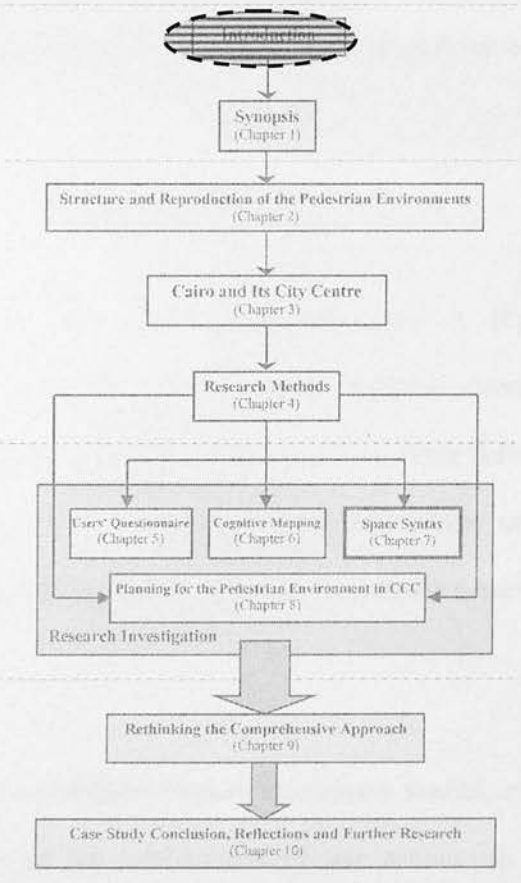
The empirical work in this research is composed of four chapters, each investigating a component of the environment defined in the proposed model. The *Social-grouping* is investigated using a questionnaire distributed to a sample of the users. The *built environment* is examined by applying space syntax analysis (Hillier and Hanson, 1984; Hillier, 1996). The *relationship between the Social-grouping and the built environments* is examined by the cognitive mapping technique as devised by Lynch (1960). Finally the rules governing the *reproduction of the (pedestrian) environment* in are examined using a combination of document analysis and a professionals' questionnaire.

The findings from together with the literature review are combined to reflect on the proposed model for the environmental system and structure. They reflect on the research at three levels: on the *methodology*, on the *methods* used and on the *case study* of Cairo City Centre. The *methodology* demonstrates how comprehensiveness in urban analysis reveals aspects that remain hidden if only one research approach is adopted. The *methods* used to examine the case study are shown to complement and not contradict each other. The research also highlights the underlying causes of problems encountered in the *case study*. The author argues that tackling these will alleviate many of the more apparent problems.

Part One

RESEARCH ARGUMENT

INTRODUCTION



INTRODUCTION

This chapter aims at describing the main pre-research practical experiences and theoretical concepts that led up to the research. This information includes factors from the research assumptions that had an influence on initiating the research as well as on the selection of the research approach. It also describes the problem that this research is tackling in the case study, the research's hypothesis and objectives. The chapter ends with a brief account of the field survey that is used in the research, research limitations and a description of the various parts of the research.

RESEARCH ASSUMPTIONS

The following section reviews the research assumptions which influenced the initial approach in tackling the main lines of the investigation. These assumptions or preconceptions affected the initial scope and approaches used in the research but had no influence on the findings in any way. Although these preconceptions are likely to be challenged by the research findings, it was found important to cite them considering their importance in directing the research in its early beginnings.

Importance of Walking

Pedestrian movement is the activity that is under investigation in the current research. It was selected because of its great importance as a key activity involved in almost all other activities that the human being carries out. Coming from an urban design background, the author believes that the success of the pedestrian environment is the key element in the success of any urban design project. The importance of walking is gaining increased attention in both the academic arena and real life situations.

For example, as more attention is given to environmental impact assessment studies, most research work is becoming very much aware of the implications of our actions on the

environment. By encouraging walking the energy used in and pollution emitted from transportation vehicles are reduced, therefore walking features among the key elements for sustainability and town planning.

It is often the case that suburban commercial centres are taking the commercial focus from the original city centres. If the centre did not take any action to prevent its pedestrian population being lost to new peripheral centres, it would end up loosing its status as a major focus for functions and activities and it may become deserted. It is even possible to argue that the health of the city centre is vital for the health of the city as a whole. Appropriate design can facilitate an environment that encourages walking as a major mode of transport rather than only a pre-journey or post-journey mode.

With the increase in complexity of relationships both in work and social life, practising a regular sport is becoming an optional luxury in many life styles. It is also suggested that the budgets spent by many governments on health services could be reduced by encouraging the public to practise a useful, easy, and inexpensive sport such as walking. However, governments should make available the environmental conditions and operation strategies which promote such an activity.

It is argued in many research works (for example Gehl, 1987) that walking, as the main media for socially encountering people, is a major key element in enhancing the community health from different points of view such as safety and crime prevention. It is also argued in other work (Hillier, 1996) that by meeting more people, and probably the same persons, the social links are strengthened to an extent that could be reflected on ones sense of belonging to the community with all the consequent positive social changes.

Two Types of Walking Practices

Walking as an activity could exist in at least two types of practices which affect the characteristics of the walking experience, thus having an impact on the research objectives and

methodology. It is essential to differentiate between these two types in order to understand the characteristics of each one of them.

1) The first type is as a means of transportation between different destinations. This practice can be found anywhere in any city. As this constitutes a means of transportation, most of the rules governing transportation engineering should apply to it. This suggests that there might be an objective way, which might be quantifiable or not, of understanding its characteristics and then predicting its approximate behaviour. Nevertheless, there are some qualities that are attributed to walking making it different from the rest of transportation modes. *First,* walking allows the person maximum flexibility in regard to many journey variables like number and location of stops, route choice, number and nature of possible changes in direction and interaction with the immediate environment. The *second* quality is that the main limitation to walking movement is the physical ability of the user of this mode. *Third*, it is mainly used in small distance trips for two reasons: its physical limitation and being the slowest transportation mode, as time is the main factor governing all transportation modes.

2) The second type of walking practice is as a dependent activity. It is common knowledge that walking in itself, when practised in a clean environment, is a very healthy activity. For most human beings, walking in a beautiful environment is an entertaining activity for its own sake. This type of walking experience is not governed by any numerical rules, but with a more personalised subjective criteria, in the sense that it is unpredictable and non-measured.

It is this distinction between necessary and leisure walking that is essential to understand the difficulty in studying some activities such as shopping. Shopping, mostly, involves both kinds of walking experiences; thus it is partially governed and predictable and partially ungoverned and unpredicted. It is also this distinction that is the key element to understand most of the

conflicts and contradictions that appear in the majority of studies into pedestrian movement and pedestrian environment.

Is the Street a Link or a Place?

The existence of these two kinds of spatial description of the street is important for the understanding of pedestrian movement. For example, most literature on transportation planning deals with streets as purely movement arteries which are articulated with buildings and a variety of activities. On the other hand, others like Gehl (1987, 1996, and 2000) see the street as the place of public activity. A street as a place could be a goal in itself and that would make a difference to the comprehension of the street network. It is clear that both kinds of spaces could not be studied in the same way and that neither of them is more important than the other.

Although the existence of these two descriptions could be agreed upon, the street as a pure link cannot exist unless no activity takes place in it, so the street is always a place but with different levels. Walking through a street could be considered as an activity in itself. On the other hand, a street as a pure place does not exist because it must be leading from one point to another. Therefore the street as a place could be defined by its ability to be understood and used as a setting for activities apart from passing through it. The street as a link could be defined by its ability to be easily understood as *mainly* a preferred way of getting to a particular goal or set of goals.

RESEARCH INITIATIVES

The following section aims at presenting the points that played an important role in shaping the start of this research. It includes the experience that the author had of the subject before starting the research, research hypothesis, and finally the main objectives of the research.

Pre-research Experience

Since the economic liberation in the 1970s Cairo has been rapidly and uncontrollably growing. There is no easy and obvious approach to stop the random growth as it has been the outcome of a process of centralisation on all scales. The centralised importance of Cairo on the national scale being reflected on its centre at the local scale. All kinds of functions, governmental agencies, economical institutions and most of the central services have been located in the heart of Cairo. What was thought to be practical at the beginning of the 1980s was to prepare new plans to deal with the expected problems such as movement congestion, the huge number of new consumers and of daily visitors to the city centre from all over the country.

Part of the solution was to decentralise these services on both the national and local scales. On the national scale, new towns were planned to absorb some central functions from Cairo and located far enough from Cairo to prevent them from expanding to reach Cairo. On the local scale, a Master Scheme for Greater Cairo Region (GCR) was proposed. This scheme included three major strategies: *first,* creating new sub-centres within the city; *second,* relocating many governmental and administrational services in El-Sadat new city, which was planned for that purpose; and *third* following the strategy of 'homogenous sectors', which divides the city into seventeen sectors with the intention of making them partially self sufficient. The first strategy partially succeeded driven by the growing need for new major centres. The second did not succeed, as it was not given enough support by the government. The third also failed in that it ignored many interactions between the adjacent sectors and on account of some administration problems (as will be seen in Chapter Three, Cairo and its City Centre and in Chapter Eight, Planning for the Pedestrian Environment in Cairo City Centre: The Reproduction System).

New plans and policies were enacted in order to adapt the city centre to a centralised future. For example, four multi-storey garages were built to reduce the area taken up by car-parking and the amount of traffic within the city centre generated by drivers looking for a parking place. Traffic regulations and plans were devoted primarily to solve the problem from the point of view of the car drivers. For pedestrians, nothing substantial was provided apart from two pedestrianisation

schemes in two of the most famous shopping streets in Cairo, El-Shawarby Street and El-Alfy Street. However, these were not based on reliable criteria reflecting the supply and demand characteristics of this service, nor well implemented as no significant physical changes were made apart from stopping cars from going through these two streets. El-Shawarby Street, as the more mature experience, was abused by the shops by using it as an extension for their commercial activities and, in the end, the street was transformed from a luxurious shopping street to a place full of randomly located, unattractive features and activities.

This brief account of pre-research experience was the reason to bring the author to an initial realisation of the problem facing pedestrian environments in Cairo and in CCC specifically. The feeling that the pedestrian environment in CCC could be better was becoming irritating especially with the competition it has from newly constructed and planned sub-centres, which might result in a dead city centre if fast but carefully considered actions are not taken. A welcoming pedestrian environment and pedestrian movement system are considered in many discourses as the backbone of city centre's vitality (Gehl J, 1987).

Research Hypothesis

The research proposes a hypothesis to allow for further development of the topic, which involves gaining better understanding of the problem and recommending future directions. This hypothesis states that:

1) By using a combination of research methods it is possible to develop a more representative model of the environment.
2) The planning process in Cairo marginalises the role of pedestrian environment.
3) A comprehensive analysis of the pedestrian environment in CCC can bring to light aspects, which are vital for its future development.

There are many examples of the little attention given to pedestrian movement and its environment in Cairo and the following (which will be discussed extensively in Chapter Eight) is one of them. It is the ambitious transportation plan for the greater Cairo region prepared by

the JICA (Japan International Co-operation Agency) (JICA, 1988). Although the aim of this huge piece of work was to enhance the transportation policy in the whole city, and especially the centre, the pedestrians have received very little consideration, with most of the surveys, proposals and recommendations, focusing mainly on vehicles of different types and motorised transportation of different modes.

The JICA study considered few issues of function, regulations and services geared towards satisfying the wishes of the pedestrian. The visual and environmental qualities that are offered to pedestrians, although these may be significant criteria, would not be treated as anything beyond optional criteria in the current economic situation and in reflection of the priorities that the local authorities have (Abu-Zekry, 1983).

The problem has become more complicated, as this attention given to car drivers has been recognised by pedestrians. They find themselves in an environment not designed for them, even more they feel alienated since most plans and regulations exist to make travel easier for vehicle drivers and, in effect, make it harder for pedestrians.

However, this problem does not seem to be a local one, but rather an international problem of ignoring the pedestrian environment, which increases the importance of studying it. When looking at the situation outside Cairo and even outside Egypt, many writings highlight the negligence of pedestrian aspects in most development plans (e.g. Untermann, 1984).

A research aiming to promote walking as a mode of transport by the National Consumer Council in the United Kingdom found that four themes seem to recur in the process of pedestrian environment production: (1) pedestrian services are offered based on unsuitable information about how pedestrians behave in reality; (2) the pedestrians are not consulted in the decisions that relate to them; (3) in case of any conflict of benefits, the pedestrians are always the lowest priority; (4) the rules that guide the relation between the pedestrian and other users are not sufficiently studied (National Consumer Council, 1987: 1-2). A few years earlier,

Hillman said that walking "has received scant or superficial attention in legislation, policy and research, particularly at the level of strategic thinking and policy development" (Hillman, 1979: 18).

Research Objectives

It is possible to say that there is an implicit aim of this research that is to highlight the need to put the pedestrian environment on the level of strategic thinking and policy development. However, through the process of applying the comprehensive approach and testing the hypothesis the research will contribute to the field of urban design and town planning through:

1) a better understanding of the analysis stage, which might result in a more responsive planning for future enhancement of the pedestrian environment in the city centre of Cairo;
2) a better understanding of the nature and characteristics of pedestrian environment as a system in general which should help in decision making in similar situations; and
3) concluding and suggesting directions in which the work could be taken further. The conclusion will be focused on the specific and general aspects of the case study, the comprehensive approach, the research methods, and highlight topics for future research.

The Research Title: Explanation

The title of the current research is 'A Comprehensive Analysis of Pedestrian Environments: the Case of Cairo City Centre'. The following is a brief account of why it was selected as it is and how it reflects on the contents:

1) The *comprehensive* approach is directly linked to the research hypothesis. Comprehensiveness is achieved by proposing a model that covers the various components involved in the investigation.
2) The research aims at the *analysis* because it offers a starting point for any successful enhancement plan. The concept of *analysis* is a consistent one all through the research, although it gradually change from descriptive, to association, and finally inferential analysis.

3) The *pedestrian* refers to users of walking as a mode of transport. The importance of walking was explained earlier. The research is concerned with the pedestrian as the main element of analysis, however other aspects which reflect indirectly on it, such as vehicular movement and social aspects, will be reviewed.
4) The *environment* is a broad term which is used to point to the comprehensive approach used to cover most aspects of the topic.
5) *Cairo* is selected as the global case study area because the author is a Cairene and the problem of movement congestion in the city. It provides the global or macro level of analysis all the way through the analysis.
6) The *city centre* is selected as the specific case study area under consideration because of the vital role that the pedestrian environment plays in the success or failure of city centres in general. It provides the local or micro level of analysis.

THE RESEARCH

In this section some facts about this research are presented. These facts include the diary of the field survey, the limitations which were encountered and which had some kind of impact on the research directions or extent of findings, and the structure and content of this final written version of the research.

Field Survey Diary

The author conducted fieldwork activities in the case study area several times during the research period. The purpose of this was to collect data such as pedestrian counts, derive a resource of information such as planning reports, and to carry out the questionnaires. In total there were four field trips devoted to data collection as follows:

1) August-September 1998: users' questionnaire (including cognitive mapping) and collection of documents and maps of CCC.
2) June-August 1999: professionals; questionnaires, pedestrian counts, collection of planning reports (1), and updating maps (for Space Syntax analysis).

3) March-April 2000: collection of planning reports (2), and participant field observation (to test Space Syntax findings).

4) December-January 2000/2001: collection of planning reports (3), and photography of features highlighted in the analysis stage.

As seen from the diary, the collection of planning reports was carried out on three visits. Working in parallel with all of these surveys was the collection of media reports.

Research Limitations

There were some limitations that affected both the breadth and depth of the results. These limitations can be summarised as follows:

1) The financial limitation is the major factor affecting any research especially those involving some kind of field survey. This limitation affects, for example, the number of streets (breadth) surveyed in Chapter Seven, Space Syntax, and number of rounds for each selected segment (depth). The author had to carry out the field counts individually, as there was no fund available to engage a team to do it.

2) Availability of information about the case study area is also a major problem. The vice-head of the Planning Department in the Cairo Governorate said[1], "we do not have any physical plans for the city centre as it is a relatively new district and it is in a good condition. We give more care and concern to slums and historical areas". Data collection is one of the hardest tasks in any research dealing with less developed countries. Lack of accurate information about social status is a persisting problem of research into the society of Egypt. Thus one needs to use a combination of education, illiteracy levels and unemployment to indicate the socio-economic status of the population (Abu-Lughod, 1971). Problems with data collected in many of the developing countries could be summarised as follows (gathered from text from: Abu-Lughod (1971) and Eid (1992)):

   - Inaccuracy.
   - Missing information.
   - False reporting.

[1] Informal discussion with architect Hayam Aref, vice-head of the Planning Department in Cairo Governorate June 1999.

- Mistrust between the population and the government.
- Lack of significant variables.
- Inconsistencies in the units and variables of successive research and studies.

3) Access to information, especially when dealing with development strategies, is difficult when they are not completed or implemented.
4) Time limitations of the author and the subjects.
5) Hierarchies of power and public relations which result in further limitations to access to information.

Research Structure

The research is ordered in four major parts. These are Research Argument, Case Study Background, Empirical Research (the investigation) and Conclusion (see figure 0.1). The contents of each part are as follows:

Part One, **Research Argument**, includes an *Introduction* and a *Synopsis* Chapter. This part aims at presenting the main thread of the argument. Therefore, it attempts to widen the scope of the research from a narrow problem towards a more general situation based on theoretical support.

- The *Introduction* states the author's background and the reasons behind this research. This includes the description of the problem and the hypothesis which is tested in the research.
- The *Synopsis* Chapter develops the theoretical model used in the research, through which the comprehensive approach is proposed.

Part two, the **Case Study Background**, comprises three chapters:

- Chapter Two, *Structure and Reproduction of the Pedestrian Environment*, is the first step towards applying the research methodology proposed in Chapter One to the pedestrian environment. In this chapter, literature related to the pedestrian is reviewed in relation to the proposed model.

- Chapter Three, *Cairo and its City Centre,* gives the background to the evolution and the current situation of Cairo and its city centre. This chapter is the second step of applying the model to the case study by reviewing the literature on Cairo, its city centre, and the pedestrian environment of the city centre.
- Chapter Four, *Review of Literature on Research Methods,* includes the essential background information on the research methods used, namely questionnaire, cognitive mapping, Space Syntax and document analysis. The review of these methods is limited to the basic theoretical backgrounds of each of them and a brief account of similar applications. The fourth chapter could be seen as the third stage of applying the model by describing the selected research methods to investigate the various components of the case study.

The third part of the research is the empirical research or the **Investigation** stage.

- Chapter Five, *Users' Questionnaire,* investigates pedestrian's opinions through the questionnaire.
- Chapter Six, *Cognitive Mapping,* presents the findings of the cognitive mapping analysis attached to the questionnaire form.
- Chapter Seven, *Space Syntax,* reports the findings of applying space syntax analysis to the case study area. It also reports on the reflections from Chapters Five and Six on the concepts of Space Syntax. It presents a new axial model to complement to the conventional model of Space Syntax which accounts for distance as well as configuration.
- Chapter Eight, *Planning for the Pedestrian Environment in CCC: The reproduction System*, gives a brief account of the planning process which is responsible for the production of the pedestrian environment in CCC.

The final part is the **Conclusion**.

- Chapter Nine, *Rethinking the Comprehensive Approach,* brings all the findings from the four chapters of analysis into one set of findings. It addresses the conflicts that arise between different findings as well as highlighting the similarities.

- Chapter Ten, *Case Study Conclusion, Reflections and Further Research,* starts with the main findings which the research recommends to enhance the pedestrian environment in CCC. It then states the more general theoretical and conceptual contributions of the research and reflects on all parts of the research as a method of self-appraisal. It ends by suggesting areas for further research.

Six appendices follow the conclusion. Appendix A presents definition of the components of the environmental model as used in this thesis. Appendices B, C and D include detailed data related to the third part, the *investigation*. Appendix E includes an English translation of the questions given to the users, originally in Arabic. Finally, Appendix F includes index of places and features that are mentioned in this thesis and their geographical location in Cairo and the city centre. The location and limits of CCC are highlighted in both maps.

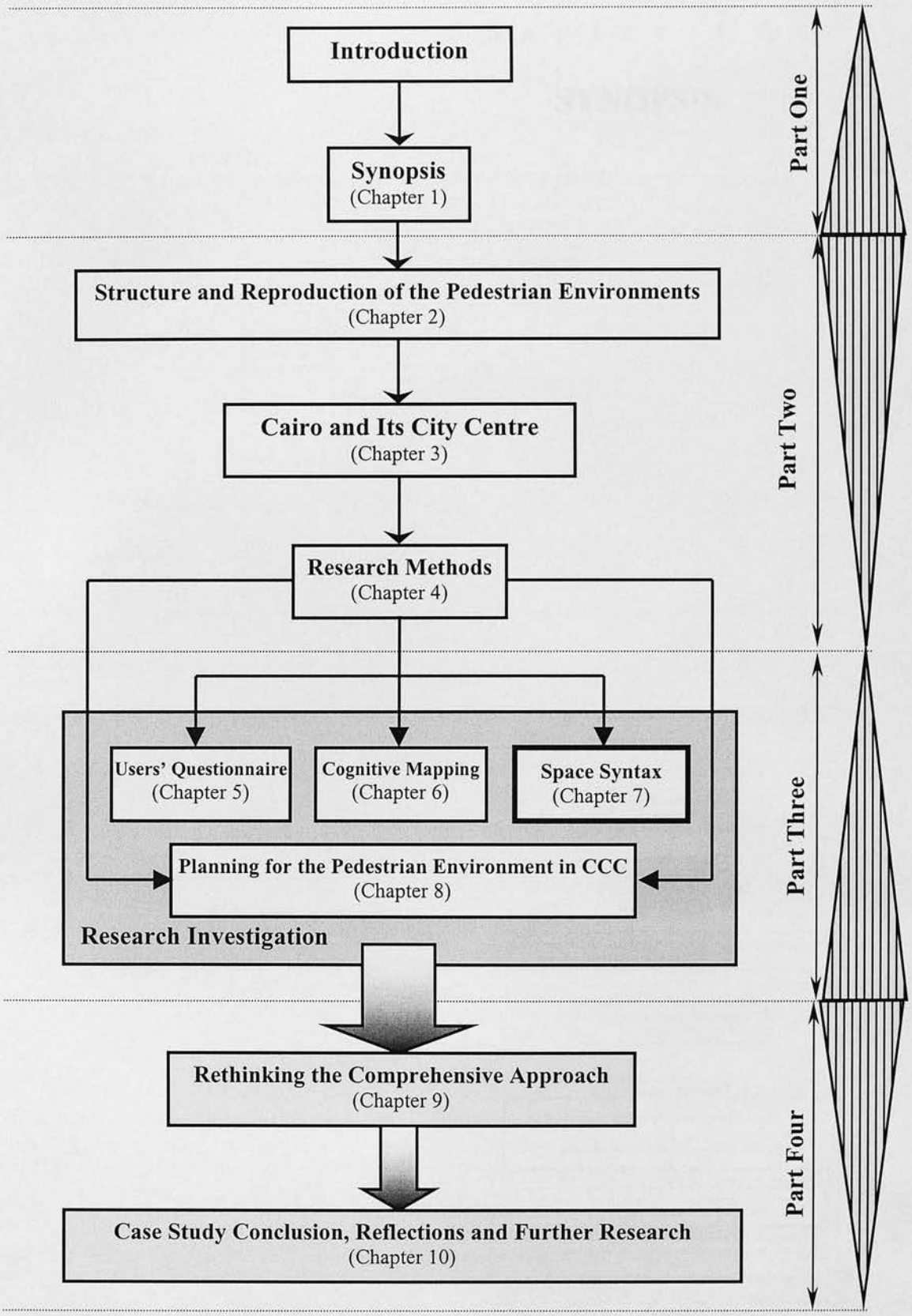
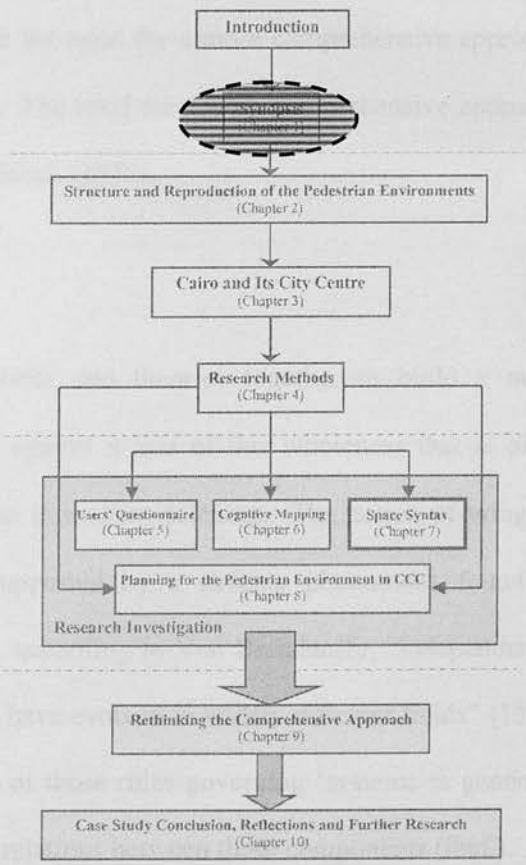


Figure 0.1– Diagram showing different parts of the research and the chapters they contain. It shows the nature of each part either widening the scope (Parts One and three) or focusing (Parts Two and Four).

Chapter One

SYNOPSIS



INTRODUCTION

This chapter aims to present the main theoretical and empirical cores on which this study is based. The theoretical core highlights the main theories which played a major role in shaping the conceptual discourses of the research, and on which the comprehensive approach used in the analysis is built. The empirical core will take these conceptual discourses to research practice and build the research framework, selecting the appropriate research methods to reach the required outcome.

1.1 THEORETICAL APPROACHES DIRECTING THE RESEARCH METHODOLOGY

On the general theoretical level there are some concepts which helped in directing the research all the way through its progress until it reached its final shape. The most important one of these concepts is the General System Theory (GST), which was founded by Von Bertalanffy (1971). Although Bertalanffy is a biologist, his theory reflects on almost all aspects of life. The concept of GST offers an understanding of how complex the need for a more comprehensive approach to analyse a problematic and complex situation. The need for such a comprehensive approach was raised by many urban planners such as Chadwick (1978).

1.1.1 General System Theory

In brief, GST tries to bring different disciplines and theories together to build a more comprehensive whole of knowledge. It reacts against a loss of this wholeness that is often associated with the ever-increasing specialisation in modern sciences. The notion of bringing these different specialisations together was supported by a striking phenomena found in surveying them. This phenomena is defined as, according to Von Bertalanffy, "independently of each other, similar problems and conceptions have evolved in widely different fields" (1971: 29). GST seeks the formulation and derivation of those rules governing 'systems in general', whatever the nature of their components and the relations between these components (ibid.).

Although GST itself is a search for the rules governing 'systems in general', the current research only borrows the concept of bringing multidisciplinary enquiry techniques into the analysis of a problem and aiming for a more comprehensive coverage of the problem rather than concentrating on only one technique. The combination of the findings of these techniques to reach a more comprehensive analysis of the problem should lead to a deeper understanding of the problem faceted complexity.

1.1.2 Transformation

The second concept is that of *transformation*. Transformation is defined as the "constant duality, or bipolarity, of always being simultaneously structuring and structured" (Piaget, 1971: 10). The concept of transformation then acknowledges the condition of all structures as being in continuous change. Thus, something that is a property of a structure today does not have to be the same tomorrow and most probably will not be the same for a long time.

Considering first that every thing must be a part of a system and that every system is a part of a more global system, and second that the lower levels of systems are more likely to change over a shorter period of time than the higher levels, will highlight the importance of categorising the environmental considerations into different levels. The implications of such a concept are many. Considering the current research, for example, it could be seen as just a view of the situation at a point in time. In order for the results to be useful in the future, different levels of categorisation should be used. Lower levels of categorisation contain more detailed results but are mainly helpful for the near future, and the opposite for higher levels of categorisation.

1.1.3 Positivism and Anti-positivism

Two approaches to study societies dominated the field of social science until the beginning of the 1970s. These two approaches were *positivism* and *anti-positivism*. The basic distinctions between these two approaches can be understood by defining the *ontology* and *epistemology* of each of them. *Ontology* is the definition of the *subject-matter* by someone or what s/he thinks

reality to be like. *Epistemology* is what someone counts as *knowledge,* depending on what s/he wants knowledge *about* (Jones, 1993).

According to Jones the type of knowledge someone seeks to a certain extent defines the *methodology and methods* must be used to find it. These distinctions are briefly compared between the approaches as in table 1.1.

Approach (main thinkers)	Positivism (Durkheim, Parsons, Popper)	anti-positivism (Becker, Goffman / Garfinkel, Sacks)
Also referred to as	Structuralism/functionalism	Interpretivism/actionism
Ontology	Reality is a normative or cultural system (a system of ideas) which produces social life whose workings are independent of human consciousness	Reality is the meaningful accomplishment of social actors as the society is the construction of its members through their: a) Interpretations b) Meaningful actions
Epistemology	Appropriate knowledge is *empirical* evidence of the structural forces which produce behaviour and beliefs	Appropriate knowledge is an *understanding* of the motivations and methods underlying meaningfully created social settings
Favoured methodology	The *hypothetico-deductive staged as:* first, *deducting a hypothesis from existing knowledge;* and second assessing its validity by an *empirical* evidence to form a new hypotheses to be tested. Thus the methodology is *objective* and *quantitative.*	The use of the *Verstehen*[1], defined as putting yourself in the place of the actors and working out how their interpretations were arrived at to produce meaningful actions. Thus the methodology is *non-empirical*, *subjective* and *qualitative.* Two research approaches using the *Verstehen* were found: 1) Symbolic interactionist research: use of *Verstehen* to understand and explain. 2) Ethnomethodological research: how members of the society use the *Verstehen* to understand each other and to form a social order.
Methods	Controlled and structured applications of experiments, observations and surveys.	1) Symbolic interactionist research uses less controlled and structured and open-ended: participant observations/ethnographies, Interviews. 2) Ethnomethodological research: experiments, observations/ethnographies and conversational analysis.

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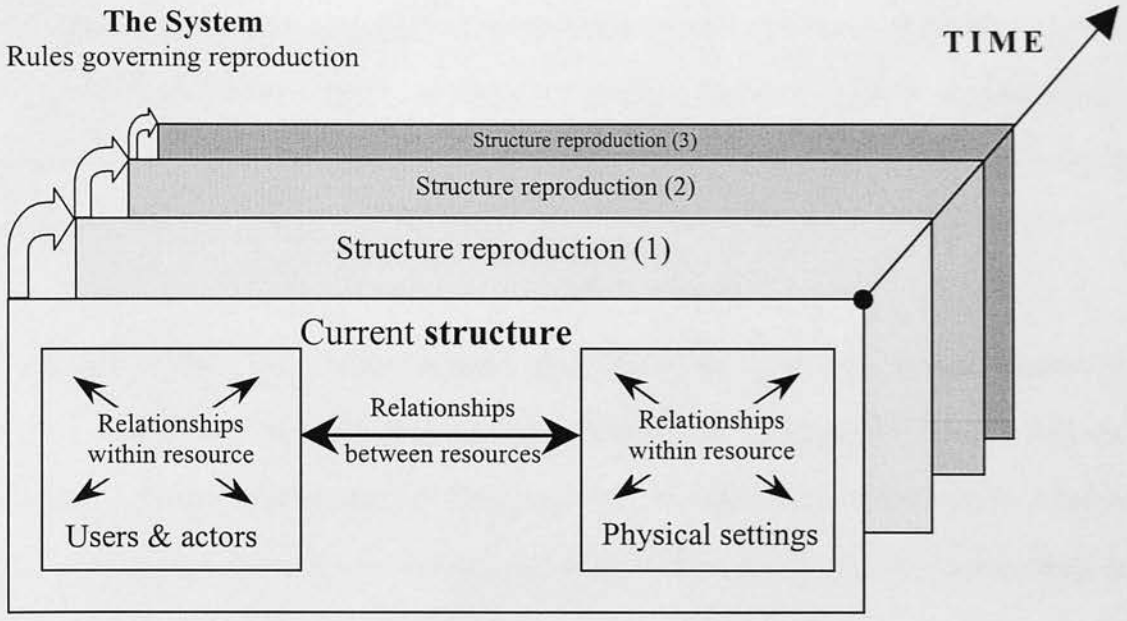

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The research hypothesis suggests that their is a value in conducting an approach that takes account of as many variables as possible and which covers a wide range of the aspects related to

the problem. This approach is referred to as the *comprehensive approach*. However the extent this comprehensiveness could be achieved in a single piece of research is questionable. Reviewing the recent approaches in social research provided a further endorsement to the usefulness of this comprehensive approach.

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But how can this comprehensive approach be applied to urban planning and design, specifically the pedestrian environment system and structure? What are the components of comprehensive inquiry, for these will define the research methods to be used? What are the expected outcomes from applying these research methods? Finally, how could the research approach, once devised, respond to the research objectives? These questions are answered in the following subsections.

1.2.1 Comprehensive Approach and Pedestrian Environment

The comprehensive city planning approach proposed by Branch (1985) could be considered as a simple theoretical framework for the application of comprehensiveness in urban planning. Branch described several approaches for defining the components of comprehensive city planning (Branch, 1985). One of these approaches, which is of significance to the current research, is the division of the city itself into the Physical City, the Social City and the Economic City. This division gains its importance from two points of view, one from the urban planning process and the other from urban management in the post-occupancy stage.

First, urban planning practice until the 1950s followed a spatial design approach and was practised by many non-planning groups, such as architects and surveyors. It changed when a more specialised profession emerged and became engaged in city planning (McConnell, 1981). Only then did city planning change from being mainly spatial design to becoming more explanatory of the expected life and activities within planned spaces. However, even after establishing this more comprehensive approach, the planning process can only design physical models which might allow or encourage certain activities to occur. These activities together with other social-grouping aspects of the environment, such as feelings, preference and meanings, will remain hypothetical until the real users activate the living part of the city.

The **second** point of view, which encourages making a distinction between the physical city and the living city, is from an urban management point of view. It suggests this distinction based on the ability and cost of changing each of them after implementation of the designs. The physical city could be very costly to change, but the change is relatively simple once the funds are available. On the other hand, changing the living city does not have to cost much, but will be very complex, and may be impossible, if rejected by the users.

The importance of this approach specifically in the case of analysing the pedestrian environment was supported by a recent practical study of the Massachusetts Pedestrian Transportation Plan (MPTP) (Wallace *et al.*, 1997, 1998). Their study targeted promoting walking as a means of transport by creating a better and more suitable walking environment for pedestrian. Being driven by a real life situation, their study holds a powerful concept of the main approach that should be used to achieve a successful plan. They differentiated between two approaches in dealing with analysis of the pedestrian environment, physical and behavioural. However, they follow a general recommendation by the *National Bicycling and Walking Study*, which emphasises the need for multidisciplinary approaches to improve the quality of the pedestrian environment and thus increase walking. They referred to that multidisciplinary approach as the comprehensive approach.

Wallace *et al.* define the three approaches as follows:

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The behavioural approach of Wallace *et al.* is referred to as the social-grouping approach in the current research. However, that does not mean that the research accepts there are real division between physical and social-grouping environment or that they are separable. The structuration theory states that there are continuous interactions between resources of the structure, in which both physical objects and social-grouping attributes exist. The extent to which this interaction occurs is greatly dependent on the context under examination. Despite, that precaution of the division between physical and non-physical environments, this division is sometimes helpful in differentiating research areas which are more related to the built environment from those more related to social-groupings and the society in general.

The environmental structure of the case study is constituted of the built environment, which is Cairo City Centre, and the social-grouping, which is the pedestrians and other actors involved. These two represent the *resources* of the structure. The *relationships* governing the interaction between the two resources, and within each one, represent the rules of the structure. The system of the case study is defined as the *rules* governing the *on going* reproduction of the structure. The structure and the system of the case study could be visualised as in figure 1.2.

Although GST itself is a search for the rules governing 'systems in general', the current research only borrows the concept of bringing multidisciplinary enquiry techniques into the analysis of a problem and aiming for a more comprehensive coverage of the problem rather than concentrating on only one technique. The combination of the findings of these techniques to reach a more comprehensive analysis of the problem should lead to a deeper understanding of the problem faceted complexity.

1.1.2 Transformation

The second concept is that of *transformation*. Transformation is defined as the "constant duality, or bipolarity, of always being simultaneously structuring and structured" (Piaget, 1971: 10). The concept of transformation then acknowledges the condition of all structures as being in continuous change. Thus, something that is a property of a structure today does not have to be the same tomorrow and most probably will not be the same for a long time.

Considering first that every thing must be a part of a system and that every system is a part of a more global system, and second that the lower levels of systems are more likely to change over a shorter period of time than the higher levels, will highlight the importance of categorising the environmental considerations into different levels. The implications of such a concept are many. Considering the current research, for example, it could be seen as just a view of the situation at a point in time. In order for the results to be useful in the future, different levels of categorisation should be used. Lower levels of categorisation contain more detailed results but are mainly helpful for the near future, and the opposite for higher levels of categorisation.

1.1.3 Positivism and Anti-positivism

Two approaches to study societies dominated the field of social science until the beginning of the 1970s. These two approaches were *positivism* and *anti-positivism*. The basic distinctions between these two approaches can be understood by defining the *ontology* and *epistemology* of each of them. *Ontology* is the definition of the *subject-matter* by someone or what s/he thinks

reality to be like. *Epistemology* is what someone counts as *knowledge,* depending on what s/he wants knowledge *about* (Jones, 1993).

According to Jones the type of knowledge someone seeks to a certain extent defines the *methodology and methods* must be used to find it. These distinctions are briefly compared between the approaches as in table 1.1.

Approach (main thinkers)	Positivism (Durkheim, Parsons, Popper)	anti-positivism (Becker, Goffman / Garfinkel, Sacks)
Also referred to as	Structuralism/functionalism	Interpretivism/actionism
Ontology	Reality is a normative or cultural system (a system of ideas) which produces social life whose workings are independent of human consciousness	Reality is the meaningful accomplishment of social actors as the society is the construction of its members through their: a) Interpretations b) Meaningful actions
Epistemology	Appropriate knowledge is *empirical* evidence of the structural forces which produce behaviour and beliefs	Appropriate knowledge is an *understanding* of the motivations and methods underlying meaningfully created social settings
Favoured methodology	The *hypothetico-deductive staged as:* first, *deducting a hypothesis from existing knowledge;* and second assessing its validity by an *empirical* evidence to form a new hypotheses to be tested. Thus the methodology is *objective* and *quantitative.*	The use of the *Verstehen*[1], defined as putting yourself in the place of the actors and working out how their interpretations were arrived at to produce meaningful actions. Thus the methodology is *non-empirical*, *subjective* and *qualitative*. Two research approaches using the *Verstehen* were found: 1) Symbolic interactionist research: use of *Verstehen* to understand and explain. 2) Ethnomethodological research: how members of the society use the *Verstehen* to understand each other and to form a social order.
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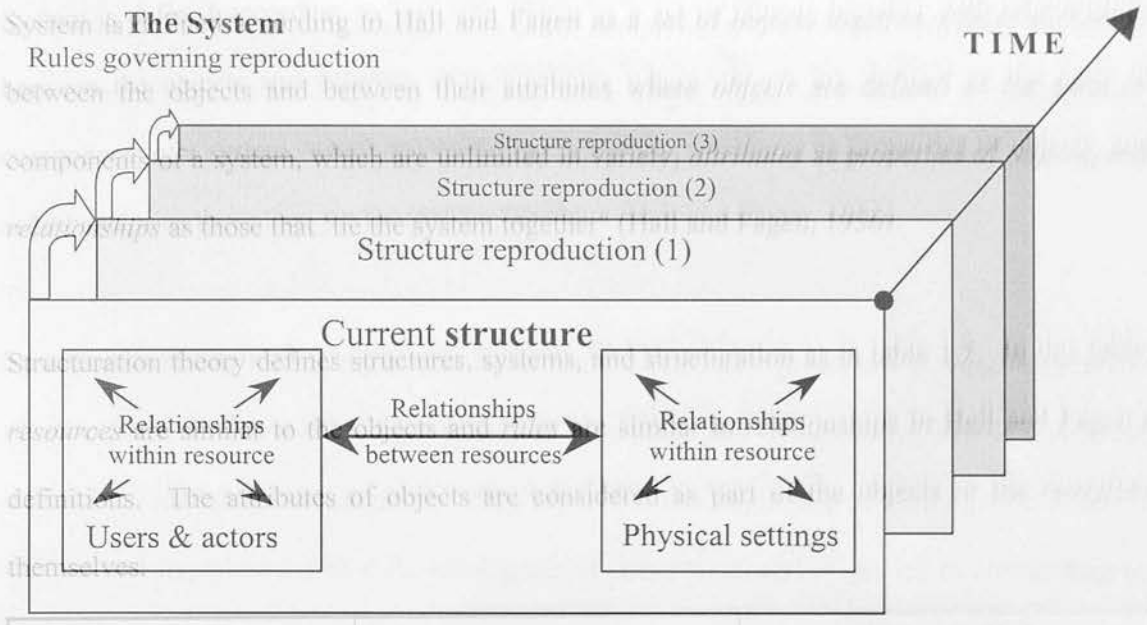

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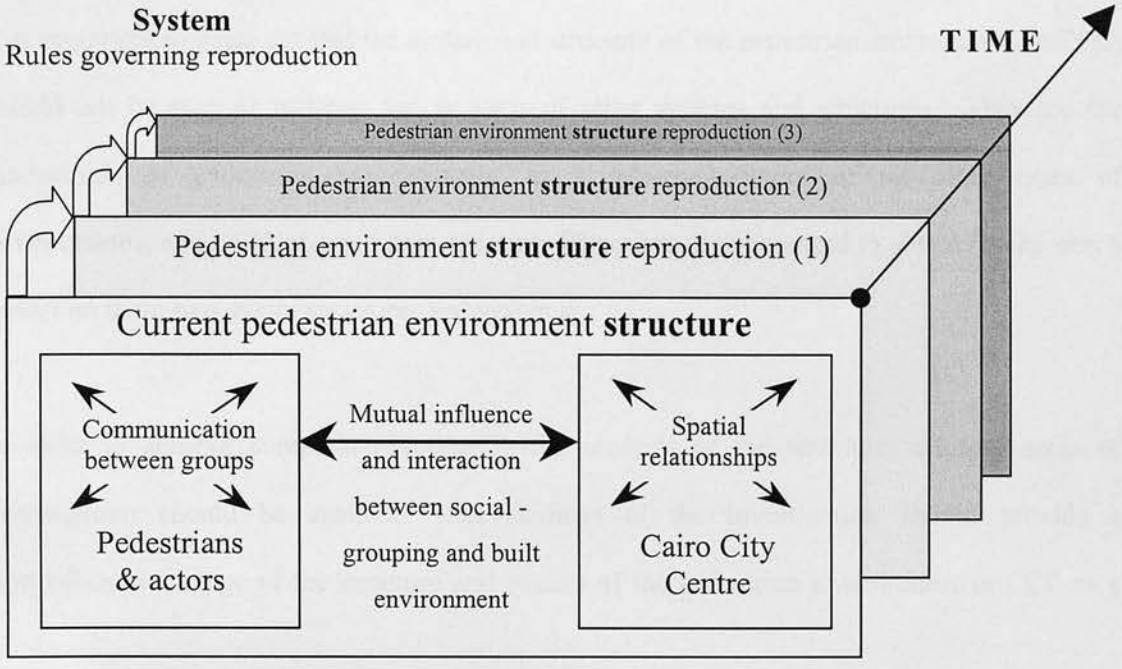


Figure 1.2 - Structure and system of the current case study

1.2.2 The Components of the Comprehensive Inquiry

The current research is interested in the relationships within and between the two resources and the rules of the reproduction process. These relationships and rules could be represented as areas of investigation. Therefore, it is possible to isolate four areas of investigation, and therefore relationships and rules, in the system and structure of the case study. These four areas of investigation represent the components of the comprehensive inquiry and they are:

1) The relationships within the social grouping and their actions, representing social grouping as pedestrians and other actors and the actions of walking and other activities related to walking within the context of Cairo City Centre (CCC).

2) The relationships within the built environment of CCC.

3) The relationships between the pedestrians and other actors and the built environment of CCC.

4) The rules governing the reproduction process of the whole structure over time, which are currently represented by the planning system for the pedestrian environment in CCC.

It is important to point out that the system and structure of the pedestrian environment in CCC, should not be seen as isolated, but as parts of other systems and structures. They are the intersection of pedestrian environments, as a sub-environment of all other types of environments, and CCC, as a sub-area of Cairo. Therefore, it is expected to obtain results which reflect on these two macro structures and systems.

In order to achieve comprehensiveness in the analysis of the structure, all four areas of investigation should be studied. The findings of the investigation should provide a comprehensive image of the structure and system of the pedestrian environment in CCC as a whole.

1.2.3 Research Methods

A suitable research method should focus fully on one of the four areas of investigation and it is acceptable to have some results in other areas. However the reliability and validity of the results in regard to the specific research objectives are important, as are the research limitations. Some research methods can provide thorough results, but they lie outside the research limitations which are listed in the Introduction to this thesis (see page 10).

Table 1.3 lists all methods considered in the selection stage. The table shows the research methods which were excluded in each area of investigation and the reason for excluding them. It lists also the selected research methods and gives a brief account of their limitations (which will be studied in detail in Chapter Four). The methods listed in this table are the main methods that were available from the literature consulted at the start of the study.

Four research methods were selected: questionnaires, cognitive mapping, Space Syntax analysis, and document analysis of planning reports for the pedestrian environment in CCC. These four methods provide various outcomes, and although each one focuses on a specific area of investigation only the total outcome of the four methods could cover the four areas of

investigation comprehensively. The results of each research method will not be restricted to one of the four areas of investigation, but will focus on one of them and produce results on the other modes.

Although a theoretical review of all research methods is included in Chapter Four, a brief account of the focus of each research method at this stage of the research is noted below:

1) The *users' questionnaire* focuses on the relationships within social groupings of people as pedestrians and other actors and their activities related to walking.

2) The *cognitive mapping* focuses on the relationships between the pedestrians and other users on one hand and the built environment of CCC on the other hand.

3) The *Space Syntax analysis* focuses on the spatial relationships within CCC. Although Space Syntax methodology claims the ability to predict the influence of the built environment on the users' behaviour, the research limits the initial function of this analysis only to the spatial analysis of the case study area. The reason for that is that the interpretative vehicle upon which the prediction process depends for verification, is not yet founded for the current case study. However, the use of other research methods should reflect on its foundation in Cairo and especially in CCC.

4) The *document analysis* of planning for the pedestrian environment in CCC, using the critical analysis technique and a discourse analysis agenda, focuses on the reproduction process of the whole structure over time. A complementary *professionals' questionnaire* is also used to investigate the same area. This area of investigation has two main objectives. The first is to evaluate the planning process and the environment in which the reproduction process is taking place. The second is to pin down the major planning actions considered by the reproduction system.

area of investigation	Research Method	Advantages	disadvantages
Relationships within social grouping and their actions	Field observation	* An accurate account of what is really happening. * Researcher interference is minimal.	* Can't give any information about expectations, preference and all other cognitive information. * Needs long time to be spent in the field study area.
	Experiment	* Easy to control and to analyse. * Researcher interference is minimal.	* Provides very limited variety in information, which does not match the exploratory nature of the current research.
	In-depth interview	* Produces huge amount of detailed information.	* Tends to give indication of the personal view rather than the common view. * Requires long periods to secure reasonable sample size. * Analysis of the outcome is difficult and tends to be more subjective. * The researcher's influence is not eliminated from the collection process.
	Questionnaire	* Easy to get reasonable sample within limited time and budget. * In self-completion forms, the researcher is not part of the data collection process. * Relatively easy to analyse.	* Low rate of response and bias in the final sample is always a danger. * In self-completion, comments on the respondents' mode and condition while answering is not available. * Can't ensure that what is written is what is really happening or thought of.
Relationships within the built environments of CCC	Geographical Information Systems (G.I.S.)	* Once built can give accurate, interactive and multi-dimensional information.	* As it is not available for the case study area, building one would require information, cost and technology which are far beyond research limitations.
	Typology-Morphology studies (Conzen, 1960)	* A diachronic study which gives reflections on spatial evolution. * Accounts for other factors like the forces that shaped the space.	* Involves an extensive historical and archival research. * Synchronic results are not quantifiable and are therefore subjective unlike the nature of the built environments.
	Space Syntax (Hillier and Hanson, 1984)	* Relatively easy to build and run. * Produce relatively grounded results based on spatial inter-relationships.	* Difficult to analyse and to interpret the outcome. * Going beyond the mathematical facts of the analysis is mainly speculative.
Relationships between the two resources of structure	Personal Construct Psychology (PCP) (Kelly, 1955)	* Produces huge amount of detailed information.	* Tends to give indication of the personal view rather than the common view. * Requires very long periods to secure reasonable sample size. * The researcher's influence is significant in the collection process.
	Semantic Deferential (Osgood *et. al*, 1975)	* Controlled results which are also easy to understand.	* Very limited in the type and amount of data that could be collected. * Researcher influence is not minimised.
	Cognitive mapping (Lynch, 1960)	* Response could be in text or graphical format. * Easy to analyse and to interpret. * Some of its techniques can ensure minimal researcher influence.	* Respondents tend not to participate in the graphical format task. * Graphical format is only analysed phenomenally and not genetically.
The reproduction process of the structure over time	Questionnaire	AS ABOVE	AS ABOVE
	Document analysis	* Brings an insight of the actual process. * Researcher's interference in data preparation is minimal.	* Difficult to analyse. * Presumes the accuracy of the documents. * Researcher's interference in data analysis is dependent on the method used.
	Cognitive mapping (Eden *et. al*, 1990; 1998)	* Provides clues to the perceptions of the problem. * Researcher's interference in data analysis is minimal.	* More of a personal perspective rather than a real account of the real process. * Researcher's interference in data collection is significant. * Researcher's interference in results' interpretation is significant.

Table 1.3 - Advantages and Disadvantages of the alternative research methods to investigate in each area of investigation.

A close examination of the four methods selected for the investigation shows that among the four research methods,the raw data required for each one of them has differing degrees of uncertainty inherent in it. Space Syntax is the objective method of comprehensively studying its allocated area of investigation. It relies only on a reliable geophysical map, which is then associated with field observations. On the other hand, the threeother research methods rely on sampling techniques of the population which might be restrained by the limitations mentioned in page 10 of this thesis. However, by grounding the other three methodsinto the findings offered through a Space Syntax analysis it is possible to reflect on these other areas of investigation. This suggests considering Space Syntax as the main analysis and the other three methods as complementary.

1.2.4 Lines of Argument

It is possible to define two parallel lines of argument in the current research. The first reflects on the case study and contributes to knowledge on the pedestrian environment in Cairo City Centre. The second reflects on a better understanding of the nature of the comprehensive analysis using the four techniques mentioned earlier. Considering the complexity of presenting both lines of argument at the same time, the strategy for presenting each one of them is described below.

The first line of argument, reflecting on the case study, is presented as the main line through this thesis. This is because it is directly focused on the immediate problems that CCC currently has and provides new knowledge of how the situation can be enhanced. It is also concerned with the more direct results of the empirical work without the sophistication of the theoretical and conceptual aspects embedded in the second line of argument, i.e. within the comprehensive analysis. This sophistication might be in some cases difficult to grasp.

Therefore the second line of argument remains in the background of this thesis until Chapter Nine, where the findings from all four areas of investigation are combined to evaluate the

comprehensive approach and to prepare for the final conclusion of the case study in Chapter Ten. Thisprocess of combination is intended to use a unified framework to which all findings are referred in order to facilitate the comparison process. This framework is proposed in Chapter Two.

1.2.5 Outcome and Value

The outcome of this research should reflect on all three major points of the objectives and should be directed by the research methodology as follows:

1) Decision-making guidelines for the future enhancement of the pedestrian environment in the city centre of Cairo. These guidelines are produced in a general format as weighted categories and subcategories. They are presented in the format of relationships within and between resources and as rules governing the reproduction system of the pedestrian environment in CCC.
2) By covering many aspects of the pedestrian environment in a single case study it is believed that this will develop a better understanding of the nature and characteristics of the pedestrian environment as a system and more specifically about the pedestrian environment in CCC as a structure captured during the research period by the research methodology.
3) No previous research in the field of urban planning was found to have used the comprehensive approach, which this research is adopting. Therefore, the research should point out the feasibility and usefulness of using this approach in this field. This is presented in the shape of reflections on the research methodology and methods.

1.3 SUMMARY

This Chapter reviews the main theoretical research concepts that the current research is built on. The chapter has two main sections. The first considers the general theoretical background of the research and the second the research methodology.

In the first section the main concepts and theories which were useful as theoretical bases for the research and which guided the research through its different stages of development are presented. These concepts, such as the *GST* and *Transformation*, are important for the understanding of any complex situation. This is followed by considerations of *positivism* and *anti-positivism* as research approaches and is extended to the recently developed theory of *structuration*. This short review ends with the proposed model.

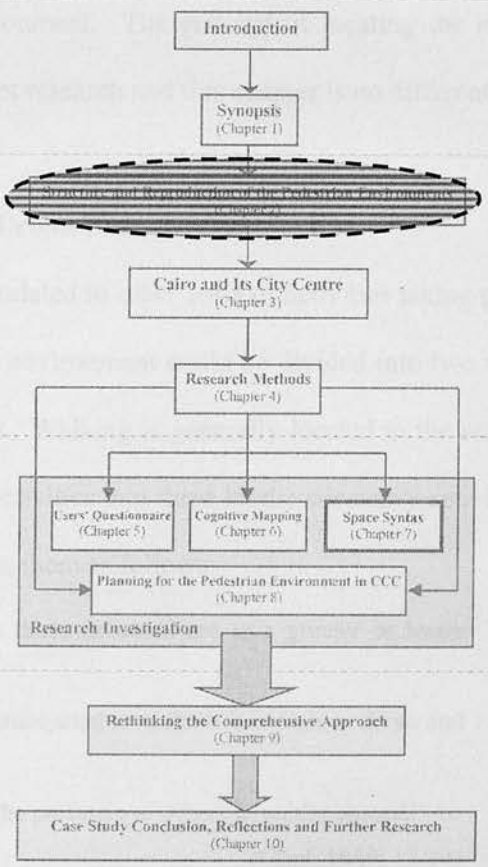
The Chapter, then, moves to defining the research methodology used to study this comprehensive model. Areas of investigation are specified. Research methods available in the field of urban research were reviewed to select the most appropriate methods. A brief account of each method selected is presented.

Part Two

CASE STUDY BACKGROUND

Chapter Two

STRUCTURE AND REPRODUCTION OF THE PEDESTRIAN ENVIRONMENT



INTRODUCTION

This chapter sheds some light on the specific nature of the pedestrian environment as a component of the more global environment, that is the urban environment. A review of the pedestrian environment is one part of the background of the case study. Another part is Cairo and its city centre and this follows in Chapter Three.

2.1 URBAN ENVIRONMENT

The following are some issues which are important to highlight in order to understand the nature of the urban environment in general. An awareness of the main concept of GST (General System Theory) constantly raises the issue of interrelationship between *consequent* levels of systems and *overlapping* or *adjacent* systems.

In the case of this study the relationship between the pedestrian environment and the urban environment is of the former kind, i.e. one of *consequent* levels, with the pedestrian environment being 'included' in the urban environment. The concept of locating the micro within the macro level is in the nature of the current research and this chapter is no different.

2.1.1 Hierarchy of Human Activities in the Urban Environment

It is essential to see how pedestrian movement is related to other sorts of activities taking place in the urban environment. Activities in the urban environment could be divided into two main categories: *indoor* activities and *outdoor* activities. Walking is generally located in the second category (Gehl, 1980). Gehl divides the outdoor activities into three kinds: *necessary* activities; *optional* activities; and *social* activities. He defines them as follows:

> "1- Necessary activities: all activities in which those involved are to a greater or lesser degree required to participate;
> 2- Optional activities: Those pursuits that are participated in if there is a wish to do so and if time and place make it possible;
> 3- Social activities: all activities that depend on the presence of others in public spaces."
>
> (Ghel, 1980: 13-14)

Another classification of outdoor activities was suggested by Rapoport (1987), under the label of *street activities*. This definition is wide enough to include pedestrians and non-pedestrians. The proposed two main categories are: *non-pedestrian movement* and *pedestrian activities*. The latter was further subdivided into two types: *dynamic behaviour* and *static activities*. The difference between these divisions becomes clearer by looking to the terms that he used as a suffix for each one: *movement* vs. *behaviour* vs. *activities*. *Non-pedestrian movement* is thus a label for both mechanical movement and the human activity of driving. *Pedestrian activity* is broader than behaviour and contains both *dynamic* and *static* forms of participation. It is apparent that walking is located in the first subdivision of pedestrian activity that is dynamic activity whereas sitting is an example of static activity. Rapoport comments on dynamic activity as being "comparatively constant in nature... Culture only influences how acceptable walking is, who walks, where, when, how fast and with whom" (Rapoport, 1987: 83). That means that the very basic characteristics of walking are common among various cultures.

2.1.2 Definition of Urban Public Space

One must be very careful when dealing with general terms such as *space*. It is usually used in various contexts. It has been used without a clear definition in respect to each research specific context as if its meaning is universally accepted and is a confusion-free definition. If only one reference source such as the Oxford English Dictionary (1993) is referred to in order to find out how it defines space, 19 different meanings of space can be found. These meanings include: a "continuous expanse in which things exist and move", an "amount of this taken by a particular thing or available for particular purpose", and an "interval between points or objects". In the Concise Oxford Dictionary (1999), the term space is defined as "a continuous area or expanse which is free or unoccupied". Madanipour (1996) explores the meanings used for *space* and how these emerge from different attitudes. Through his exploration, he found many contradictions when dealing with *space,* such as *absolute* and *relational* space.

Defining the term *public* is another difficult task to achieve in order to reach a specific and clear concept of the setting before hand. According to the Oxford English Dictionary (1993), the term *public* means, "in general, and in most of the senses, opposite to private". In the Concise Oxford Dictionary (1999), the definitions include "of, concerning, or open to the people as a whole"; "involved in the affairs of the community, especially in government or entertainment". It is also defined as "done, perceived, or existing in open view" and "of or provided by the state rather than an independent, commercial company".

Carr *et al.*'s definition of *public space* is "the common ground where people carry out the functional and ritual activities that bind a community, whether in the normal routines of daily life or periodic festivities... [It is] the stage upon which the drama of communal life unfolds" (Carr *et al.*, 1992: xi, 3).

Walzer says that *public space* is the "space we share with strangers, people who aren't our relatives, friends, or work associates. It is space for politics, religion, commerce, sport; space for peaceful coexistence and impersonal encounter" (1986: 470). Tibbalds defines it as, "all the parts of the urban fabric to which the public have physical and visual access. Thus, it extends from the streets, parks and squares of a town or city into the buildings which enclose and line them" (1992: 1).

The current study proposes a simpler definition of *urban public space* and which takes in account the two basic aspects of the raw definitions of the two words *urban* and *public* and considering *space* as a common factor. *Urban space* is then any void between the solids of the urban built environment. *Public space* is then the void which offers unrestricted accessibility to all humans in a society. Therefore, *urban public space* is the resulting intersection between these two types of spaces.

2.1.3 Human Needs in Space

Many scholars have dealt with human needs in general. Maslow's theory is one of the most general and comprehensive theories on human needs (Maslow, 1970). Maslow suggests that the

human being is placed in the highest link of the evolutionary chain of animals. He differentiates human beings from lower animals by the capability of learning that makes them aware of the opportunities and the constraints of the situation they are in. Therefore they are able to decide which alternatives to choose. This ability complicates the humans' needs and desires and their attitudes towards meeting a specific condition. He also believes that there is a natural categorisation of human needs which raises the amount of needs in a hierarchical pattern, starting from the physical needs at the lower level to self-actualisation at the top, as seen in figure 2.1 Maslow discusses the human needs in general and he believes that no one would demand satisfaction of a certain level unless the preceding, lower levels are satisfied. However, it could be criticised for its generalisation of human needs across cultures.

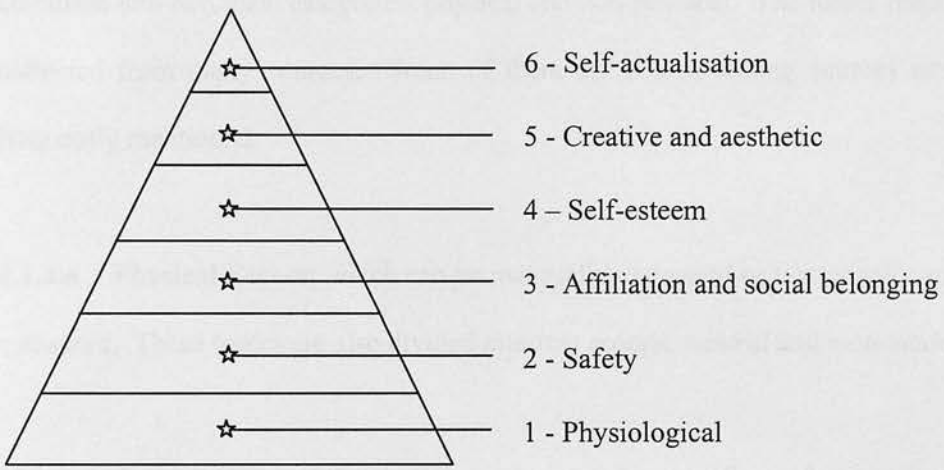


Figure 2.1 – Maslow's triangle of needs
Source: Reconstructed from Maslow (1970).

On a more specific line of argument, Stephen Carr and others discuss the human needs in urban public spaces (Carr *et al.*, 1992). They divide the *human needs* in an urban public space into *immediate* needs and *long-range* needs or purposes. They think that the purpose for going to a space, eventually, becomes a need in itself. Immediate needs include the need to drink or eat; long-rang purposes include the need for change. According to Carr and his work group, the *purposes* of going to a public space are in general: comfort, relaxation, passive engagement with the environment, active engagement with the environment and discovery (ibid.).

Carr *et al.* (1992) also mention the human *rights* in space, defined as what the users of a pubic space require and which result in more interaction between the people and the spaces they occupy. These rights include *access* (including three types of accessibility: physical access, visual access, symbolic access), *freedom of action*, *claim*, *change and ownership* and *disposition*.

2.1.4 Forces Shaping Urban Public Life and Space

To have a comprehensive understanding of the nature of urban public space, it is essential to discuss the forces that affect and therefore shape that space. In general, these forces can be classified into two main categories: physical and non-physical. The forces mentioned below are collected from many sources. Some of them are shared among sources and some are less frequently mentioned.

2.1.4.a Physical Forces: which can be materially expressed or numerically and quantitatively measured. These forces are also divided into two groups: *natural* and *man-made* forces.

Natural physical forces: defined as those forces exist regardless of man existence or activity. They include:

- *Topography*. This affects directly the shape of the built environment and indirectly the activities that can take place and how they can be performed;
- *Geology*. This rarely affects the individual urban space. Rather it affects the whole settlement for being the medium for plantation and other soil dependent properties; and
- *Climate*. Unlike topography this directly affects the activities and indirectly the shape of the space and its surroundings as a reflection of the environmental control.

Man-made environment forces: defined as those forces exist as a direct or indirect result of human activity. They include:

- *Surrounding structures*. These affect both the visual enclosure and the appropriateness of located activities that use the space. Also it may be instructive to discuss whether they actively interact with the space or use it only as means of enclosure;
- *Movement arteries*. The relation between these and space is recognised by Frey as *Path* and *goal* (cited in Norberg-Schulz, 1971). Kevin Lynch defines paths as "the channels along which the observer customarily, occasionally, or potentially merges" (Lynch, 1960: 47). Visually they affect the space by determining fixed opening points in the enclosure of the space or opening vistas to another target. Functionally they work as exchange points. They determine the previous and the following spaces in the life experience of the user. The kind of movement is also an important factor, whether it is pedestrian, vehicular or mixed;
- *Secondary landscape elements*. These are the physical elements that are not considered as the main enclosing elements of the space. Rather they are complementary elements that help the space to work properly in both visual and functional aspects;
- *Landform*. This is the final shape of the space floor whether it is shaped according to topographical forces or to other design reasons;
- *Pollution*. all kinds of air pollution affect the space functionally, but there is also the visual pollution that affects the space visually. Sometime visual pollution makes it uncomfortable to spend time in a space;
- *Infrastructure*. As a man-made element this does not affect the space visually unless there is a link between the surface of the ground and what is below, such as the ventilation openings for the underground tunnels, or exit and entrance points. On the other hand it directly affects some functional aspects of space by deciding what and how the exchange between below and above the ground takes place;
- *Technology*. This simply sets out what can be accomplished and what cannot be in a particular context; and
- *Community size and heterogeneity*. Both visual and functional aspects are affected by the physical size of the community.

2.1.4.b Non-physical Forces: A wide range of forces fits under this category. In many instances, the social life can not be separated from the economic. Although some forces such as Religion can be only categorised as social forces, others, for instance the political forces include both economic and social factors. Because of that, this heading includes forces that involve both social and economic life.

Social values: These could be defined as the shared values among a society. They determine who is going to contribute to the public social life and how. Society is naturally divided into several social, religious and ethnic groups each with different attitudes towards their public life.

Symbolic: These forces come mainly from a cultural background. They develop out of the meaning held by the people for the physical settings of the built environment and the rituals that occur in public.

Religious: Generally in the contemporary societies, these rarely affect the general visual appearance of the space, rather they determine the existence of the space itself, what functions are there and, to an extent, who occupies the space and when. The presence of the religious institutions, like the temple, the church and the mosque, in a public space is a dominant feature of most of urban communities.

Political: In many cases it is the main director of the community instead of any other socio-economic forces. It strongly affects the function of the urban public space as a gathering place. It was also the reason behind initiating some activities in the urban space like the parade spaces in Moscow and in many totalitarian countries.

Economic: In contemporary societies, this might be the strongest factor affecting the overall shape of people's lives, and not only the urban space. Visually it affects the whole appearance of the space, its surroundings and landscape elements. Functionally, it affects the availability

and accessibility of the public space and the priorities for its development and maintenance. Carr *et al.* stress, "unless there is a commitment to obtain spaces and maintain them by the authority, the public life is highly threatened" (1992: 36). Krier agrees that the main element affecting the public urban space is the economic factor decided by the cost and benefits of the investors (1979).

2.2 PEDESTRIAN ENVIRONMENT

The following review reflects on walking and pedestrian movement as discussed in literature on urban planning and design and in transportation planning literature.

2.2.1 Characteristics of Walking

Since walking is considered a means of transportation, it is expected to have characteristics mutual to all other modes of transportation, at least in their most general profiles. The characteristics of walking which are borrowed from or shared with other transportation modes are cited below. They are all mentioned in the literature (Hass-Klue, 1988, 1990; Untermann, 1984; Hillman, 1979; Pushkarev, 1975).

- **Purpose of journeys:** These can be divided into two main categories: walking as a mean of transportation to reach certain destinations, and this includes going to work, school, shopping, visiting etc.; and walking as an aim in itself, and this includes: enhancing health, relaxation, passing the time, socialising etc. Most studies do not make such a subdivision but it is important to put it this way to reflect on the fact of the street being both a *link* and a *place*. In other words, pedestrians using the street as a means to reach other activities or as a location for activity in itself.

- **Distance:** There is much research work on the effect of distance on people's decision to walk. Pushkarev (1975), investigating the distance people will choose to walk in the same environmental conditions but for different purposes, found that this differs from one purpose

to the other with restaurants generating the longest walks and suburban dwellings the shortest. A more recent study discusses the average distance that could be walked within the physical capability of the human being (Hillman, 1979). Untermann studied some properties that would affect the distance one is willing to walk (Untermann, 1984). Others deal with distance from a different point of view, the perceptual distance. That means that distance can be perceived as being longer or shorter than it really is, and this affects the perceiver's decision or ability to make the trip and to which extent they would walk (Lee, 1970). Lee found that journeys in the direction of the city centre are perceived to be shorter than they really are.

- **Speed:** Untermann's work (1984) suggests that the speed of pedestrian movement affects the decision to walk, much as, the speed of motor cars affects the decision to drive to a destination. Untermann says that there are four main factors affecting the pedestrian speed: pedestrian density, number of crossing intersections, topography and purpose of the journey.

- **Trip itinerary:** There is little research on pedestrian movement in general, and a small portion of this researches how people choose their route from the place of origin to a specific destination. One research (Marchand, 1974) is of special interest because it used cognitive mapping as a research method and its results reflect on Space Syntax methodology. Marchand's research was based on a study in France and looked at the routes people chose to arrive at a Metro station. His main aim was to re-use cognitive mapping as proposed by Kevin Lynch (1960) but with a different approach. What Marchand proposed was an approach to obtain quantitative results from the method instead of the qualitative results that Lynch and his followers sought. The main elements of the study were a survey and a mathematical model to analyse the results.

The survey itself contained three questions, asking for: (1) the pedestrian's address; (2) a detailed description of their itinerary from home to the station; (3) a map of St. Maur (the area under study) to be drawn on a 20 x 20 centimetres square, which required the location of a

particular set of six widely known landmarks in the area. There were some differences between Marchand's and Lynch's maps. Marchand's were poor and contained less information than Lynch's, but they could be readily quantified. The main difference lies in the imposition of six landmarks compared to the open-ended elements that Lynch's subjects could have identified.

Marchand's main results came in the form of three categories: (1) some hypothetical suggestions of pedestrian perception; (2) some theoretical properties of what could constitute 'mental space', and (3) a few insights into pedestrian behaviour observed through itinerary mapping and flow counting. He considered the first two to be "partly hypothetical". Since the results of the first two parts depended mainly on the maps drawn by the subjects, Marchand admitted that he suspected the unreliability of generalising his results. He said:

> "A basic problem appears here: do the surveys represent the true mental space or do people deform their mental image to put it in to some standardised form on the paper? The latter is probably the case: correlation is not powerful enough, here, to go beyond the appearances."
>
> (Marchand, 1974: 500)

So it was found more reliable to see only the third part in a few details[1]. He cited that:

> "The pedestrian chooses his itinerary according to three definite laws: First, he walks directly to the closest main axis. Then he follows it straight ahead, even if this axis is neither the shortest way, nor the most agreeable, nor the safest... Third he anticipates his changes in direction a long time beforehand by carefully choosing the correct curb."
>
> (Marchand, 1974: 506)

There are two interesting comments by Marchand on this behaviour. The first is that the pedestrian prefers the main axis because he enjoys not having to make any further itinerary choice. The second is that the pedestrian does not behave as a user of a specific means of transportation - which is walking - that has special characteristics, but rather as a car driver forced to walk. There is an important point that should be taken into consideration when looking at Marchand's experiment. This is the very specific sample that generated his findings:

[1]For the first part he found that: (1) there is a tendency to symmetrisation; and (2) there is a differential perception of distance according to two factors: The mode of transportation and the neighbourhood effect. And for the second part he found three properties of mental space: (1) One point property: $Dij = 0$ with $i \neq j$ under a certain threshold; (2) Two points property: $Dij \neq Dji$ and (3) Three Points property: not always $Dij \leq Dik + Dkj$

a specific social group in a *suburban* area with a specific *trip purpose* - rushing to catch the subway to go to work - in a *daily* manner repeated for a *long time*.

2.2.2 Pedestrian Movement in Transportation Planning Literature

Literature in transportation planning suggests that *time* and *distance* are important factors affecting pedestrian movement. Seneviratne (1985) says that pedestrians in central areas have a main objective and that is to save time by *minimising the distance* they walk. Säisä & Gärling (1987) asked subjects to simulate trip planning in locations familiar to them. It was found that, in sequential route choices, people tended to minimise the total distance of their trip rather than to minimise the distance of the next destination. Again, Gärling & Gärling (1988) found that shoppers in multi-destination trips use the tactic of globally minimising the distance by first visiting the furthest location, as the number of objects they carry increases with the number of places visited. Although the tactic of locally minimising the distance was frequent, the global minimisation was clearer. Khisty (1990) pointed out the pedestrian need to minimise travel *distance* as a major goal, and discussed the effect of *road network pattern*.

Virkler (1998) considered more the effect of *time loss at intersections*, but did not consider change of direction specifically; a pedestrian will save time, Virkler suggests, by changing direction to avoid busy intersections. By doing so they will be closer to their objective, i.e. to save time, but even though longer total trip distance will result from their choice of orthogonal vectors replacing the more direct vectors. Lorch & Smith (1993) demonstrated how shoppers are affected by the existence of shopping malls, as these represent the *dernier cri* of distance minimisation by grouping maximum variety into one building and offering adjacent parking spaces.

It is to be expected that distance will affect a person's sequential route choices. Borgers and Timmermans (1986), in their advanced model of pedestrian movement, found that route planning developed from three steps: *destination choice*, *route choice*, and *impulse stops*. The first depends partially on the total floor area of the uses located on each destination street and

partially on their distance from the point of origin; *route choice* depends on minimising the distance; and *impulse stops* depend on both the destination and the route choice, combined with other variables. Hanson (1980) refines the distance minimisation variable into effort minimisation to account other factors such as change in topography within the same distance.

It has been noticed that, in a setting analysis, there are many factors that appear to be affecting a behavioural phenomena but which in fact are in turn the result of other, more independent factors. For a factor to be independent it must have the ability to change the settings regardless of other factors. That difference can be explained by looking to the six factors deduced by Seneviratne (1985) affecting acceptable walking distances. They are *trip type*; *trip purpose*; *age and gender of the pedestrian*; *geographic location*; *time of day*; and *cost of parking*. Changing the geographical location (even according to Seneviratne's findings) does affect the walking distance but only due to differences in land use patterns. This implies that land use patterns should be considered as the factor, rather than the geographical location. Another example might be the preference for walking on the sunny or shaded side of the street. It is a factor dependent on the independent factor of the overall weather condition of the setting. The sunny side is considered as a positive in cold weather conditions such as Edinburgh, but as a negative in the hot weather conditions of Cairo.

Within independent factors related to the built environment, further examples could be found, for instance, the effect of the *geometry* and *appearance* of the urban form in shaping pedestrian movement patterns (Wright, 1985; Zacharias, 1997). Ciolek (1978) also pointed out the importance of *number of changes in direction* in shaping movement patterns, specifically that pedestrians try to avoid a route that contains sudden or abrupt changes in direction, such as in parking lots. The *size of the city* is also a factor affecting pedestrian behaviour (Walmesley and Lewis, 1989), and *location of services* was studied individually but not as part of an overall model (Zacharias, 1995).

2.2.3 Factors Affecting Pedestrian Movement in Urban Planning Literature

An interesting approach into studying the factors affecting environment-human interaction is the concept of cost-benefit. This approach depends on the feasibility study basics, meaning that, for anyone to take any decision, they will evaluate the cost and benefit in regard to every factor involved and affecting the considered action or decision. This approach was not proposed to be a standard method, but was used by Pushkarev to study some factors affecting pedestrian movement (Pushkarev, 1975).

Literature generally divides the factors affecting pedestrian movement into physical and social-grouping. Further divisions might be confusing and misleading, as the factors in many cases are complex and intersecting. The importance of these factors is investigated in the questionnaires with the users in Chapter Five and the professionals in Chapter Eight. However, the findings are not expected to be in the form of absolute values, but rather as a grouping of factors sharing similar levels of importance.

2.2.4 Resources of Pedestrian Environment (Environmental Structural Considerations)

Having reviewed the above general concepts of the pedestrian environment, this section aims to conclude with a more detailed definition of the main *resources* involved in this environment as a structure and which was mentioned briefly in Chapter One. The two resources of this environment are the *built environment* and the *social-grouping*. Each one of these two resources could be categorised into two main categories and which are further sub-categorised into minor categories which this research calls the Environmental Structural Considerations (ESC).

The research, from its outset, and following the multi-disciplinary approach which is a general theme of the study, borrows a classification of *'components of imageability'* which was established by Harrison and Howard (1972). Although their study considered why people tend to remember different parts of the city better than others, but because of its open ended quality, it defined an extensive variety of components of the environment. This variety seems to cover

most aspects of the two major components of the environment (*components* in Harrison *et al.* study's terms and *resources* according to the current study's terms).

The components of Harrison *et al.*'s (1972) study are listed in table 2.1. However, neither the categories nor the definitions as Harrison *et al.* defined them are dealt with as 'taken for granted'. The categories and their definitions will be modified to suit the terms of this research. The amended list and definitions are included in Appendix A. This will be referred to throughout the research as the Environmental Structural Considerations (ESC) and will be used after being refined according to the findings of the case study starting from Chapter Five.

Main Category	Sub-category	Minor category
Physical Components	Location	Aerial Location - Spatial Relationships – Prominence - Scope - Activity - Associated Features - Signs and Markers.
	Appearance	Age – Size – Colour – Design – Shape, Pattern, and Form – Construction Materials - Condition, Upkeep, and landscaping - General Visual Appeal - Other Factors Related to Appearance.
Cultural Components	Meaning	Economic – Political and Social – Religious and Ethnic - Historical - Functional - Non-functional – General Significance – Convenience and Welfare - Other Factors Related to Meaning.
	Association	Affinity - Familiarity – Atmosphere.

Table 2.1 – The starting categories of resources involved in the pedestrian environment.
Source: Constructed from text on components of imageability (Harrison *et al.*, 1972).

The first amendment to this list is the renaming of the first level of categorisation, or the main categories of *physical* and *cultural* to be *built environment* and *social-grouping*. That is to reflect on the research initial argument of the continuous interaction between physical and non-physical and that the division might lie between the built environment that professionals design and how the social-grouping interact it. Natural environment is internalised in both of them either as an adaptation in the social grouping or as environmental treatment in the built environment.

Although, this division was the starting point, but as mentioned in sub-section 1.2.1 when defining the components of the comprehensive analysis, it is just to reflect on the focus of each investigation area either the built environment or the social grouping. The subcategory and the

minor categories are only to be examined against the results of the investigation as a flexible framework which will serve as a scale for comparing the results of three investigation areas, questionnaire, cognitive mapping and Space Syntax in Chapter Nine.

2.3 UNDERSTANDING PUBLIC POLICY

Public policy is the main governor of the production of the urban environment. This section briefly describes the main theoretical issues involved in the production and reproduction of environments in which public policy plays a role.

2.3.1 Definition

Public policy is defined, according to Dye (1992), as whatever the governments choose to do or not to do. Another definition, proposed by Hall and Jenkins (1995), states that, for a policy to be regarded as public policy, at the very least it must have been processed, even if only ratified, by public agencies. This suggests that the public policy should not always be developed solely by a public agency, thus defining any concepts or proposals for a policy by any private agency as public policy if it was only authorised by the government (Hogwood and Gunn, 1984). In this context urban planning and management proposals could be seen as part of public policy so long as they have been, at least, approved by a public agency.

It should be pointed out here that, in the interests of the current research, 'public agency' is not meant to infer any political status but any body of an administrative and institutional character that forms a part of either the central or local government. Also, in this context, the role of the private sector is not ignored but its actions are considered to be either promoted or prohibited by public policy.

2.3.2 Stages of policy process

The planning process is divided into four stages arranged to form a continuous process (Attia, 1999). These stages, without reference to their order, are: *problem identification*, *policy formulation*, *policy implementation*, and *policy evaluation* (see figure 2.2). In the research

conducted by Attia (1999), problem identification was considered as the starting stage of the whole process until reaching the stage of policy evaluation, which should lead back to the problem identification stage again, but of course this is no longer the same problem. Thus the evaluation stage should lead again to problem identification together with any emerging conditions or problems and so on.

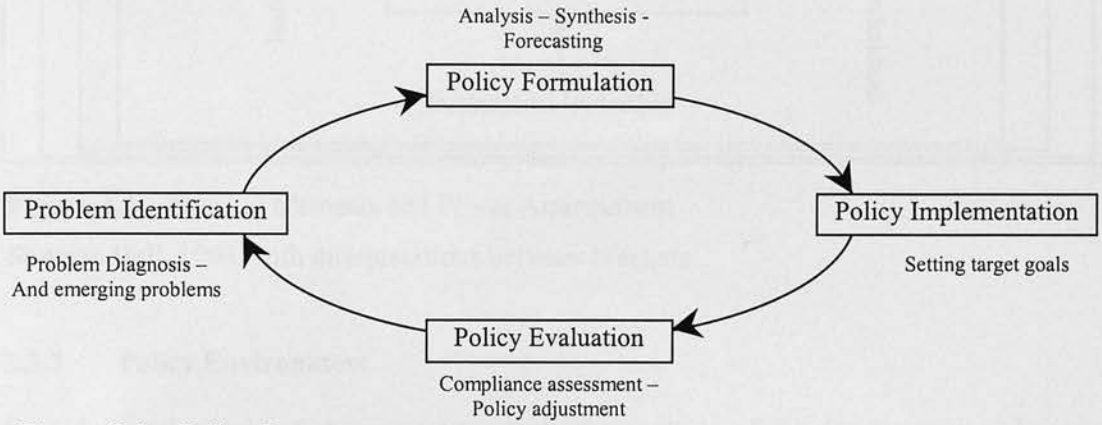


Figure 2.2 – Policy Process.
Source: Attia, 1999.

Although Hall *et al.*'s (1994) model of elements shaping the policy environment - in which the policy making process takes place – is in the discourse of tourism, the same elements could be found in urban planning such as is the context of this research. Hall cites four elements of influence which directly affect the specific policy issues in the policy-making arena. These elements are: *institutional leadership*; *significant individuals*; *institutional arrangement*; and *interest groups*. He also acknowledges the existence of broader elements which indirectly affect the process, in other words the elements of the environment in which the policy process arena exists. These elements are: *power* arrangement; *values* (personal, cultural, social, economic, etc.) and institutional *arrangement*.

For Hall the specific policy issues have the same four stages that are mentioned in the previous model of policy process, but he uses different terms. Starting with the first stage, the policy process consists of: *demands* (or inputs); *decisions*; *outputs*; and finally *outcomes*. Figure 2.3 illustrates the main concepts included in Hall *et al.*'s model.

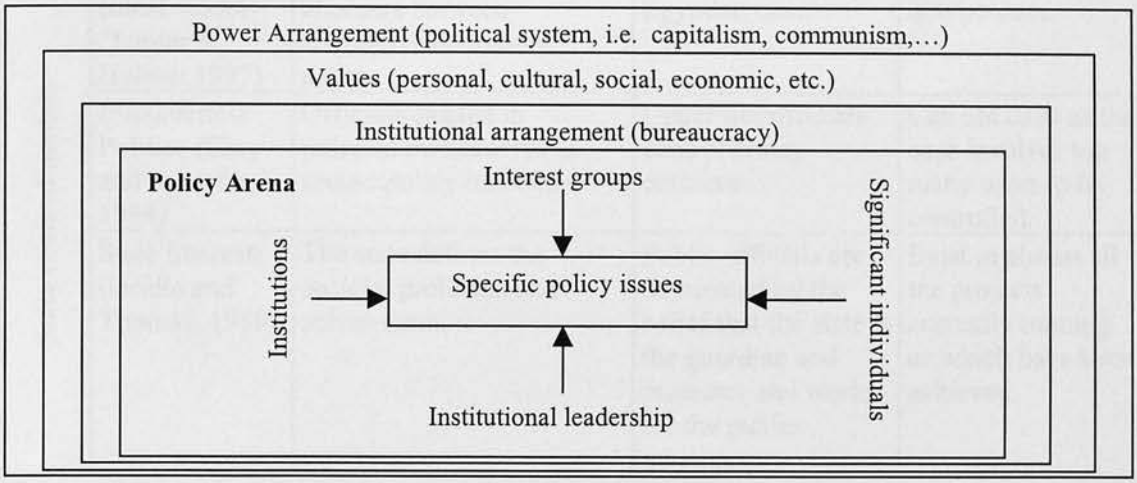


Figure 2.3 – Political Elements and Power Arrangement.

Source: Hall, 1994, with interpretations between brackets.

2.3.3 Policy Environment

Considering the scale of the current research, the analysis of this environment only aims at explaining the lower two levels of its elements, these being *values* and *institutional arrangements*. A classification of different types of values involved in policy process was included in Attia's (1999) study of the NWC (Northwest Coast) of Egypt. In this, Attia measures the relevance of these values to the Egyptian context. His classification is arranged in table 2.2 with an added column of 'Relevance to CCC' (Cairo City Centre).

	The model	Model description	Relevance to NWC	Relevance to CCC
Society centred models	Social class (Attia, 1999)	Policy is an instrument of domination used by the ruling class.	Public institutions utilised policy to gain access to land ownership.	Not relevant.
	Pluralism (ideal model) (Atkenson and Moon, 1994)	Policy decisions are reached through bargaining, negotiation and compromise where it is assumed that power is diffused through society.	No relevance to the Egyptian case.	Too ideal to be put into practice.
	Public choice (Buchanan, 1986)	Individuals seeking special advantage through public policy.	Several examples can be found in the NWC.	Exist at two scales: 1) Shop owners. 2) Investors in adjacent districts

State centred models	Rational Actor (ideal model) (Turner & Hulme, 1997)	Actors are rational choosers between alternative courses of action.	No relevance to the Egyptian case.	Too ideal to be put into practice.
	Bureaucratic Politics (Clay and Schaffer, 1984)	Officials engage in political manoeuvres to secure policy outcomes.	Upper tier officials control policy outcomes.	Can not exist as the case involves too many users to be controlled.
	State Interests (Gridle and Thomas, 1989)	The state defines the societal problems and solves them.	Public officials are dominated by the belief that the state is the guardian and protector and works for the public interest.	Exist in almost all the projects currently running or which have been achieved.

Table 2.2 – Models for Explaining Policy Behaviour Referring to the Policy of NWC, Egypt and CCC.

Source: NWC, Egypt (Attia, 1999) and CCC (the author).

2.3.4 Policy Making and Problem Solving Attitudes

According to Ackoff (1974) there are four main streams of attitude among managers and administrators. Each attitude differs in the way it handles the situation and decides what to do or not to do. These attitudes are *inactivist*, *reactivist*, *preactivist*, and *interactivist*. Islami summarises the main variables defining each of these attitudes (see table 2.3).

Attitudes	Orientation	Objectives	Management	Research	Policy	Problem solving	Characteristics
Interactivist	Idealiser	Development	Radical	Qualitative	Revolutionary	Problem Dissolver	Creation
Preactivist	Optimiser	Growth	Liberal	Quantitative	Reformer	Problem Solver	Exploitation
Reactivist	Remedial	Revival	Reactionary	Qualitative	Clinical Manager	Problem Resolver	Re-creation
Inactivist	Satisficer	Survival	Conservative	Quantitative	Crisis Manager	Problem Absolver	Conservation

Table 2.3 - Different attitudes of the managers suggested by Ackoff (1974) and Ackoff *e. al.* (1984)

Source: Islami, 1998.

Despite the excessive detailing of these divisions and the differentiation between them which relies mainly on language derivatives, the four categories are also practically different. Nevertheless, it is quite impractical to think of any real life situation or decision making arena as being described with only one of them.

2.3.5 Problem Solving Attitudes or Decision Making Attitudes

By looking to the last two subsections of policy process stages and problem solving attitudes (reactivist and inactivest), it is possible to see a link between them. This link explains how the latter could be explained in the light of the general rule of the former. The start of such a finding is in the search to locate the starting stage of each of the four attitudes.

- **Reactivists** start from the *problem identification* stage;
- **Preactivists** start from stating an objective for growth, thus they start from the *policy formulation* stage which will lead them to achieve their future aim; and
- **Interactivists** start from analysing the resources they have and consider them as the potentials for and constrains of development projecting the problems that might occur in the future and prevent them from happening, thus they start from the *evaluation* stage.

On these grounds, inactivists can be described as being another level of the reactivists. Although inactivists follow the same procedure by starting from problem identification stage, they have more tolerance for the problem to occur and to develop into a crisis. Also they try to give the minimum effort possible to make the situation bearable, but not to reverse it to prevent the problem from recurring, as the reactivists would aim to. This analysis also leads to the expectation of the existence of other levels of decision-making attitudes taking the major three distinctions of interactivist, reactivist and preactivist as a starting level for each attitude.

Another point arises from the comparison of the concepts of policy process stages and decision-making attitudes, that is the expectation of another attitude that takes the stage of implementation as its starting point. Rationally this does not seem possible, as it is generally agreed that in order for the human being to act, he or she must be prompted by a rational objective directing the physical self to act. Although the time needed for this thinking might be reduced to minimum, as in involuntary self-defence reactions, it will never be reduced to nothing. This would suggest that no decision-making attitude can emerge from the implementation stage. The author thus argues that all policy actions emerge from a definable objective and can not be attributed to purely random acts of purposeless implementations.

2.3.6 Understanding Urban Public Policy: the Urban Reproduction System

Borrowing the definition of 'public' from sub-section 3.1.2, and in the context of policy and public policy that is explored in subsections 2.3.1 to 2.3.5, an understanding of what 'urban public policy' means can now be proposed.

People must be involved in one or more of the stages of the whole policy process (identification – formulation – implementation – evaluation). Sometimes they are involved in the evaluation stage, but more rarely in the identification process. Moreover, they are hardly ever involved in the formulation or the implementation stages (Islami, 1998).

The government, and therefore any agency related to it, always dominates the formulation stage. Most of the time it enacts identification in isolation from its public; sometimes it tries to involve the public in the evaluation as a democracy procedure show, and finally implementation involving other agencies takes place. To the extent that the power is intensified in central government, public participation in the public policy process will occur (Castells, 1978). Just when the power of decision-making is defused through the society, the public policy could be really representing the public.

However, practice suggests that, even when the right to involve (representing the diffusion of power) the public in the decision making in regard to public policies, not all those involved are willing to contribute. So, can the result of this process be considered as public policy? The extreme example of people's participation in decision-making in public policy is that used in Australia and Switzerland, countries that fine those who do not vote in public elections, yet even this extreme measure does not guarantee that everyone will contribute. It is then enough for the purpose of urban management decision-making to allow all those who wish to do so to take part in the processes of problem identification, policy formulation and policy evaluation.

2.4 ANALYSES OF PEDESTRIAN ENVIRONMENT IN PREVIOUS STUDIES

Several studies can be found in relation to the analysis of pedestrian environment in various parts of the world. Some of them are academic such as Mabaila (1998); others are more practical and are design and policy oriented such as Wallace *et al.* (1998, 1997). The examples from both backgrounds show some limitations with respect to the generality of the methodology used in their analyses. Academic research tends to search in what data is already available and uses this resource to derive suitable research methods for the specific research conditions. Although Mabaila has studied the planning procedure and user opinion, she has not studied the interaction between the built environment and the users and their interactions within the built environment, in other words the spatial configuration.

On the other hand, research which is generated from a practical background, with policy and design orientations, seems to lack a theoretical background and in many cases is overloaded with practicality and emphasis on the design stage more than the analysis stage. Being more design oriented, these researchers use many more universal concepts rather than searching for the concepts emerging from their own context. For example in the Massachusetts pedestrian transportation plan (Wallace *et al.*, 1998; 1997), the study started by asking a leading question through presenting a proposal which was then open to public review and comments.

It could be argued that the investigation of public opinion before putting forward the proposal is important, as the approach would otherwise lead to content-loaded answers from the respondents, i.e. highly influenced by what is offered in the proposal and not the real problems. However research generated from a practical background is, in principles, sensitive to the reproduction system of the environment. Yet, this sensitiveness might lead the analysis to rest on more tangible information (such as a physical description of the site, demographic and statistical data, and other functional properties of the context) than the cultural, social and other intangible aspects of the environment.

However both fields of research into the pedestrian environment hold useful guidance for the current research. For example the academic research (Reid, 1995; Mabaila, 1998) provides a solid base for the importance of investigating the pedestrian environment by reviewing existing literature. It also provides guidance for two aspects of the investigation, into involved social groups and into the reproduction procedure of the whole environment represented in the planning system.

The comprehensive approach as defined by Wallace *et al.* (1997), which combines the physical approach and the behavioural approach, was one of the initiators to search for a solid base for comprehensiveness. Their approach provides a useful framework for the real life problems. For instance, it helps to build a better understanding of the changes sought either by the users or by the professionals. A most important contribution of such research is the classification of categories of actions, which are considered as rules or policies aimed at reproducing the urban system needed for implementing the plan. Wallace *et al.* mentioned that the types of required actions fall into one of six categories:

1. **Co-ordination/Implementation** refers to communication among agencies and organisations that have roles to play.
2. **Planning** refers to developing data, priorities, and plans to provide a foundation for projects and programmes.
3. **Engineering** refers to physical and land use improvements.
4. **Encouragement** refers to actions to promote walking.
5. **Education** involves both professional training and public safety education.
6. **Enforcement** refers to improving adherence to regulations that apply to both vehicle operators and pedestrians.

(Wallace *et. al*, 1998: p 10-1).

These categories will be referred to throughout this research as the Environmental Reproduction Actions (ERA) and are open to modification according to the specific nature of the responses and findings. The categories and their definitions are not taken for granted but will be modified to suit the terms of this research. The amended list and definitions are included in Appendix A. They are used in the assessment of the compatibility between the four areas of investigation that are identified in sub-sections 1.2.2 and 1.2.3.

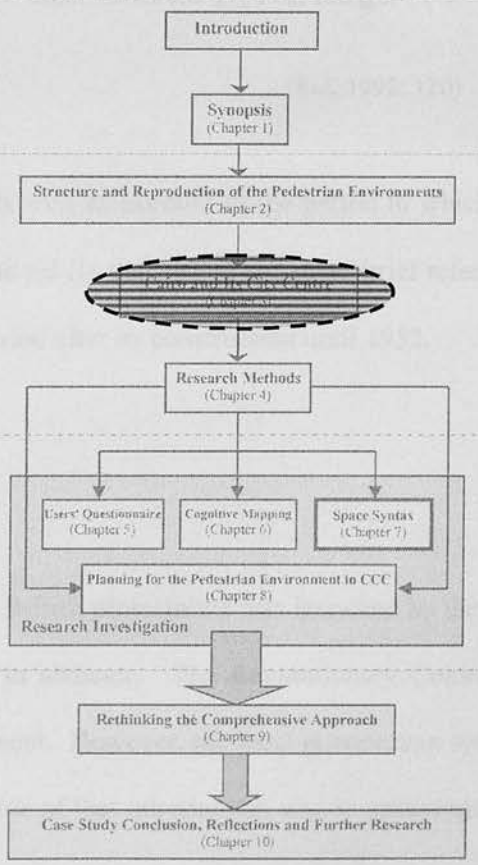
2.5 SUMMARY

This chapter reviewed some basic and important concepts of the urban environment in general and the pedestrian environment in particular. These concepts lead to a more specific understanding of the nature of the resources constituting the pedestrian environment. The review also intended to gain an understanding of the main concepts involved in public policy as the main system of reproduction of the urban environment.

The review of the current state of pedestrian analysis as found in the literature supports the need for this research. Moreover, it supports the use of a comprehensive multi-dimensional approach in order to give a better understanding of the situation than single dimensional approach. The review also provides the research with a conceptual and empirical background about the nature of pedestrian environments. All the information and methodologies deduced from the literature are open to modification according to the needs of the empirical work. They thus serve as a draft framework or a starting point for a better understanding of the research context and the specific qualities of the case study.

Chapter Three

CAIRO AND ITS CITY CENTRE



INTRODUCTION

This section focuses on providing background information on Cairo and its centre as the setting for the case study. The local government system in Cairo is reviewed first as the framework that includes the rules governing the reproduction system of the urban environment. Then, the information about the environmental background is categorised according to the two components of the urban environment, the physical environment and the non-physical or the socio-economic environment. These two are understood to be the resources in the structure of the urban environment as mentioned in Chapter One. Finally a visual account of the current situation of the pedestrian environment in CCC is presented combined with comments by the author.

This background information covers only the modern history of Egypt from 1952 (the Egyptian revolution) until the most recent available information. Eid said:

> "Although Egypt was granted nominal independence in 1923, and officially in 1936, no major socio-economic changes were acknowledged at the time. It was not until the revolution of 1952 that the city started to witness major social and physical changes in its fabric "
>
> (Eid, 1992: 120)

However the review of the built environment starts with an account of the period in which the current city centre, the case study area, was constructed (in the 1860s) and gives brief reference to major changes in the built environment in the period after its construction until 1952.

3.1 LOCAL GOVERNMENT SYSTEM

On the 23rd of July 1952, the revolution against the British protectorate was launched by the free officers movement and King Farouk was forced to abdicate. The Revolutionary Command Council was formed, representing the new government. However, the local government system was only introduced in 1960 (124/60). The objective of that introduction was to encourage the

local participation. The aim was to have a central planning system and distributed local execution (Serageldin, 1984b). The act was followed by many amendments, which aimed at increasing public participation and at ensuring the administrative flexibility of the local authorities. Figure 3.1 illustrates the location of local government in the hierarchy of the Egyptian government.

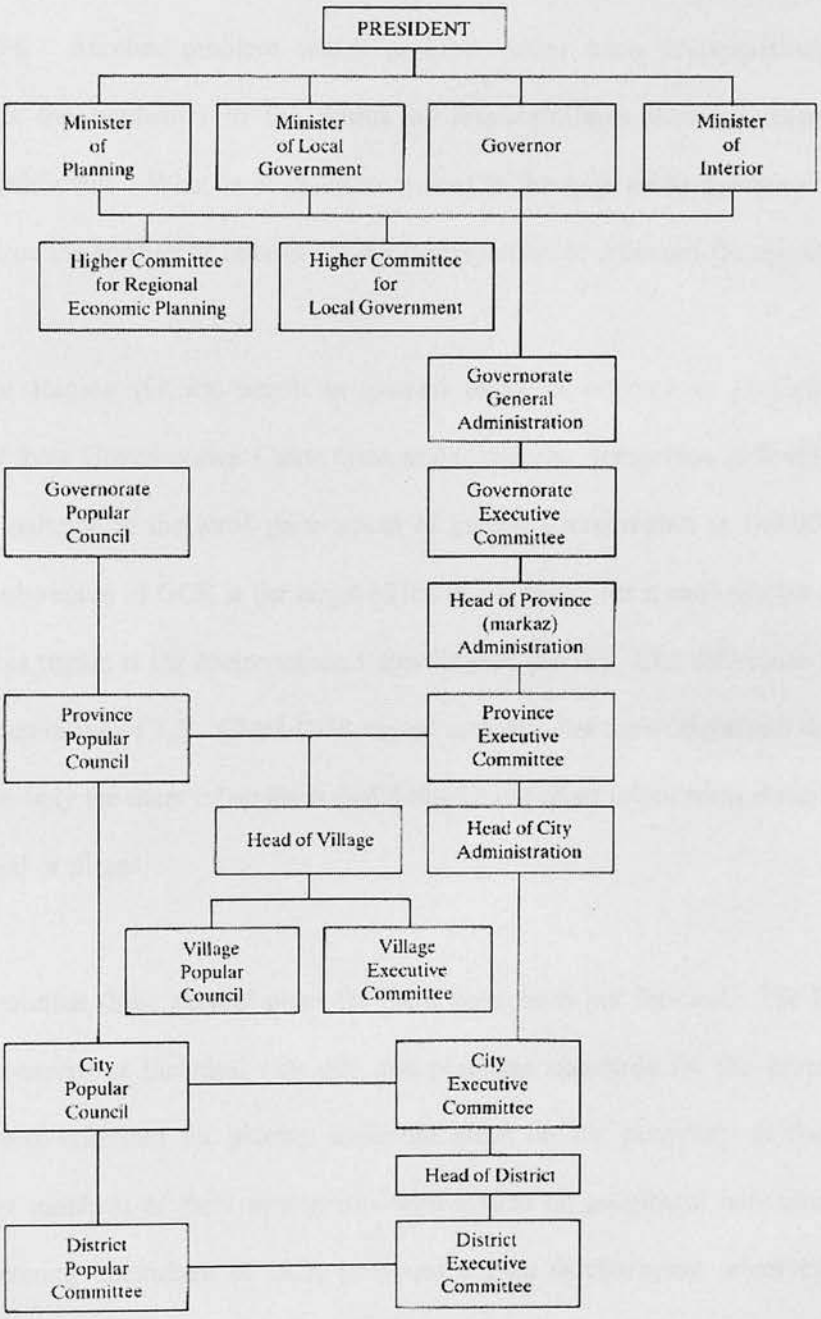


Figure 3.1 – Local Government System in Egypt

Source: Serageldin, 1984b: 163.

According to Serageldin (1984b), the governor of each Governorate is the direct representative of the president of the country. The governor holds the executive responsibilities for public services that each minister in the central government has. The governor also supervises housing, infrastructure, land reclamation, maintenance, urban planning and design projects, and their implementation.

However, the Governorates suffer from a lack of the resources needed to meet these responsibilities. Another problem which prohibits them from accomplishing their tasks proficiently is the confusion in the remits of responsibilities between them and central government ministries. What is even more critical is the lack of an adequate co-ordination strategy to avoid the conflict of interests or the contradiction of decisions (Serageldin, 1984b).

Greater Cairo Region (GCR), which in general terms is referred to as Cairo, is in fact constituted of three Governorates: Cairo, Giza, and Qalubiah. Serageldin, (1984b) estimates the workforce population in the local government of greater Cairo region at 140,000 employees. However, a sub-region of GCR is the target of the urban plans, for it excludes the rural areas of the GCR. This region is the Metropolitan Cairo Region (MCR). The difference between both regions are seen in figure 3.2. Where GCR region includes vast agricultural and desert land, the MCR includes only the main urban areas (solid black) and other urban areas directly attached to it whether legal or illegal.

Since the revolution three general plans for GCR have been put forward. The first, in 1956, adopted the concept of the ideal city size and planning standards for the urban extensions. However it was criticised for placing industrial areas on the periphery of the city, which attracted huge numbers of rural immigrants who settled on peripheral agricultural land. In 1969, the planning committee of GCR proposed a plan discouraging urban extension onto agricultural land and recommending new satellite cities on desert land and vertical extension within the current urban fabric as an alternative. The third is the general plan for GCR which is extensively discussed in Chapter Four.

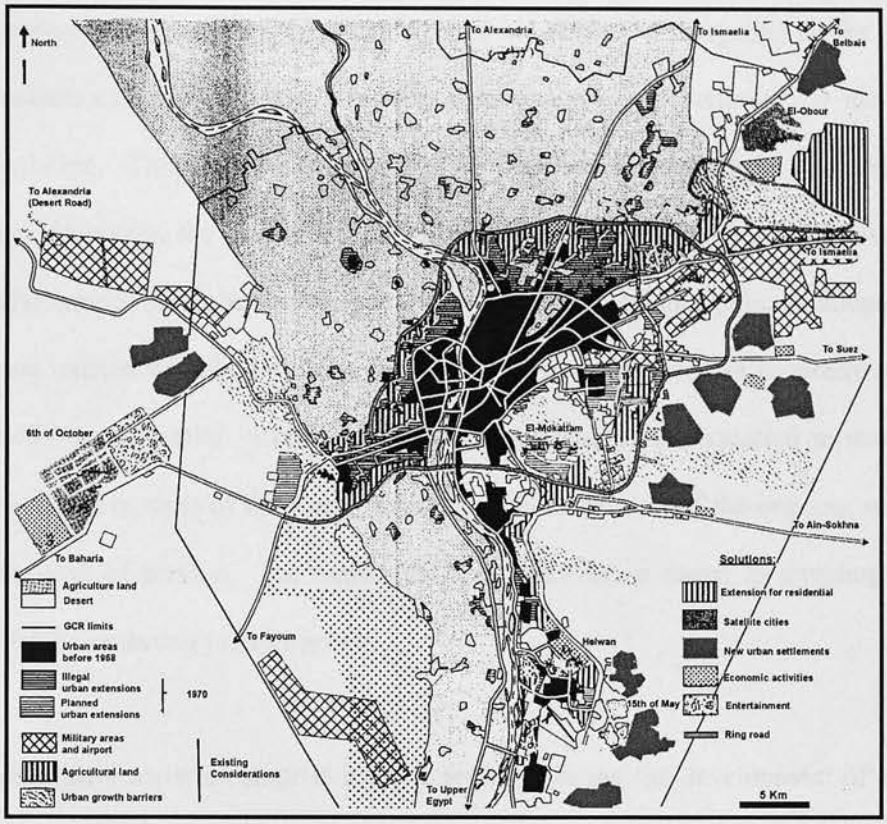


Figure 3.2 - The limits of GCR and MCR, overlapped on the strategy plan of GCR development until the year 2000.

Source: Moselhy, 1988: 464, with modifications by the author.

Serageldin (1984b), mentioned three major problems facing local government in regard to the urban environment in GCR: construction regulations; financial limitations; and administrative aspects. Construction regulations present a major problem to the local government because 60% of the buildings in GCR have not been built according to the building regulations. The reason for such large-scale failings may simply lie in the local governments' adoption of western regulations which were suitable to neither the environmental nor the social considerations of the local context of GCR. On the other hand, the continuous issuing of building regulation laws did not serve the management of construction in GCR but achieved the opposite. The complexity of these rules and the inability of the executive institution in enforcing them made it easier for the people to break the rules than to follow them.

Financial problems should always be expected in a developing country like Egypt. In GCR financial problems exist on a scale of a metropolitan area which is continuously increasing in size and population. This increase must be met by adequate investment in new services and infrastructure. However, the available funds hardly maintain the existing built environment. The local government has inherited a heavy load from the socialist policies adopted in the sixties and any transfer of public utilities and services to the open market economy appears to be unacceptable to the public. Continuous government funding is requested in many fields, which are privatised in most of the world, to maintain both the cost of the ongoing service and an acceptable level of service. The major problem, however, is found in directing the little funding available to meeting priority needs.

Finally administrative aspects comprise a major problem facing the development of any urban plan in GCR. A common criticism of the governmental services is that they are lacking active and skilled professionals. On the other hand it is fair to argue that the increase in the number of workers in each department within the local government, besides their low salaries and slow promotion, all contribute to the demoralisation of the labour force in these departments. The use of consultancy committees is currently the most successful method to reach a policy which is accepted by the various institutions and departments involved in each urban decision. Co-ordination between various sectors is difficult considering the responsibilities and limitations of each of them (Serageldin, 1984b).

3.2 THE SOCIO-ECONOMIC ENVIRONMENT

The socio-economic life of Cairo, from the revolution until nowadays, can be divided into two major periods with a transitional period. This division is mainly based on the economic policies adopted by the government and which, in turn, have had an impact on the social life. The first period is from 1952 until 1967, when the government was adopting socialist policies. The second period is from 1974 until the current date, when the government changed to open market

economic policies. During the transitional period from 1968 until 1973 the economic and social life was almost on hold because of the state of war that Egypt was experiencing.

3.2.1 The First Period (1952-1968)

The first period was initiated by the new socialist policies adopted by Nasser (died 1970) to compensate the poorer people of Egyptian for the long periods of class division between them and the élite who held the money and power. By adopting these policies the government gained the support of the lower social classes, the new labour class, and the peasants in rural Egypt. Nasser was aiming to build a strong economy based on all kinds of industries, which he partially managed to do. All of these people-oriented policies had created a great sense of belongingness in the Egyptian public towards their country. On the other hand the economic policies brought anger to the previous élite who found their investments being either nationalised or greatly affected.

Nasser was a great believer in Arab nationalism and supported all the countries of the third world. This attitude made Cairo the social and cultural focal point of the Arab and developing worlds and gave it a lot of political and social weight on the international scale. However, all this glory was ended by the catastrophe of the 1967 war. The economical, and consequently the social, power then fell into decline, as most of the available funds were directed towards the military. After that there was very little effort put into any kind of redevelopment apart from the military until Egypt achieved victory in 1973 (Raymond A., 1994).

3.2.2 The Second Period (1974 - to the present day)

This period was started by president Sadat's announcement of the new open market economic policy. After the 1967-1973 war, both the people and government were enthusiastic to restart the internal development of the country which had been put on hold. In contrast to Nasser, Sadat's vision was to adopt the western model of development which, in his vision, was to influence all aspects of life. It shaped the economy by adopting open market economic policies, the culture by secularising cultural life, and the built environment by encouraging western

planning and design techniques in new construction. Owen argues that Sadat's adoption of the open market economy was "connected with his parallel attempt to limit, and then to destroy, the organisation of the Arab socialist union, which he identified, correctly, as forming part of the power base of his Nasserite rivals." (1992: 143).

Overall, the new open market economic policies resulted in more dominance of Cairo over all other cities in the country. That was supported by the absence of a comprehensive national development plan whether physical, economic or social and the serious shortages in services and facilities in all other cities.

What made this development possible was the huge increase in the remittances of the Egyptians working in the rich Gulf region (Lapidus, 1988). The number of foreign investors and the old élite of Egypt who emigrated in Nasser's socialist regime found the chance to come back and rapidly benefit from the struggle in the local market which was not prepared to such a sudden and extreme change in policies. In 1977, after only three years of adopting these new policies, the anger of the middle and lower classes was clearly demonstrated in a destructive protest in which many of the new political and economical symbols were burnt, such as the night-clubs, luxury cars, and police stations. The military had to be involved to solve the situation, and hundreds of protestors were killed, most of them from the dense residential areas (Ibrahim, 1985). Sadat continued with his policies until he was assassinated in 1981 (Thabet, 1995).

Mubarak, the successor of Sadat, followed almost the same economic attitude but using more conservative actions in contrast to the radical actions that Sadat had followed. This minor change in policy partially managed to avoid public opposition to moving away from the socialist ideals, which protected the lower and middle classes of the society, and towards the open market policies, which benefited the upper classes (Steinberg, 1991; Thabet, 1995).

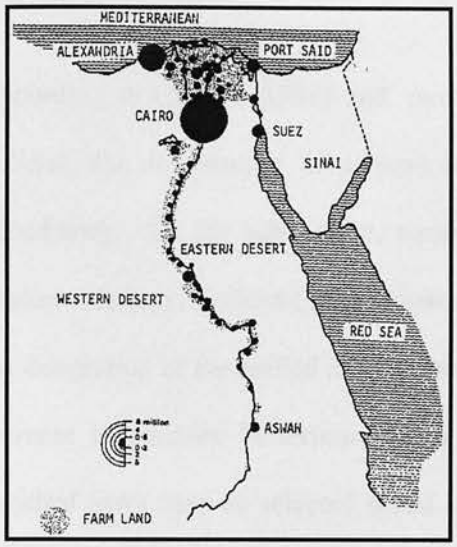


Figure 3.3 - The dominance of Cairo over all other cities on the national level of Egypt by the beginning of the 1980s.

Source: Serageldin, 1984a: 132.

In 1991 the Iraqi occupation of Kuwait forced many of the Egyptians working in the Gulf to come back to Egypt. That seriously affected the local economic and social life in Egypt. One reason was that the remittances of the Egyptian labour force in the Gulf used to be a major part of national revenue. Also, working in the Gulf was the main, if not only, legal option for the middle and lower class to rapidly increase their status and reduce the gap between themselves and the classes above them. Reducing this opportunity increased the gap between the white-collar/ blue-collar classes and the business class, who were not affected by the Iraqi occupation and were continuously increasing their wealth (Steinberg, 1991).

Abdel-Gawwad (1991) argues that the many of laws issued in tandem with the announcement of an open market economy resulted in the existence of what is called the 'parasitic class'. The relationship between the open market policies and laws in Egypt and the production of the parasitic class has been a constant observation of many scholars in Egyptian society since the seventies (e.g. Abdel-Fadl, 1984; Abdel-Gawwad, 1991; Al-Esawy, 1987; Ibrahim, 1989; Salama, 1990; Seyam, 1992). Imam (1991) categorises the new economic élite in Egypt into three main categories: the *traditional capitalists* (those with origins before the 1952 revolution), the *bureaucratic bourgeois*, and the *parasitic class*. Imam acknowledges the existence of other classes such as those who obtained their wealth from working in the Arabian Gulf, but says these were not effective and untraceable in comparison to the above mentioned categories.

According to Cooper (1982) and, more recently, Wahba (1994), the open market economic policies did not manage to achieve many of their economic benefits because of political expediency. On the other hand, social life was highly and negatively affected by the open market economy. Salama (1990) summarises the five main social implications of these policies: the emigration of the skilled labour force; the feeling of disloyalty; a decline in cultural life; an increase in parasitic behaviour; and a deterioration of social values. That the government lavished extra care on selected social classes like army officers, bureaucrats and technocrats, together with the retreat from the social equality policies of the 1960s, provided further reasons for the negative social changes.

There is a huge dearth in the credibility of the government and its policies in the public imagination. This gap has been produced by many actions, one of which was the neglect of public opinion. This was accompanied by false or inaccurate announcements of government achievements and a disenfranchising government bureaucracy and administrative set-up which forced the public to go directly to the highest position in the system instead of the going through the regular channels in order to be heard (Thabet, 1995).

An important part of the social life is the religion of the people, whether Muslims or Christians. The adoption of the open market economy could be seen as the first step of the government secularising the country and minimising the role of religion in public life as had happened in Turkey. This reflected the mechanism of globalisation that then and now has been exerting such pressures all over the world. However, Lapidus (1988) argues that Egypt and the Egyptian society were not the same case as Turkey. He says:

> "In Egypt, as opposed to Turkey, Islam remains the main vehicle of resistance to the state and its policies. The basic structures of the Egyptian society are similar to those of Turkish society, but because of the more limited powers of the Egyptian political elite and the more limited degree of social and economic differentiation, there is a standing conflict between the secularised state elite and their Islamic petit bourgeois and student opponents."
>
> (Lapidus, 1988: 636)

What Lapidus says about Islam and Muslims in Egypt can be applied to Christianity and Christians in Egypt. Christianity in Egypt is one of the most fundamentalist[1] churches of all Christian churches around the world. The religion of both Muslims and Christians have been the main points of reference that the Egyptian population turn to when faced with national problems[2].

During the nineties the state accelerated the rate of privatisation of public sector investments. The privatisation not only dealt with the public sector but, surprisingly, reached the real estate lands surrounding GCR, claiming that this was what the public needed. This expansion into the new settlements around GCR contrasted with all previous planning schemes in the region. The government encouraged the public to buy building lots in these new areas, which are reserved only for residential purposes, and such investments only exhausted a great amount of the economic power of all social classes.

The government also started implementing many huge national projects like Toshky, the Suez Port extensions, and Zaid Canal. The implementation of these projects all at once, together with the remains of ongoing infrastructure projects either in Cairo or in other parts of the country, absorbed huge amounts of the government budget and the revenues from selling the public sector. However, these projects were neither completed with the available funds nor are likely to gain revenues in the near future. These policies have brought the local economy to a halt and the country is now facing a period of economic recession that has amplified the negative social problems caused by the open market economy by adding the public mistrust in the government's policies and attitudes (Thabet, 1995).[3]

[1] Fundamentalism should not be confused with extremism that carries many negative meanings, but instead it means the attitude to stick to the fundamental and essential concepts of any direction whether religious, political, economic etc.
[2] For example throughout the Revolution in the twentieth century, symbols of both religions unified against the enemy, either the colonisation of Britain or the regime of Muslim King Farouk.
[3] See most daily and weekly Egyptian periodicals and journals since 1999, and research works currently running in the field of local economy in Egypt.

The current economic crisis was partially expected by Abu-Lughod (1996). She commented on the labour returning to Egypt after the Gulf War as being the majority of the three million who were working in the Gulf. She argues that these labourers used to send their savings from work to Egypt, which formed an important source of national income. After coming home they formed a class which demanded urgent job opportunities and at the same time they had grown used to the consumerist way of life which, in conjunction with the increasing inflation rate, was to add to the difficult urban life in Cairo (Abu-Lughod, 1996). According to Abu-Lughod (1996: 2050), "while not all of them [the returning labour] originated in Cairo, most descended on that already over-stressed city".

3.3 THE BUILT ENVIRONMENT

The built environment considered here is that part of the total environment that is fixed and not usually mobile. It therefore includes roads, buildings, open spaces and landscaping. Everything else in the environment constitutes the living environment and that includes the social, economical, cultural and political aspects.

Moselhy (1988) divides the contemporary history of Cairo into three periods. The first is *the start of the explosion period* (1952-1968). The second is *the end of the explosion period* (1968-1982). And finally there is the period of the *Governmental Master Plan* (Greater Cairo Region Master Scheme, GCRMS) which, for Moselhy, started in 1982 and ran up to the date of his study (1988). Nowadays, however, the observer of GCR can notice that another stage started in 1993 with the arrival of a new government cabinet. The policies adopted in this last stage greatly conflict with many of the ideas proposed in the plan of 1982. Whereas the plan of 1982 aimed at discouraging any further extensions of the metropolitan region, the plans of the 1993 government encouraged urban extensions in almost all directions towards the surrounding desert land beyond the existing urban form. In brief it represented another period of expansion of the limits of the built environment of GCR.

To reach an understanding of the current situation in regard to the built environment of Cairo and its Centre, the study needs to go back to the origins of modern Cairo during the period of Khedive Ismail's regime in the nineteenth century. This review first traces the changes in the built environment that were introduced by Ismail. Then the review focuses on three phases of the built environment after the revolution in 1952. The three phases are: *the first expansion phase* (1952-1967); *the filling phase* (1974-1993); and *the second expansion phase* (1993-to the present day). The names selected for these three periods differentiate between building increases within the planned urban areas (the filling period) and the increase in the total area of the planned urban limits of the region (the expansion periods).

3.3.1 The Origins of Modern Cairo

Khedive Ismail is a key historical figure behind the contemporary look of Cairo, especially its city centre. He had, like his ancestors, a passion for urban constructions. He was fortunate to benefit from a huge increase in the production of Egyptian cotton and the rise in its price after the American cotton market exports halted because of the American Civil War. This increase in the national income (1863-1867) gave Ismail the opportunity to think about extensive plans for the expansion and modernisation of Cairo (Abu-Lughod, 1971).

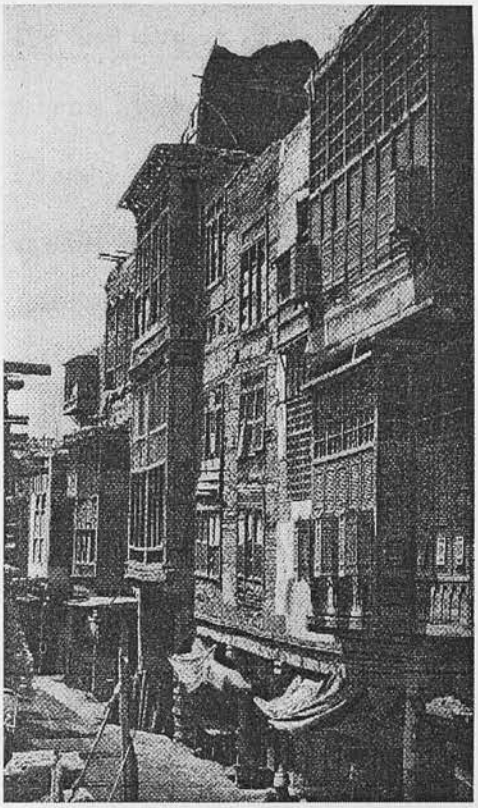
Significantly, Ismail followed a policy in urban development which had been previously used in Cairo by Sultan Al-Nasser ibn Qalawun (ruled from 1310 to 1341), that is to start the urban development with a substantial amount of public works. These public works included canal digging, provision of fresh water and installing a gas network. However, although this policy is not exclusive to Egypt, adopting it at that time after about 500 years of random urbanisation is significant.

Ismail's visit to the *Exposition Universelle* held in Paris in the spring of 1867 had a great effect on his image of the modern Cairo that he wanted to build. Baron Haussmann, who redesigned modern Paris by way of imposing formal parks and wide boulevards on the spatial structure (which was later to be known as haussmannisation), was the companion of Ismail during his

visit to Paris. It was not the first time that Ismail saw Paris, but Haussmann's company seems to have great influence on his opinion of and aspirations for a future Cairo. Abu-Lughod (1971) speculates that, during this visit to Paris, Ismail also met the famous landscape gardener Barillet-Deschamps who had executed the plans for the Bois de Boulogne and the Champ de Mars. The reason for that speculation, as Abu-Lughod (1971) mentions, is that, two years after the exposition, Ismail asked Barillet-Deschamps to work on the plan to beautify Cairo.

The need for new plans to beautify Cairo was strengthened by the projected opening of the Suez canal in 1869. Ismail needed a beautiful city to reflect gloriously on him as the ruler of Egypt when receiving the crowned leaders from all over the world in the opening ceremony. There was not enough time to beautify the old city of Cairo (currently known as the Fatimid Cairo). Instead the simplest option was to create a new city to the west of it and trying to cover up all the poor qualities in the old city and to avoid it being seen by the majestic guests (see Figure 3.4).

The plan for the new city included the construction of two urban areas, El-Ismailiyah and El-Fajjalah, the new El-Azbakiyah Garden, the allocation of many public spaces or squares, and the opening of some new straight streets through the old fabric of Cairo. The urban pattern adopted is described by Abu-Lughod (1971: 110) to be "a network of supplementary latitudinal and longitudinal thoroughfares as well as numerous connecting diagonals." However, it was not possible to implement all parts of the plan due to conflicts between the plan and public opinion in areas where existing structures needed to be demolished to open some of the new streets. Figure 3.5 shows a reconstruction (by Abu-Lughod (1971: 111) after the text of Ali Mubarak in his book *Al-Khitat*) of the master plan for Cairo illustrating the parts implemented of the plan and other parts that were not possible. In figure 3.5, the area between Fatimid Cairo (in gray) and the River Nile represent the current city centre of Cairo. The area marked 'G.C.' is currently called Garden City and followed an Art Nouveau style of curvy lines with smooth intersections. This could be better seen in figure 3.6.



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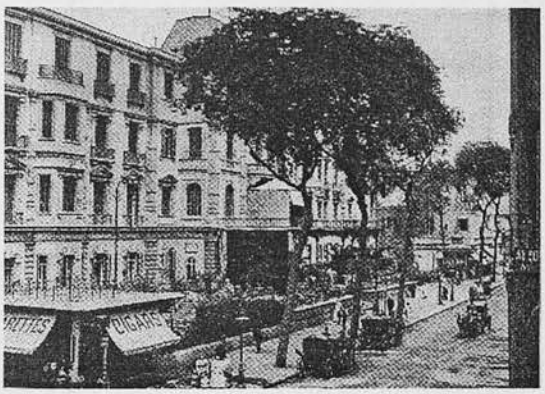

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Figure 3.4 - Photos of old Fatimid Cairo and the new European Cairo.

Source: Williams, 1923: 1140, 1151, 1150 respectively.

1) A view of Cairo from the Castle looking westward.
2) Old Fatimid Cairo by the end of the 19th century.
3) The old Sheperd Hotel (was later burnt and reconstructed elsewhere) as the landmark of the new European life style of the new city to the west of old Fatimid Cairo.

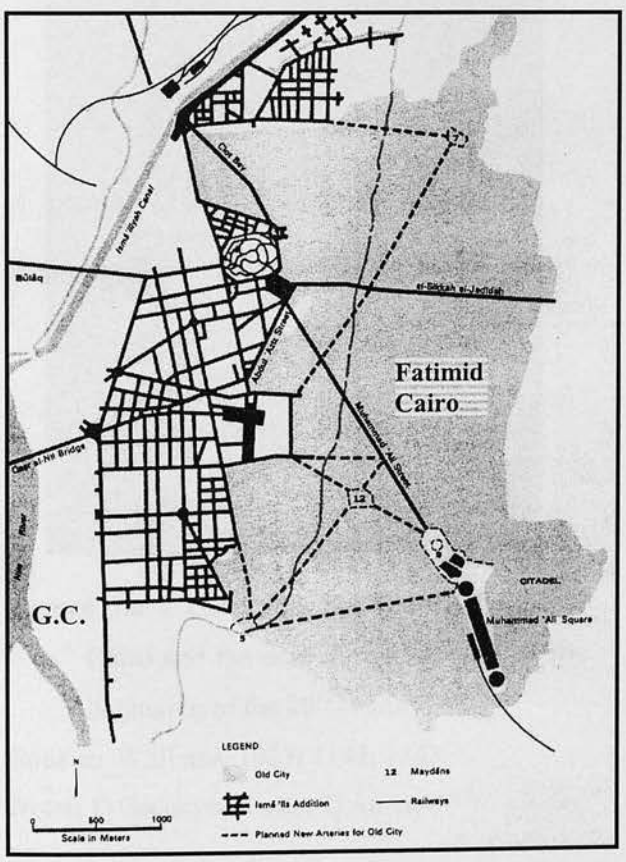


Figure 3.5 - Reconstruction of the master plan of Cairo showing various streets were planned to be cutting through the existing urban fabric of the old Fatimid Cairo, however, not all of them were implemented.

Source: Abu-Lughod (1971: 111) after the text of Ali Mubarak in his book *Al-Khitat*.

The final network of the new extension is a mixed pattern of the grid and radial concentric patterns which developed with a course-grain and uniform texture (Al-Masry, 1999) (see figure 3.6 and 3.7). After the layout of the above plan the city underwent some natural growth in order to infill the newly planned areas in the new parts of the city, where as the old parts kept on deteriorating. The existence of two cities within the region of the capital had its own impact on

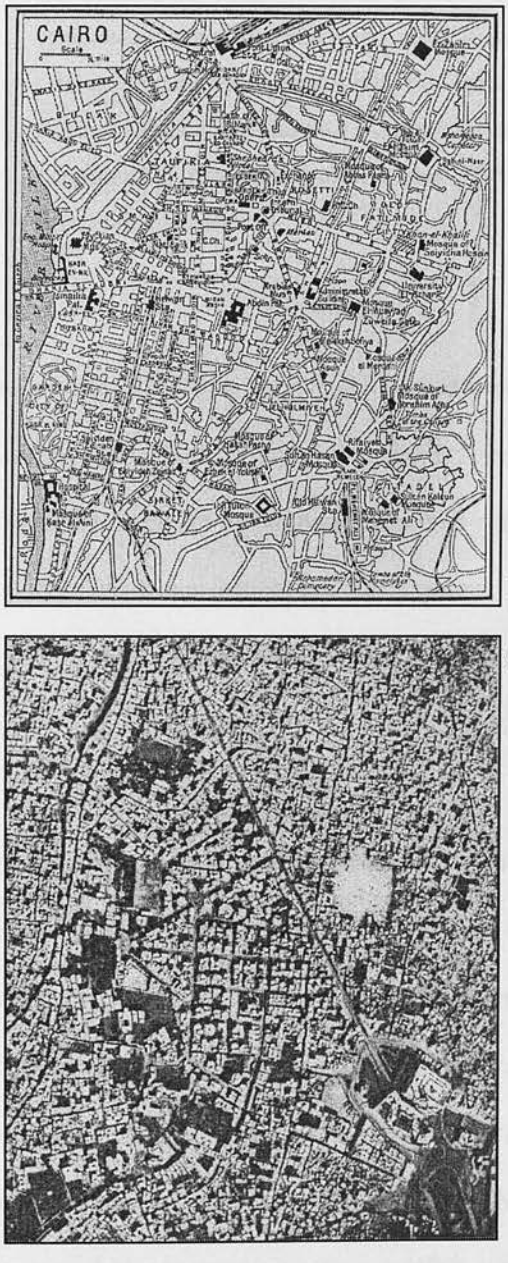


Figure 3.6 - The urban Fabric of old Fatimid Cairo and the new European Cairo at the beginning of the 20th century.

Source: Williams, 1923: 1142, 1143.

Notes: 1) Geophysical map; **2)** Air view.

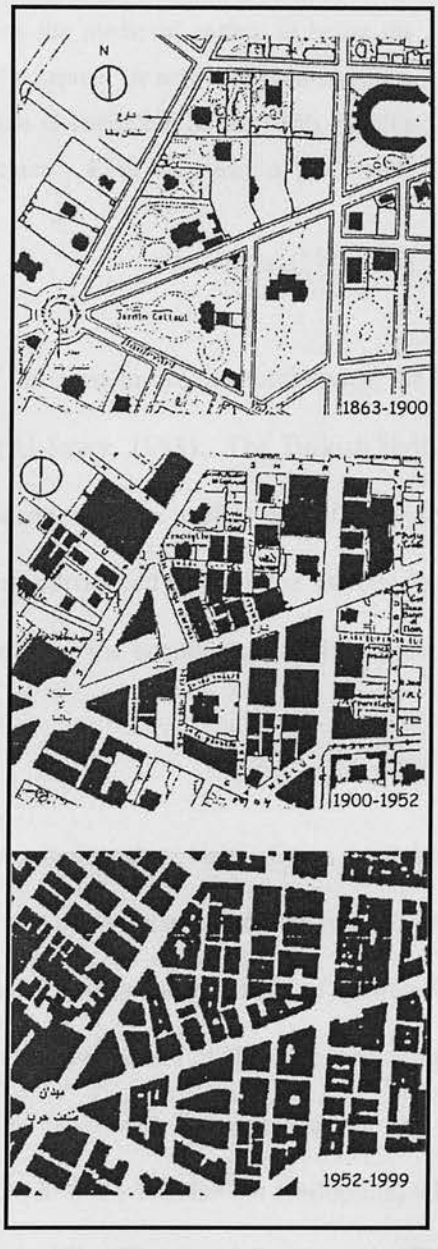


Figure 3.7 - Evolution of the urban fabric in European Cairo since it was first planned until 1999.

Source: al-Masry, 1999: 242-243.

the environment as the demand for urbanisation increased. This has affected the continuity and integration of any subsequent development of the city. The physical difference eventually led to social and economic differences. The old city became associated with low social and living standards. The situation by the end of the nineteenth century in the city is best described by Abu-Lughod (1971: 117) as follows:

> "By the end of the nineteenth century...the city had completed its physical and ecological mitosis into two distinct communities. The old native city had been left intact from the premodern age, its abandoned areas reconstructed on the medieval pattern to house the thousands of rural migrants who had been drawn to the capital. A new European-style city had developed parallel to it on the west and had begun to encircle it on the north, but this community remained socially and physically distinct. Each city had a predictable continuity of its own."
>
> Abu-Lughod (1971: 117)

The architectural style used in the period was a mix of three major architectural styles: the local Mamluk style; Turkish style; and the European style (Al-Sawy, 1988). The Turkish style was introduced to Egypt through the Ottoman rule. The European style used is one of three styles, Rococo, Neo-Renaissance, and Eclecticism. These were introduced through the various foreign architects and designers employed to work in Egypt during the second half of the nineteenth century and the first half of the twentieth century (ibid).

After the major changes that Ismail introduced in the nineteenth century, Cairo experienced increasing demand for new urban land. That need was met by two major projects that facilitated the urban extensions both to the west and north. The first was the building of Aswan Dam which made it possible to build many bridges between the two banks of the Nile, reducing the destructive consequences of the flood. These bridges facilitated the extension of the city towards the west. The other project was the Metro line to Misr El-Jadidah (or Heliopolis) which was aimed at constructing a new satellite city. Its name *Misr El-Jadidah* means 'new Cairo' because Cairo is referred to as *Misr* in Arabic, which means Egypt[4].

[4] This reflects the importance that Cairo had and still has on the local level, the public symbolising it as the country itself and not only a major city and a capital.

After laying down the plans and main infrastructure works for these new, the city continued in its growth slowly, for two main reasons. There was a lack of economic ability among the Egyptian public as the social system had a huge gap between the élite minority and the poor majority, with an intermediate class of white collar workers which itself lacked any significant economic power. On the other hand the government policy did not give enough financial support to the lower classes of the society to provide them with adequate living standards (Makkawy, 1938). The inadequate living conditions encouraged the revolution of the free officers in 1952.

3.3.2 The First Expansion Phase (1952-1967)

According to many urban geographers such as Moselhy (1988), and to urban planners such as Amin (1994), the year 1952 was a turning point in the history of Cairo. The revolution announced a new era where Egypt was governed by its own people adopting new policies and ideologies. The reflection of these policies and ideologies on the built environment was apparent (Amin, 1994).

According to Amin (1994) the built environment of Cairo after the revolution, until 1973, was a reflection of the socialist thought adopted by the new Egyptian government. For example, housing schemes for low-income groups were introduced in many districts. Although Amin's argument was focused on housing, the same could be said of most urban projects during this period. Due to economic reasons, new urban projects were not implemented to a high standard either in design or in building materials. The planning concepts and building regulations had been taken wholesale from previous western experiences and were not adequately implemented. Ibrahim (1984) argues that there were many shortages and drawbacks in the products of the planning and design in that period.

During this period the attitude towards the centralisation of services and investment in the capital caused many urban problems due to the lack of preparation for the consequences, such as the increase in urban population (Wahba, 1963). The government policy to increase the number

of industries was mainly focused on Cairo which again added to the load the capital city was carrying (ibid) as this policy only attracted immigrants from the rural areas seeking a better life.

Many housing schemes were planned and built for the low income class such as those in Imbaba, Ain El-Seera, and Shubra (Ibrahim, 1984). Big industries were established in peripheral areas in to the north in Shubra El-Kheema and to the south in Helwan (Eid, 1992). Modern districts were planned for the middle class like Nasr City and other areas were built to accommodate the new power holding professions and were named after them (such as the districts of *El-Muhandeseen,* the engineers, *El-Dobat,* the officers, and *El-Shurtah,* the police) (Abu-Lughod, 1973).

During this period the government had taken charge of providing public services and housing. Ibrahim (1984) noted that these actions were based neither on a general plan nor heading towards an acknowledged goal. The policies discouraged the private sector from becoming involved in the process of providing services or housing as a result of some laws adopting a communist approach. The law that had the strongest influence on housing provision was the law controlling the relationship between the owners and the tenants of a residential unit[5]. The pressure was huge on the public sector that when the war of 1967 happened, the city was falling apart due to many problems such as the poor condition of the infrastructure. What had worsened the living conditions in Cairo more during the period from 1967 until 1973 was the huge number of immigrants coming in from the Suez canal zone (Raymond A., 1994).

Eid (1992) made a cluster analysis study[6] of Cairo over three stages of time 1960, 1976, and 1986. She found that the city of Cairo in each of these three periods had some significant clusters of districts which shared some developmental properties. According to Eid, the stage of 1960 was a transitional stage between the situation before and just after the revolution whereas

[5] This law restricted the levels of the urban rent to a value which does not increase over time once a contract is signed and the owner does not have the right to ask the tenants to leave the residential unit. Furthermore, the contract is inheritable to first-degree relatives who live with the main tenant. However, the government changed this law in the 1990s.

[6] Data involved in Eid's cluster analysis are: population; family size; per/room; unemployment; building completion (completed/incomplete); building ownership (governmental/public); date of construction; number of informal houses education level; and income levels.

the 1976 stage accounts for the changes during the 1960s and early seventies which were the results of new government policies after the revolution and before the open market economy in 1974. In her 1976 analysis, Eid (1992: 207) found five main clusters of local districts in Cairo. These five clusters are as follows:

1) The sacrificed fabric: upper-middle residential districts.
2) The old suburbs transformed: emergence of the blue-collar districts.
3) The western expansion (Ismail's extension) in transition.
4) Low-income high density districts.
5) The transitional indigenous stagnant districts.

Eid (1992: 207)

As a final comment on the planning, design, and building industry in this period, it can be said that the western approach adopted was clearly shown to be unsuitable for the context of Cairo (Abu-Lughod, 1978; Steinberg, 1991). Steinberg recommends that:

> "Cities throughout the Islamic parts of the world need not develop into inferior copies of Western models, but can be truly innovative compositions, in which deep-rooted value systems and requirements of today are merged into a synthesis characterised by both homogeneity and unity."
>
> (Steinberg, 1991: 86)

Steinberg's conclusion that the western model is accused of influencing many other cultures might be seen from a more neutral angle, which is that each culture has its own properties that should be allowed to continue and develop. Regardless of being western or eastern, the local properties of the environment should taken in consideration by any environmental policy or action.

3.3.3 The Filling Phase (1974-1993)

In 1974, after achieving victory in 1973 war, the government policies were towards the open market economy. Sadat proposed these policies as the solution for the national economy after six years of war. In this, Sadat's policy was close to Khedive Ismail's in its leanings towards the western world. Nevertheless, Khedive Ismail had Paris as the ideal city model and Sadat

had Houston and Los Angeles as the ideal city models (Ibrahim, 1985). By the beginning of this period, the city expanded as never before, as seen in figure 3.9.

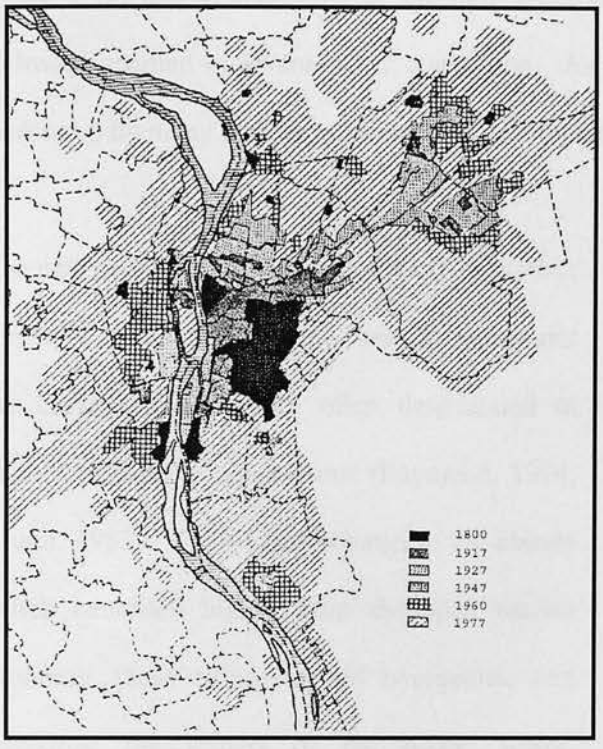


Figure 3.8 - The limits of Greater Cairo Region at different stages (1800-1977).

Source: Serageldin, 1984a: 134.

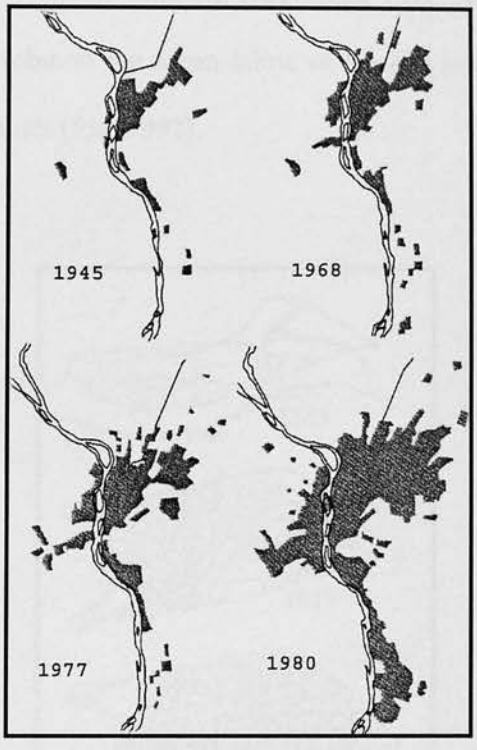


Figure 3.9 – Evolution of Cairo's built-up area.

Source: Serageldin, 1984a: 136.

The active real estate market and the huge increase in prices of building plots changed the whole face of the built environment. Most of the luxury villas in the central areas were demolished and replaced by high rise building blocks. Still the housing problem persisted as government control on rents discouraged investors from providing any kind of housing suitable for classes with limited income. Most of the housing available in the real estate market was either luxury flats in central areas like Zamalek and Garden City or in speculative suburbs like Heliopolis and Nasr City (Raymond, 1994). The lower income classes had the opportunity and access for accommodation in more peripheral areas which were not properly planned for that purpose in the first place, like in Ain Shams and El-Omrania.

Several first class hotels were built in the central area to accommodate the expected tourists from the Arab world. The increase in building densities either in rebuilt areas like Zamalek (see figure 3.10) and Garden City or the new areas in which the building regulations were not followed resulted in severe traffic congestion. As a solution the urban fabric of the city was broken up by many highways, overpasses, and underpasses (Eid, 1992).

The new economic system resulted in two distinct forms of built environments, one luxurious and the other humble, which often deteriorated in quality to become quasi-slums (Raymond, 1994; Brunn, 1983). The former belongs to the classes which benefited highly from the open market economy, these being the old bourgeoisie and landlords, the leaders of the public sector, Egyptian labourers from the Gulf and, of course, traders, especially those working in the sector of foreign trade and the import industry. The latter belongs to unskilled and white-collar labourers. The big gap between the two led to many riots during the late seventies (Raymond, 1994). As a result of the riots between Christian Copts and Muslim fundamentalists in mid-1981 Sadat used the situation as an opportunity to arrest 1500 of his opponents including Muslim fundamentalists and that was another incident that led to Sadat's assassination (Aufderheide, 1990).

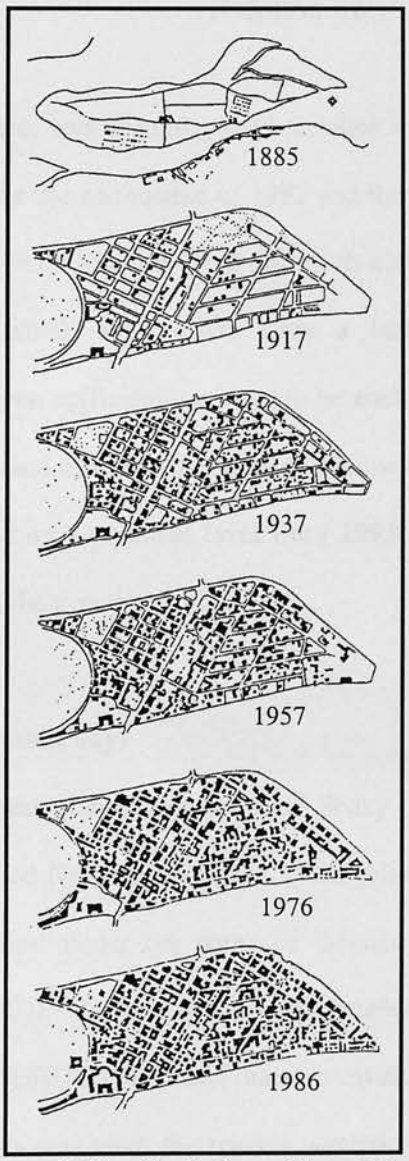


Figure 3.10 – Evolution of Zamalek and the resulting density.

Source: Eid, 1992: 175-176.

In the cluster analysis of 1986, Eid (1992: 221) found six main clusters of local districts in Cairo, which are:

1) The high density, high rise of upper-middle class residential districts.
2) The modern technocrats' districts.
3) The blue collar institutional districts.
4) The mutation linear transition zone.
5) The high density stagnant and indigenous traditional districts.
6) The informal marginal fringe.

(Eid, 1992: 221)

Eid noticed no difference in the way the built environment was changing until the date of her study (1992). However, a closer look at the situation after the earthquake of 1992 and the new government of 1993 reveals another turning point in the line Cairo followed during its change. The following section focuses on this last period which still suffers from a lack of documentation or research as it is not yet completed or even sufficiently mature to be analysed. Therefore, the review will be a descriptive illustration based either on the common knowledge in Cairene society and the author's personal experiences on a practical level from 1993 until 1997, and observing it through the media from 1997 until the present.

3.3.4 The Second Expansion Phase (1993-to the present day)

In 1993, a new government cabinet was formed and was chaired by Dr. Atef Sedky. Dr. Mohamed Soliman was the 'Minister of Reconstruction and New Communities' (later joined in 1994 to the 'Ministry of State for Housing and Utilities' under the name of 'Ministry of Development, Housing, & Urban Communities' (MDHUC)). The new government accelerated the liberal policies towards the open market economy. MDHUC introduced massive extensions to the urban borders of Cairo driven by the idea that this was what the market wanted. The areas introduced in the first expansion phase (1952-1968) had been almost entirely filled by that time. It could be said that the 1952-1968 period provided a framework which was fleshed out during the period of 1968-1993 after which there was a need for a new framework to meet new urban demands.

A majority of the huge influx of labourers returning from the Gulf after the Gulf War of 1990/1991, dreamt of living in a private villa with a garden, which contemporary Cairo could not offer them. Within the existing population, people who had the economic power and were dissatisfied with the quality of life that the congested city provided them with also sought a suburban lifestyle. Then an earthquake hit Egypt in 1992 and the number of buildings that collapsed or cracked revealed their poor construction, even among those that had been recently built. The government issued many rules to avoid further problems, such as preventing the replacement of any existing building unless it is declared dangerous and unstable. It also issued a rule which prevented the vertical extension of any existing building regardless of its condition.

In responding to the increasing demands for urban expansion, the policy adopted had ignored many aspects and recommendations of the GCR dating from 1982. The urban settlements around Cairo were supposed to be separate from each other, and from the main body of Cairo, and had been designed to absorb the overflow population from the inner districts of the city populated by the lower and middle class (G.O.P.P. *et al.,* 1983). Some of these settlements contained an economic function, like the medium and small industries planned in El-Shorouk. (General Organisation for Physical Planning *et al.,* 1983). All of these developments were halted and a new policy was adopted. It could not be said to be a 'plan', as it was changing from time to time according to the market. The stages of change were as follows:

1) Stopping any further building in the lower class housing areas and transferring some of what has been built to satisfy the needs of the middle and upper classes.
2) Following the ministry's media reports and propaganda which presented these areas, such as El-Shorouk settlement, as high-class districts, the public demand for land increased. Two examples show how the ministry reacted to that demand which shows that this policy cannot be seen to be a plan. The first, the area of El-Shorouk settlement, was more than doubled in size (from 2000 Feddan to 4500 Feddan). The second is the conglomeration of three settlements (the First, Third, and Fifth) into one big city adding to their area all the

vacant areas supposed to be separating them, as well as parts of the green belt[7] of Cairo. By forming this huge community, which was named 'New Cairo', demand for this area also increased, so almost an equal area was added. It is important here to notice that adding an area means that the government has sold it to the private sector either individuals or investors.

3) To compensate public opinion for the reduction in public housing support, a few housing projects targeting young people with limited incomes were designed and built. They were given names like 'El-Mostakbal' (the future) and 'El-Shabab' (the youth).

4) Increasing the area of GCR, by almost doubling the existing size of the city.

These changes resulted in the ring road being no longer an edge of the city but an inner city highway. Attracting the savings of the public[8] to buy lands and build in these new areas might also have contributed to the late nineties economic recession. The long-term effects of these major changes to the built environment cannot be speculated on at the moment but what most worries the author about them is that they were sketched out (it is difficult to say 'planned') and enacted in a very short period (1994-1998) considering the size of the change. Even some time ago, El-Naggar (1963) argued that the growth of the metropolis and concentration at its centre was inevitable due to economic, social and political influences. He recommended that Cairo accommodate this growth and tendency to concentrate by developing alternative centres on the national and local scale.

On the other hand many positive changes have happened which follow the master plan of 1983. For example:

1) Many wholesale and crafts areas were relocated to the periphery of the city making their original sites available for more suitable development (Raymond, 1994).

2) The third stage of the underground network was completed.

[7] The green belt was planned to lie outside the ring road. Both of them were supposed to be the edges of Cairo to prevent any extension beyond them. However, the green belt has never been greened in the first place.

[8] A recent media report estimates the amount of money pumped in these new areas and other unproductive real estate during the 1990s to be about $113,000,000,000,00 (almost one and half times the total foreign debt of Egypt).

3) The replacement of El-Azhar bridge with an underground tunnel has done much to preserve the visual quality of the old Fatimid Cairo (see figure 3.11).

4) The 6th of October bridge now extends to reach Nasr City.

5) The 26th of July axis leading to Cairo-Alexandria desert road has been laid, which cuts the time needed to go from the heart of Cairo into the desert from an average of an hour to about 15-20 minutes.

1

2

3

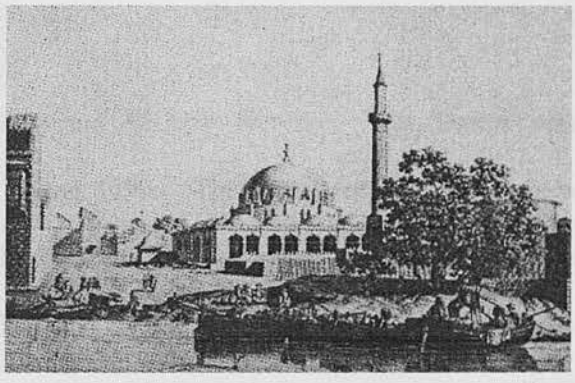
Figure 3.11 - The replacement of El-Azhar Bridge with El-Azhar Tunnels.

Notes: 1) El-Azhar Bridge from Port Saed Street; 2) The Exit tunnel at Opera Square; 3) the entrance tunnel at Opera Square.

Stewart (1999) comments on the changes in the built environment of Cairo in the second half of the nineties as being driven by international economic powers, namely the World Bank. For Stewart, the results in the built environment could be seen in the massive spread of the various American fast food chains of which, ten years ago, only one or two existed in Cairo, as well as in the new shopping centres such as the World Trade Centre and Game'at El-Dewal El-Arabiah street (see Figure 3.12). For him these present focal points of the capitalist world system.

Another reflection of the new economic system is the planning and construction of the first privately built city of El-Rehab (part of New Cairo on the eastern outer side of the ring road), which is to accommodate 150,000 residents and to offer 30,000 jobs. El-Rehab targets mainly the middle class. Many other private residential projects are planned and some have already been built. These projects are exclusive to their residents and many of them include golf courses, parks and artificial lakes. Stewart (1999) argues that the appearance of these suburbs is similar to the appearance of 'gated' suburbs in some American cities and he speculates that the side effects on the inner city will be the same as in the American cities, in other words the older and central areas of the city will be deserted.

2



1

3

Figure 3.12 - Recent attitudes in Cairo towards service and business centres.

Source: 1 and 2 from Hanna, 1992: 65.

Notes: **1,2)** Boulaque, the place of the old port became the place of the famous Cairo Tower and the World Trade Centre; **3)** Game'at El-Dewal El-Arabiah street, a famous shopping street in El-Muhandeseen district.

3.4 THE PEDESTRIAN ENVIRONMENT IN CCC

Given the background of the development of Cairo and its city centre, it is important to consider what the pedestrian environment in CCC looks like. This is presented mainly in the form of photos with comments. It is reasonable to start by saying that the pedestrian environment has hardly been an issue until the invention of motor vehicles in the 19th century. Before that, the

only other mode of transport was animals and carts, which did not significantly threaten the pedestrian environment. Therefore, It is expected that there will be conflict between pedestrian and other modes of movement in areas planned and built before the nineteenth century like in Fatimid Cairo (see Figure 3.17). On the other hand, areas built after the arrival of the motor vehicle adopted many strategies to include various modes of transportation.

The current centre of Cairo was built by the end of the 19th century and was planned to accommodate both modes and did not encounter many problems until recent years when the number of vehicles increased, especially in CCC. Although CCC has received a lot of attention in many respects such as traffic management and building conservation, the pedestrian environment is not up to the standard to compete with modern shopping areas.

Two streets were pedestrianised, El-Shawarby and El-Alfy Streets. The former was pedestrianised in the late 1980s, the latter in the late 1990s. The time interval between them seems to have added to the experience of dealing with pedestrian areas. The latter is treated slightly differently as seen when comparing figures 3.13 and 3.14. However, the pedestrian using the sidewalk is not receiving the treatment that the vehicle driver is receiving in respect to priority, management system and facilities. Three experiences are worth highlighting: El-Shawrby street (figures 3.13); El-Alfy street (figure, 3.14); and El-Boursa (stock exchange) area (figure 3.15). A collection of some observations of the pedestrian environment in CCC is also presented in figure 3.16. All these figures and the accompanying comments aim to give an idea of the pedestrian environment in CCC.

Figure 3.13 - El-Shawarby Street.

Comments (photos 1-5 were taken in 1997, photo 6 in 2000):

1) The entrance of the street from Kasr El-Nil Street, note the continuity of the sidewalk of the intersecting street as the only physical change to the street after being pedestrianised.
2) The illegal kiosks on both sides of the street.
3) A large number of shops, and the only place to put the rubbish is the middle of the street.
4) The other end of the street and the same treatment to indicate a pedestrian street, continuous kerb.
5) A consequence of pedestrianisation, small streets branching from the main street tend to encourage commercial activities.
6) At last in 2000, another physical change happened, and that is the change of the asphalt paving into a more suitable materials and tiles.

Figure 3.14 - El-Alfy Street.

Comments (all photos were taken in 2000):

1) The entrance of the street from Orabi Street is decorated with a big flowerbed.

2) Features like litter bins and seats are available unlike in El-Shawarby Street.

3) The shops on both sides of the main pedestrian street are refurbished and in good order.

4) The closure of the street on the other side, the side of Mohamed Fareed Street shows some awareness of the need for emergency entrance by locating movable flower boxes, although they seem heavy.

5) The street offers a good vista in both directions, in **4** the vista towards Mohamed Fareed Street which suggest a visual continuation and in **5** the enclosure towards Orabi Street.

6,7,8) The branching streets from the main pedestrian street, showing immaturity of functions and signs of neglect, but also a great potential for the future extension of commercial activities.

Figure 3.15 - El-Borsa (Stock exchange) Area.

Comments (all photos were taken in 2000):

1) Entry for cars is closed with a temporary chain.

2) Although the area does not offer pedestrian activities it offers a pleasant walking environment.

3) Although the street was planned to be available to movement, the management used it as parking and restricted any through traffic, only those who work in the market are allowed to enter.

4,5,6,7) The landscape elements that are chosen and located in the area.

8) An individually designed green landscape feature, which is introduced to the area by the design.

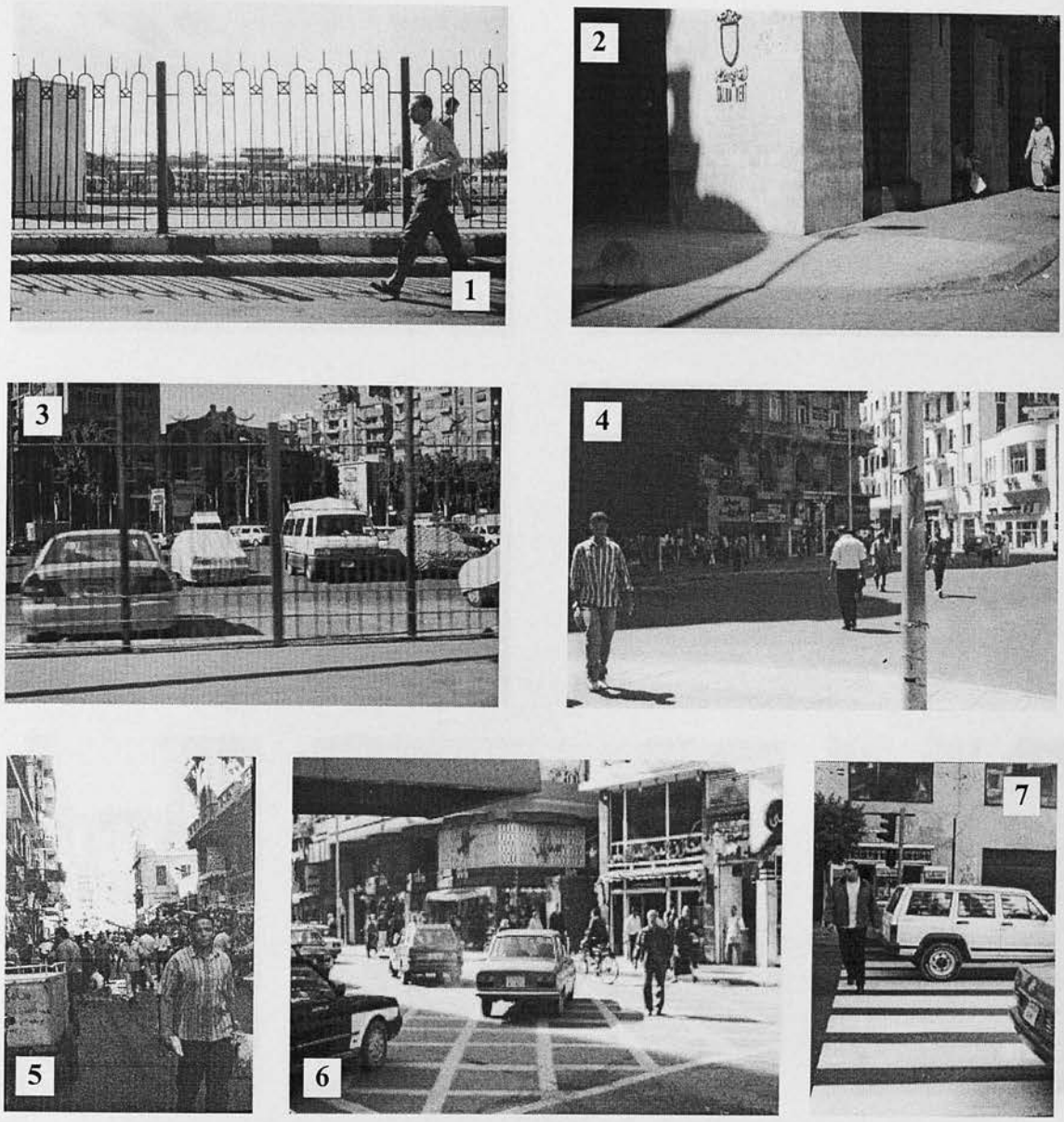


Figure 3.16 – General observations of pedestrian environment in CCC

Comments (all photos were taken in 2000):

1) A fence is used to prevent pedestrians from crossing, which is clearly not satisfactory to that user. As the reason was to minimise traffic interruption, distance between crossings is longer than suitable.

2) Some features in Cairo can only be seen in CCC, like this ramp for wheelchairs. However, CCC lacks consistency for this type of facility.

3) The need for parking allows the Governorate to transfer any vacant plot to parking area until the owner reclaims it for other uses which has partially solved the problem, however a permanent solution is needed.

4) One of the most looked after squares in CCC is Talaat Harb Square, however, the squares in CCC are mainly used to facilitate traffic and not to allow for static activities such as sitting and eating.

5) El-Tawfekiah street, which is also a market for fruit and vegetable, serves as market for the local residents and after-work shopping for workers in CCC.

6,7) The use of some traffic signs in CCC shows signs of naivety and causes confusion for users. In **6** the yellow crossing is used, according to a traffic warden, for its phosphoric brightness to warn drivers of the intersection ahead of them, where internationally it means that no stopping is allowed on them. In **7** the sign shows the 'red man' which means that no pedestrian is allowed to cross, where having the zibra lines means that once a pedestrian stepped on it, all cars should stop and allow him to cross.

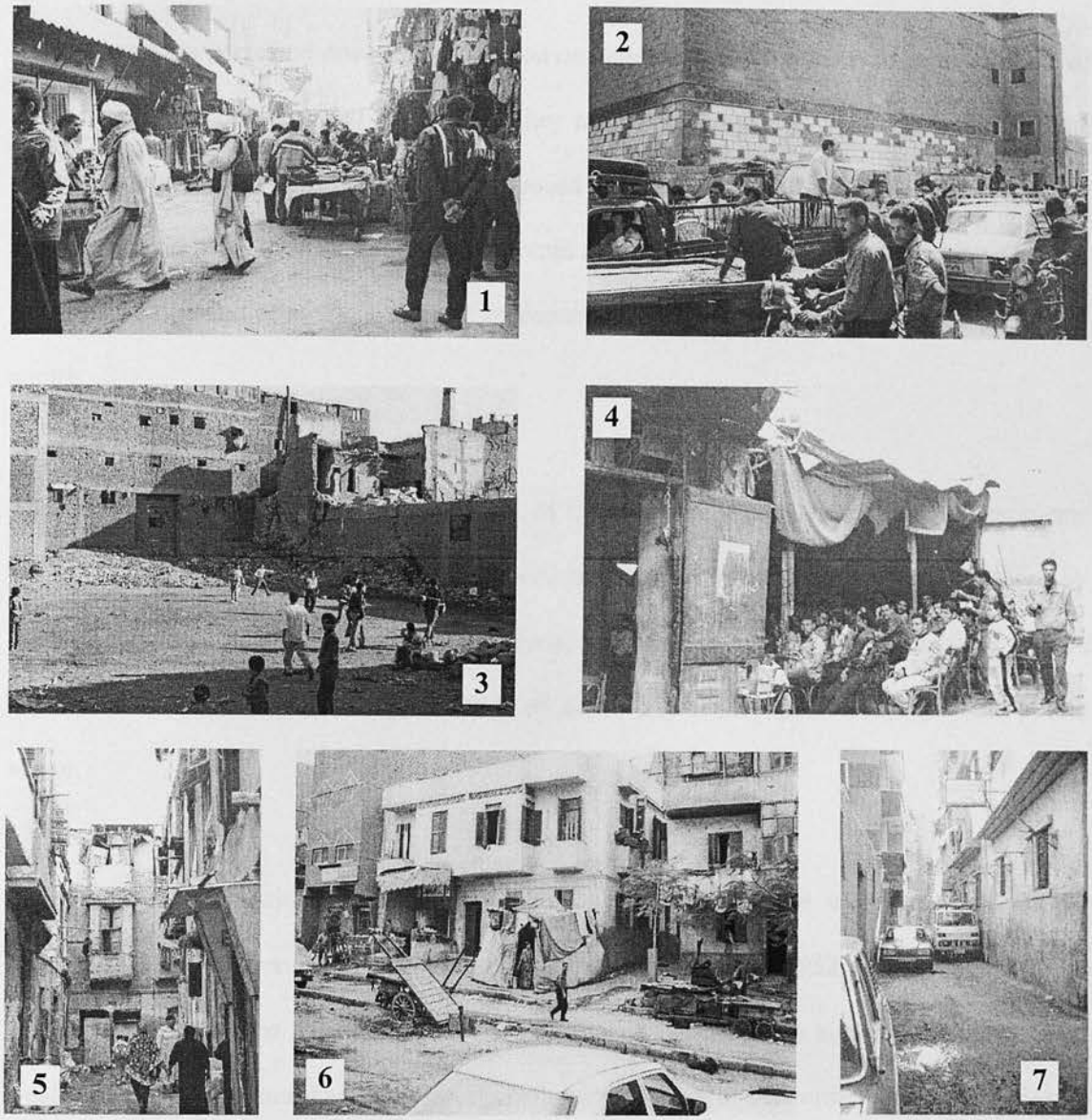


Figure 3.17 – Pedestrian environment in Fatimid Cairo.

Comments (all photos were shot in 1997):

1) Commercial streets in Fatimid Cairo compared to that in CCC do not have the same level of cleanliness.
2) The traffic system, if there is one there, is not able to cope with the existing pressure on the area and its urban fabric.
3) The potential like this vacant land, but no funding source either from outside or inside the community is encouraged to be involved.
4) Entertainment facilities are poor and residents depend a lot on coffee shops.
5) The poor images of old Fatimid Cairo as seen in figure 3.4.2 by Williams (1923) still exist and might be even worse.
6) The width of a street is no longer an indication of how clean it is, newly built and planned areas near the old Fatimid Cairo are also in the same condition.
7) A dilemma between the narrow street, the sewage problems, the luxury car and the social bond of the residents within the area. Social surveys indicate that not all residents of Fatimid Cairo are poor, some of them are rich.

3.5 Summary

This chapter has narrowed down the discussion on pedestrian environments to be to the scale of the local context of Cairo and its centre. They are presented as the main components of the comprehensive model of urban settings proposed in the Synopsis Chapter (see 1.2.3). These components are the physical and socio-economic environments. The local government system in Cairo was looked at as the system of reproduction for the pedestrian environment in Cairo centre.

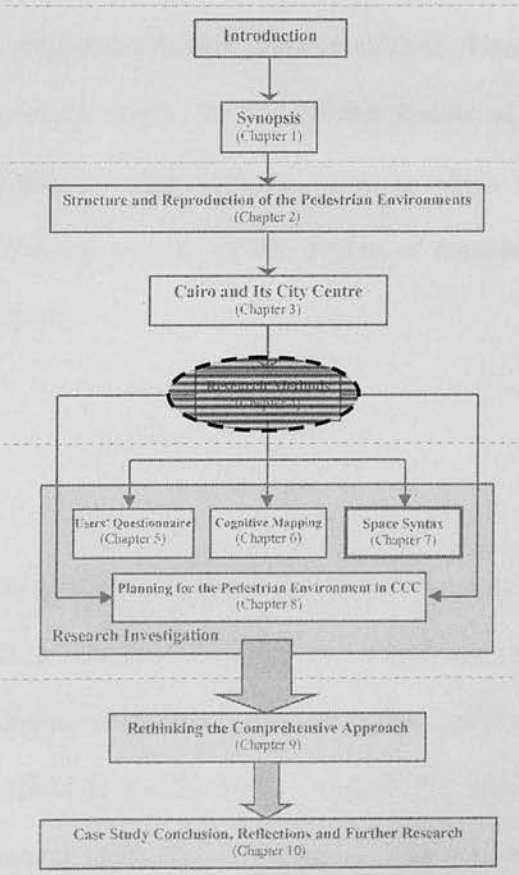
The review of the local government system in Cairo shows some deficiencies and problems with the current system. Among these problems are the regulations which are not followed by 60% of construction works; financial limitations; and administrative problems such as lack of communication and co-ordination and lack of active and skilled professionals in the public sector.

The review of the socio-economic environment in Cairo shows that there are some radical changes that this environment has undergone since the revolution of 1952. The influence of the market economy on the socio-economic environment is significant in almost all aspects. The wealth of the Gulf region has continuously influenced the socio-economic condition of Egypt, and especially Cairo as the focus of national services and investment. In total the socio-economic environment of Cairo has significantly changed and been partially disrupted by external factors.

The review of the built environment reflects the socio-economic environment changes. It shows construction acceleration when there is an economic boom and the opposite, a general principle. However, the built environment is found to be much more vulnerable to political decisions. In Cairo the agenda of those in political power is favoured over the actual public agenda. The most important observation is the centralisation of power and investment in Cairo which has weakened all other cities on the national scale (see figure 3.3).

Chapter Four

REVIEW OF LITERATURE ON RESEARCH METHODS



INTRODUCTION

This chapter describes the four research methods used in the current research. The objective of this description is to familiarise the reader with each research method. The review aims to convey four major aspects in respect of each research method.

1) The theoretical basis from which the research method, conceptually, derives its credibility.
2) The properties of the research method, which are essential to understand when conducting the research or analysing the data.
3) A brief account of the method as a research tradition which should, at the end, help to locate the current study within that tradition.
4) Criticism that has been made of each research method is reviewed and its proposed use is briefly described. However, as all four research methods have been proven to be reliable through previous findings, the criticism is to examine the limitations of each method which might affect the validity of the outcome.

It should be noted that these four aspects are discussed at different levels of elaboration according to the availability and applicability of each aspect to each research method. Thus the review of the theoretical basis of cognitive maping might far exceed the review of the theoretical basis of the questionnaire. This is also the case with the extent to which each research method is reviewed in total, which depends mainly on the degree of complexity involved in the conceptual and theoretical basis of each.

4.1 THE QUESTIONNAIRE

Unlike other research methods and techniques, the questionnaire has evolved from the authentic human desire to ask in order to know anything about anything. Children get to know the world by asking about everything they see which is unknown or unfamiliar to them. This same basic, but essential, concept holds on different levels. Children ask about simple things like 'why the cat does not speak like humans?' When they grow up and become researchers, they ask about

more specific and complicated things like 'what is the identity of a place and how it is conveyed through history?'

Unlike children, researchers, despite using the same technique to gain knowledge, have to follow some methodologies to reach a reliable and fact-based answers to their questions in order to generalise it on a specific context or level. The questionnaire in general aims at revealing individual opinions.

4.1.1 The Theoretical Background of Questionnaires

Questionnaires represent the obvious way of reaching knowledge through a common and widely accepted technique. However, it is possible to trace the use of questionnaire as a means of gaining information to the Chinese in the second millennium BC, where it was used to assess government officials (Aiken, 1997). The use of questionnaires has accelerated in the modern era due to the research work of sociologists, policy scientists, psychologists, and multidisciplinary scientists such as Quetelet, Fechner and Galton (ibid).

A definition of a questionnaire is "a written list of questions, the answers to which are recorded by respondents" (Kumar, 1999: 110). This definition is important in differentiating questionnaires from interviews, because answers in the interviews are recorded by the researchers. Based on this definition they are sometimes referred to as 'self-administrated questionnaires' whereas interviews are called 'face-to-face questionnaires' (Wilson, 1996; Aiken, 1997). Aiken has put a detailed definition of a questionnaire in general and the outcome of it as quoted in the following:

> ...a questionnaire should consist of a set of questions; but whether facts, opinions, attitudes, or other personal and social characteristics are being studied, as questionnaire may be composed of various kinds of objective or semiobjective items, including short-answer, completion, true-false, multiple-choice, rating scale, matching, ranking, checklist, or even essay. In addition, rather than being called a questionnaire, the resulting instrument may be labeled an inventory, an opinionnaire, a test, a scale, a survey, a schedule, a study, a profile, an index or indicator, or even a sheet or blank.
>
> (Aiken, 1997: 9)

The current research has employed the self-administrated questionnaire in the investigation and collection of public opinions on, and perceptions of, the pedestrian environment in Cairo City Centre.

4.1.2 The Properties of Questionnaires

Questionnaires are seen as a basic research method able to be used in most types of research. Aiken (1997) and many others report on the different types of research in which a questionnaire is a useful technique. The questionnaire could be used in an exploratory, hypothesis-testing, descriptive research or in explanatory research. This versatility of the questionnaire as a research method qualifies it to be used either as the major or the only research method used or, sometimes, to cover only some aspects of the research such as in the current study.

4.1.2.a Reliability and Validity: Reliability and validity are core concepts in research methods. The existence of one of them does not imply the existence of the other (for extensive details on both reliability and validity concepts see Silverman, 1993; Singleton *et al.*, 1993; Coolican, 1994; Babbie, 1995).

For a research method to be *reliable*, it has to give the same results if it is repeated under the same conditions (Moser and Kalton, 1989). Kumar argues that "in the field of social science it is impossible to have a research tool which is 100 per cent accurate" (1999: 140). The reason for this, Kumar mentions, is the unlikelihood of controlling all factors, or conditions in Moser and Kalton terms, affecting the reliability of any of the methods used. He mentioned five factors among those have significant influence on the reliability. They are: the wording of questions; the physical setting; the respondent's mood; the nature of interaction; and the regression effect of an instrument.

On the other hand, Kumar defines the *validity* of a research method or instrument as "the ability of an instrument to measure what it is designed to measure" (1999: 137). A definition more

related to the subjective nature of most of the social science research was developed by Babbie (1990). He says that "validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration" (1990: 133). However, validity is similar to reliability in that, in the field of social science, it is difficult to guarantee the validity of many research methods although this should be considered as an ideal that the researcher aims to achieve (Kumar, 1999). The validity of an applied research method could be *internal*, i.e. in the way the method was applied or analysed, or it could be *external*, i.e. from factors raised by the phenomena under investigation (Coolican, 1994).

Several concepts are related to the concept of validity and how it could be assessed (Kumar, 1999). *Face validity* refers to the establishment of a logical relationship between all items of the measuring scale and an objective of the research. *Content validity* refers to the measuring scale being comprehensive enough to cover all aspects of the issue under consideration. Both face and content validity are subjective evaluation of an operational definition (Singleton *et al.*, 2nd edn.,1993).

Another method of validating the results of a research is a *criterion-related validation*, which might be *predictive validity* or *concurrent validity*. *Predictive validity* is defined as how accurate the measuring tool is in projecting an outcome. *Concurrent validity* refers to a comparative measure between a research method and another one used concurrently in assessing the same conditions. Finally, *construct validity* is a statistical procedure, which determines the contribution of each factor in affecting the phenomena or concept under investigation.

The questionnaire selected for this research uses 'content validity. That is achieved by using open ended questions which provide a comprehensive measure of what the respondents think and does not limit them to specific choices.

4.1.2.b Questions in the questionnaires: A questionnaire is considered to be a structured research method, in that the questions are the same for all respondents and in the same order and

format. Questions might be open-ended, fixed, or mixed. Fixed questions have a major advantage in the ease of their quantitative analysis compared to open-ended ones, which are mainly qualitatively analysed. However, open-ended questions have many advantages over fixed questions (Coolican, 1994). They give much deeper responses, the respondent does not experience the restrictions of the fixed type and they minimise the ambiguity in the response as the respondents say what they have in mind rather than just agree or disagree without explaining their responses. Padgett argues that the difference between the quantitative and qualitative lies in the phrase that "quantitative research is 'a mile wide and an inch deep', and qualitative research is 'an inch wide and a mile deep" (1998: 50).

Coolican (1994: 143-144) recommends that certain qualities should be avoided in the design of a questionnaire, regarding its contents and its organisation. The questionnaire contents should not include: complex concepts; technical terms; ambiguity; double-barrelled items (the inclusion of two variables in one question); double negatives; emotive language; leading questions; and invasion of privacy. The design should avoid agreement rather than disagreement; respondents' interpretations; and their tendency to give socially acceptable and desirable answers. The latter could be achieved by including clearly negative and positive statements in unexpected order throughout the questionnaire.

Five main types of information can be obtained from the questionnaire. They are 'background and demographic data', 'behavioural reports', 'attitudes and opinions', 'knowledge', and 'intentions, expectations and aspirations' (Fife-Schaw, 1995). The first type is common in most, if not all, questionnaires where the existence of the other four types varies according to the objectives of the questionnaire.

4.1.2.c Sample Distribution and Questionnaire Distribution: *Sample distribution* refers to the composition of the respondents to the questionnaire. *Questionnaire distribution* refers to the method used to deliver the questionnaire to the respondents and then collecting them back.

The sample distribution should be carefully selected in order to be valid, however it should also consider the limitations of the research. The word *sample* itself implies that the respondents do not *include* every one, but they rather *represent* the group that the research is said to be targeting. The extent to which each group is precisely represented differs according to the research structure and the objective of using the questionnaire. The need for a high percentage rate of representation can be reduced by the use of other complementary research methods in the study. A research that aims at obtaining objective-quantitative facts needs larger samples than one aiming at obtaining subjective-qualitative results that are subject to interpretation and inferential analysis or, sometimes, to further research.

There are three major types of sampling strategies *random/ probability* sampling; *non-random/ probability* sampling; and *mixed* sampling (Kumar, 1999: 152). Two types of those mentioned by Kumar are of specific importance to the current research. These are the *proportionate stratified random sampling* and *snowball sampling*. Proportionate stratified random sampling refers to the strategy of representing various groups within the total population with their approximate percentage in the sample. For example if the total population contain 40% men and 60% women, the sample should contain the same ratio of each gender. Snowball sampling is a process of selecting the sample using a relationships network. At first a few individuals are selected to be part of the sample, and they are then required to nominate others to take part in the research who eventually become part of the sample. The sequence proceeds until reaching the target number of respondents in the sample (ibid.).

Kumar argues that there are other factors that should be taken into consideration in the selection of the sample apart from just being a representation of the total population. These factors are:

> 1) Motivation to share the required information - it is essential for respondents to be willing to share information with you.
> 2) Clear understanding of the questions – respondents must understand what is expected of them in the questions.
> 3) Possession of the required information – …respondents must have the information sought… in the case of opinions this does not necessarily apply as all of us have opinions.
>
> (Kumar, 1999: 124)

Considering questionnaire distribution, it could be delivered to respondents either by post or delivered and collected by hand. Posted questionnaires facilitates a bigger sample sizes but might be expensive and usually have a small return rate (Bell, 1993). Bell recommends personal distribution, as it guaranties a higher response rate, although it limits the sample size to the time available to the researcher. It is important to note also that the posted distribution requires a high standard of postal system, which unfortunately is not guaranteed in the case study of the current research.

4.1.2.d Analysis of the Questionnaire Results: The route that the analysis of the collected data from the questionnaires takes depends mainly on the research objectives which previously affected the design of the questionnaire. As mentioned earlier, if the objective of the research is to establish fact based findings, such as a hypothesis testing approach, then the questionnaire will be in the form of fixed end questions to facilitate an empirical analysis of the findings through various statistical approaches, such as correlation and regression analysis. On the other hand if the research is of an exploratory nature then the researcher has a few preconceptions about what might come out of the investigation. Therefore the questionnaire will be in the form of open-ended questions. This type of questionnaire could be analysed using a quantitative analysis technique like content analysis (see 4.1.2.a), but the findings may also acknowledge, qualitatively, the insight information of the responses. However, to do so three analysis stages must be followed:

1) *Descriptive analysis:* this stage describes the results of the questionnaire. In order to do so, the analysis employs the use of frequencies of responses to each question. The responses could be considered in their raw format, i.e. the direct response, or in grouped categories of information. These categories depend on both the quality of the responses and the objective of the research.

2) *Association analysis:* it looks for any significant relationships between various parts of the questionnaire. It also looks for significant relationships between the responses and the personal information and the background of the respondent.

3) *Inferential analysis*: This looks for explanations for the results of the previous two stages. Inferential analysis is significantly of a subjective nature which depends largely on the researcher experience and his/her ability of linking various types of information to each other or sometimes to theoretical concepts. Because of its subjective nature, the researcher should present this separate from the previous two types of information, which contain research facts only.

4.1.3 Questionnaires as a Research Tradition

There is little more that can be said about the use of questionnaire as a research tradition. Questionnaires have been employed in many fields as a basic research method which has limitations but which provides a type of information that only it can provide it. These fields include social science, psychology, geography, studies of commerce... etc. It is the most general and common research method in that most of its properties apply to many other research methods and at the same time it does not have the same restrictive 'baggage' of theoretical and conceptual backgrounds as other research methods have (Fife-Schaw, 1995).

4.1.4 Criticism and Proposed Use of the Method

4.1.4.a Criticism: The strongest criticism of questionnaires is the subjectivity of the responses and the impossibility of ensuring that these responses are the respondents' honest opinion. Furthermore there is the uncertainty as to how far their stated opinion would hold true if faced with real situation?

Other issues of criticism focus on the specific nature of the questionnaire compared to other methods of subjective inquiry such as interviews. Questionnaires lack the opportunity to clarify issues but at the same time they totally eliminate the interviewer influence on the respondent. The questionnaire might not include the opinion of only the person considered to have

completed it as he/she might have consulted others. The respondents might read through the whole questionnaire before answering, which might affect their answers to questions designed to be addressed before further proceeding to other more advanced questions. Another problem is caused by the respondents' freedom to return or ignore the questionnaire, which might give the sampling distribution a self-selecting bias (Kumar, 1999).

4.1.4.b Proposed Use of the Method: The self-administrated questionnaire is employed in the current research to obtain information from the ordinary users of the city centre of Cairo about their walking experience, within the area specifically and in general. The questionnaire was distributed personally to a first group of respondents and followed the snowball sampling strategy. However the researcher monitored the collected questionnaires to avoid any bias in the sample, for example under-representation of a target age group, which, when noticed, was corrected by asking one of the participants to recommend another person to be involved and who fitted the missing or underrepresented target group. Chapter Five includes a more detailed description of the questionnaire design.

4.2 COGNITIVE MAPPING

The study of human cognition is not a new field since it is an essential part of the general field of psychology. The concept of cognitive mapping was first coined by Tolman (1948) referring to the mechanism rats use to remember their way to food in a maze. Later, Boulding (1956) used the term *'image'* to refer to the cognitive map and described it as the picture that the beholder carries of the world in his/her mind which then works as the guide of some related behaviour (such as movement). However, it was only when Lynch (1960) published his book 'The Image of the City' that the cognitive mapping technique became a known research method[1]. In this book Lynch puts forward the basis of the research method which was later used in many research works (e.g. De Jonge, 1962; Gulick, 1963; Appleyard *et al.*, 1964; Harrison and Howard, 1972; Francescato and Mebane, 1973; Marchand, 1974; Kitchen and Fotheringham, 1997; Hattori, 1999).

Since the publishing of Lynch's study (1960), Downs and Stea (1973) has been a comprehensive reference to the basic concepts and ideas related to the concept of the image and the environment. Moore (1979) was another important literature review study of most of what have been written on environmental cognition in general. Kitchen and Freundschuh ((eds.), 2000a) recently added another important reference to literature on cognitive mapping. This literature review relies mainly on those four sources with reference to other significant contributions.

4.2.1 The Theoretical Background of Cognitive Mapping

Before going into the specific discussion of cognitive mapping the author defines and distinguishes the two terms of perception and environmental cognition. Since they are central concepts in understanding the cognitive mapping procedure and research, and they have been

[1] A year after Lynch's book was published., Strauss published his book 'Images of the American City' (1961) and despite the apparent similarity in the title, Strauss did only target to capture the main properties of the American cities in general considering both aspects of all cities, the built environment and the cultural side. He referred to the common properties of the built environment as 'the Symbolisation of Cities' and to the common culture as ' Configurations of American Urban Culture'. However, his study did not provide any empirical method to capture this *Image* when compared Lynch's study.

used in a confusing way in literature (Downs and Stea, 1973). There are many definitions for them in psychology-related references (e.g. Eysenck, 1984) but, for the sake of the context of the current research, the definitions from Downs and Stea (1973) that are related mainly to urban life and urban design and planning, are more suitable.

> ... the term *perception* [stands] for the process that occurs because of the presence of an object, and that results in the immediate apprehension of that object by one or more of the senses...*Environmental cognition* is (thus) the subject matter of interest to geographers, physical planners, and environmental designers working on behaviour issues. Cognition need not be linked with immediate behaviour and therefore need not be directly related to anything occurring in the proximate environment. Consequently, it may be connected with what has passed (or is past) or what is going to happen in the future.
>
> (Downs and Stea, 1973: 14)

Perception can be seen as the first stage of the process which leads to the product of cognition which is the tool of recognition when behaviour needs to retrieve stored information to help with decision making. However, the argument behind the cognitive mapping technique is that not all that is seen is equally perceived, because perception is affected by the strength of the stimuli and that affects what is stored.

Considering the above definitions of perception and cognition it is possible to move towards defining the procedure which produces the cognitive map in the human mind. Most research work in the field of environmental cognition rests on the assumption of Moore and Golledge (1976) which was restated in Moore (1979). This assumption adopts a constructivist approach and suggests that:

> ...the environment is conceived of in different ways by different people... as a result of different life experiences... through a highly developed interpretative process... [that] acts as a filter - a scheme in Piaget's[2] terms - and it is these schemata which are the subject of environmental cognition research and theory.
>
> (Moore, 1979: 34-35).

However, it is not always accepted that designing with environmental clues in mind will produce a legible environment because of changes in the process of transformation of

environmental meaning from one generation to the next, in contrast to the traditional cultures as Bengs (1988) suggested. In modern societies the number of different conceptual signs and symbols has increased and the harmonisation effect that behavioural clues have on individuals is much less than before (Rapoport 1982). Lehtonen (1990) argues that the ruin of collective cultural clues of meaning increases the need to add signposts, signals and clarifying signs to the environment. She continues to say that "If even the entrance of a building has to be signposted, there should be serious reasons to suspect the power of the behavioural clues that architecture contains!" (1990: h7).

Regardless of the method of investigating the Cognitive Map, the process of acquisition, storing and recognition has been widely accepted (for example Boulding, 1956; Appleyard, 1969; Downs and Stea, 1973; Moore 1979; Kitchen and Freundschuh, (eds.) 2000a). Downs and Stea (1977) referred to four aspects as the main characteristics of the process that provides the maps of the environment in the minds of the beholder. They are as follows:

1) **It is an interactive process,** which relies mainly on the positive interaction between subjects and their environment. In this interaction process both humans and the environment affect each other.
2) **The selectivity** of the cognitive mapping: In this process humans use selective criteria to decide first what elements they store and in which form and second what information they restore and in which form in order to cognise and recognise their environment.
3) It is **the organising nature** of cognitive mapping that gave it its distinctive nature. [in other words the structure that the person uses to arrange the selected elements]
4) Cognitive maps **accuracy and similarity**: It is impractical trying to discuss cognitive mapping on the criteria of *accuracy* or *similarity*. Nevertheless, that does not deny the importance of using cognitive mapping as an important and unique tool to study the spatial environment especially with the high degree of freedom it gives to the respondent.

[2] Piaget, J., *et al.* (1960), The child's conception of geometry. (Orig. French edition. 1948), trans. by E. A. Lunzer. New York: Basic Books.

These characteristics significantly affect the properties of the product which is cognitive mapping. Downs and Stea (1973) define individual cognitive mapping as the mental *process* upon which the *intermediate product* of the cognitive map and the *final product* of the individual spatial behaviour is dependent. Although that seems a deterministic approach, the two notions in the definition do give a more probabilistic approach. The first is the individual determinism they followed which prohibits any more deterministic generality. Second, cognitive mapping, as Downs and Stea acknowledge, involves "processes of unknown physiological and controversial psychological nature" (1973: 10) which then deny any deterministic notion in their approach.

4.2.2 The Properties of Cognitive Maps (as a product)

Downs and Stea described the kind of information that the built environment provides the individual with as being:

> ...from a complex, uncertain, changing, and unpredictable source [which is received] via a series of imperfect sensory modalities operating over varying time spans and intervals between time spans. [On the other hand the individual has a] limited mobility, stimulus-sensing capabilities, information processing ability, storage capacity, and available time.
>
> (Downs and Stea, 1973: 9-10)

But the individual still has to collect the information needed to form a comprehensive representation of the environment. This process of acquisition, amalgamation, and storage is *cognitive mapping*, and the product of this process at any point in time is considered as the *cognitive map.*

A selective process of acquisition is followed by individuals to choose the most significant environmental features and how are they related to each other and where the individual is spatially. Eventually the individual is able to navigate in the environment using their cognitive maps or their mental maps as referred to in some literature (e.g. Gould and White, 1974).

From this discussion the function of the cognitive mapping will clearly have a crucial impact on pedestrian movement, the main issues in this thesis, and movement in general as was studied by Appleyard for the in-vehicle traveller (1964). It is important to note that the term *cognitive map* does not refer to a *cartographic map* but to a *cognitive representation* which helps in the navigation through the environment and does not have to have the physical form of the actual environment (Blaut, McCleary and Blaut, 1970).

The importance of cognitive maps is apparent in many ways. Humans need to locate themselves whether in the city, their neighbourhood or even within their own house. If humans do not have a map in their minds defining where they are, the location of their destination and the possible routes to take, they will never comprehend the transportation task.

4.2.2.a Signature and representation: The signature of a map is the system that is used in encoding and decoding it, or in other words the symbols used in drawing it and the way it can be interpreted. In any map drawing process, there are three main stages involved: scale, point of view or perspective, and abstraction and symbolisation. It is also expected that cognitive mapping processes involve all three stages of map making. Most important of the three operations is the third one as it results in the transformation of absolute space into another form of relative space which is thus used as a guide in spatial behaviour. Therefore two major aspects of cognitive mapping should be studied to understand the representation process behind the resulting maps of any research. First, the *signature and the symbolisation* in which the map was produced by, either verbally or graphically, should be critically analysed. Second, the research should handle the *abstraction operation* or the ways in which individuals structure their map, not the specific elements they used in the map, to avoid having results which are "heavily content-loaded." (Downs and Stea, 1973: 12). The representation process is also referred to as a schematisation of the real environment into fewer sets of information and the relationships between them (Tversky, 2000).

4.2.2.b Types of Information Included in Cognitive Mapping: There are two types of information that an individual must have to navigate confidently and successfully in the spatial environment; *locational* and *attributive* information (Downs and Stea, 1973). These two types are not separated in practice, but complement each other to give the comprehensive image of the environmental phenomena needed by the individual to navigate. Locational information gives a subjective geometry of space and answers the question of where the environmental phenomena are. Locational information is given in the form of a distance and a direction. Attributive information tells us everything else about the phenomena. It is sub-divided into two further categories of information 1) descriptive or denotative, and 2) evaluative or connotative (ibid).

Although Downs and Stea see environmental phenomena as an 'object', the current research does not adopt the same point of view due to the limitations this definition puts on what people perceive as being only of a physical nature. Meaning in the built environment can be perceived as, for example, safety issues, which can not be considered as an object. This meaning can highly influence the perception of the built environment and therefore the cognitive image of it (Gulick, 1963; Rapoport, 1970b; Harrison and Howard, 1972; Rapoport, 1977; Krampen, 1979). What supports this notion in the current research is the suggestion of Downs and Stea that objects (as phenomena) and their attributes could switch places if the scale of the analysis changes, e.g. from inter-urban scale to intra-urban scale. Considering the two scales covered by the current research (Cairo and its centre) it is more suitable to leave the door open for both categories to fit into the responses to facilitate the comparison between the two scales.

4.2.2.c Structure of the Image: Lynch (1960) found five ways of structuring the cognitive image: 1) movement based on branching from a major movement artery, 2) an enclosing outline which is then filled with various elements, 3) a street pattern, 4) a set of elements which are further connected, and 5) a single reference point to which every thing else is linked.

Tversky (2000) has mentioned two general frames of structuring according to which the beholder might organise the environmental elements in the cognitive map. They are the

hierarchical organisation and the *canonical axes*. In the former elements are organised with respect to the organisational hierarchy of the geographical setting (Stevens and Coupe, 1978) and in the latter elements tend to be organised relative to a given axis as the East-West or North-South axes (Tversky, 1981).

Appleyard (1969) (discussed extensively in Chapter Six, see figure 6.2) found that the most frequent methods of structuring the urban areas in mental maps have eight categories. These eight categories were placed in two groups, sequential and spatial, ranging from topological to positional.

4.2.2.d Levels of the Image: Tversky (2000) says that all opinions regarding the cognitive map consider it as a mental representation of an external environment. This mental representation is the knowledge that is needed by a traveller in any environment in order to get from one place to another without using written instructions or a map on paper. She mentions three levels of knowledge: overviews, views and actions. The level of *overviews* is defined as the "mental representation of an area that includes 'here' and 'there' and regions around and between them" (Tversky, 2000: 24). Having this knowledge, the traveller then chooses the optimum route according to various criteria. The level of *views* is defined as the "representation of the local surroundings, with information critical to the choice highlighted" (ibid). Finally the level of *actions* refers to the knowledge of "how to take each step or each turn of the wheel, maintaining course while avoiding pitfalls and obstacles" (ibid).

Blaut (1999) defines the levels of space from the point of view of the discipline that handles each space, so for him there is the small space that is studied by the psychologists and the big space which is handled by geographers. However, the phrase *scale of space* has been used in research that demonstrates that the size of the space affects spatial cognition and thereafter spatial performance and behaviour (Siegel *et al.*, 1979; Acredolo, 1981; Acredolo and Boulter, 1984).

The significance of change in the size of the area under consideration was raised in Lynch's study under the title of 'the shifting image' (1960: 85-87). Lynch argued that the existence of a comprehensive relationship between the image of different scales is essential for the overall imageability of the built environment.[3] However, Montello and Golledge (1999) report that there are no studies which deal with the relationships between cognitive representation in different sizes of environments (see also Freundschuh, 2000).

4.2.3 Cognitive Mapping as a Research Tradition

As mentioned before, Lynch (1960) was the first to use a technique to investigate the cognitive map of urban areas. In that investigation he made analyses of the central areas of Boston, Jersey City and Los Angeles. A systematic field inspection of each area, made by a trained observer, was compared with the images of a small sample of residents. In an interview the respondents were requested to give descriptions, indicate locations, name the most distinctive elements and make sketches of the area in question.

Lynch then identifies three main categories of information which are the main components of any image: *identity*, *structure*, and *meaning*. Lynch defines *identity* as the "identification of an object, which implies its distinction from other things, its recognition as a separable entity." *Structure* is defined as "the spatial or pattern relation of the object to the observer and to other objects." *Meaning* of the environment for the recogniser is the third category and it can be practical or emotional.

However, Lynch's study focuses on the identity and structure of the environment and does not deal with its meaning for two reasons. The first is that the common meaning of the built environment among the population is much less consistent than the objects and their relations. The second is that meaning is much less influenced by physical changes than the other two components. Although this approach of Lynch has faced criticism in other studies (for example

[3] In the field of Space Syntax, the term *intelligibility* is defined as 'the relationship between the local spatial configuration and the that of the global spatial environment' and was found be of a high influence on the pedestrian perception and cognition (Young, 1999).

Gulick, 1963), its reasoning in new designs, as Lynch himself intended, is still valid. For these designs there are projected users with projected attitudes, behaviours and feelings, and not current users such as in Gulick's (1963) case study.

Lynch found five main elements which make up the image of the identity category of an urban area: landmarks, edges, paths, nodes, and areas. Lynch (1960: 47-48) defines them as:

> 1- Paths are the channels along which the observer customarily, occasionally, or potentially moves.
> 2- Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity.
> 3- Districts are the medium-to-large sections of the city, conceived of as having two-dimensional extent, which the observer mentally enters inside of it and which are recognisable as having some common, identifying character.
> 4- Nodes are the points, the strategic spots in a city into which an observer can enter, and which are the intensive foci to and from which he is travelling.
> 5- Landmarks are another type of point reference, but in this case the observer does not enter them, they are external.

Lynch also identified the term of imageability as "the quality in a physical object which gives it a high probability of evoking a strong image in any given observer" (Lynch, 1960: 9). Imageability is believed to be a key factor of the outcome of cognitive mapping research because it directly reflects on urban design criteria, in other words it is the practical outcome of the method. In a later study Gulick defines a broader definition of imageability as "a set of qualities of, or associated with, an object, which maintains in the beholder conscious visual awareness of the object" (Gulick J, 1963: 193). Guilick's intention for that definition was to include the social aspects of the built environment.

Ungerleider and Mishkin (1982) see the five elements of Lynch as loosely representing 'what' is there in the environment but still missing properties that refer to 'where' these elements are located relative to the whole image and to each other. Tversky (2000) stated several properties which might define this 'whereness' property. One of these properties is the *alignment* of elements or being remembered as "more aligned relative to a reference frame than they actually

are" (Tversky, 2000: 26). Another property is the *cognitive reference point,* which refers to any prominent element which is used as a reference point for less prominent elements (e.g., Couclelis *et al.,* 1987; Shanon, 1983).

However, it is not fair to consider that Lynch did not acknowledge the relationship between elements, especially in that it was in his objectives to study the properties of identity and structure in the environment, and the latter, according to his definition, is the relationship between various elements of the image. Lynch clearly discusses the properties of structuring technique in the image investigated (Lynch, 1960: 83-90). He describes *element interrelations* as the way elements are patterned together, producing a kind of shape or form. He proceeds to talk about the *shifting image* which is the idea referring to the environmental image as organised on different levels (e.g. the neighbourhood, the district and the city). Relations between different levels are crucial in the formation of the final comprehensive image. The structure of the image depends mainly on the two properties of the image of element interrelations and shifting image together with a third property that is the *image quality.* This refers to the relative density of the image and the cohesion of the structure.

Categories of research on people's cognition and imagery of environments

Moore (1979) comprehensively summarises the state of research into people's cognition and the imagery of environments under four major categories.

1. subjective knowledge of location, spatial layout, and other physical-geometric aspects of the environment... is called ***cognitive mapping*** (Downs and Stea, 1973);
2. linguistic labels and category systems for dealing with the every-day environment, ... [is called] ***personal construct analysis*** *as* largely conducted with regard to environments by geographers (Harrison and Sarre, 1975, 1976);
3. images of overall character and qualities of environments, the character of cities in general... is called ***urban imagery*** ...(see Gerson and Gerson 1976); and
4. People's awareness of the meaning and symbolism of different environments of different aspects of the environment... is called ***environmental meaning and symbolism*** (Cooper, 1974; Moore, 1975c; Rapoport, 1972, 1976; Duncan, 1973; Duncan and Duncan, 1976).

(Moore, 1979: 40)

The current research falls mainly in the first category but also deals with 'meaning' in the built environment as an element (equal to any other physical element) which is extracted from the respondents' direct responses without trying to go beyond the apparent meaning as usually the case in the fourth category. This combination aims at comprehensively studying the mental image from both aspects, the physical and non-physical, but at the same time aims at minimising the bias that might be caused by the respondents' personal differences and researcher influence involved in trying to find deep environmental meaning (using techniques such as in-depth interviews and Personal Construct Psychology (PCP)). This modification to the existing method is based on previous studies of DeJonge (1962), Gulick (1963) and Harrison and Howard (1972) which found that the cognitive mapping investigation technique, if designed with open ended responses (i.e. not defining the category of the requested response to be either physical or non-physical), shows the relative importance of both categories to each other.

4.2.4 Criticism and Proposed use of the method

4.2.4.a Criticism: The criticism could be divided in two categories, the first of which criticises the research method itself in general and the second of which criticises the methods of data collection and analysis techniques. Both could be understood not as drawbacks, but as limitations which vary from one research to another. The former could be called internal limitations and the latter could be called external limitations.

The *internal limitations* are those related to the technique itself regardless of the respondents involved in the investigation, in other words those limitations affecting the test's *internal validity*[4]. On the other hand *external limitations* are those related to the respondents themselves and which might result in changing results as the sample changes, in other words those limitations affecting the test *external validity*[5].

[4] Internal validity refers to whether an effect was genuine or the result of incorrectly applied statistics, sampling bias or extraneous variables unconnected with the internal validity (Coolican, 1994).

[5] External validity concerns whether an effect generalises from the specific people, place and measures of variables tested to the population, other populations, other places and to other, perhaps fuller, measures of the variables tested (Coolican, 1994).

Despite these limitations, a previous study (Howard *et al.*, 1973), using four methods of measurement, has found that cognitive mapping technique produces highly reliable and valid results. The four methods are 'method of reproduction' (which is used in the current research), 'method of modelling', 'method of absolute judgement', and 'method of ratio estimation' (see Howard *et al.* (1973) for further details).

Nevertheless, the findings should be considered in the light of the sample description for the previous findings of Zannaras (1973) which points to the influence of personal characteristics on the perceptual selection and organisation of environmental information. Zannaras also found that the land use pattern affects the image of the respondents. Among the personal differences which have been shown to have an influence on the resulting image of the environment is that between environmental professionals (e.g. geographers, architects, planners etc.) and lay persons (Leff and Deutsch, 1973).

Internal Limitations:

This category of limitation can also be understood in the light of the above characteristics of the process involved in the production of cognitive mapping (Downs and Stea, 1977).

1) Distortion: Some properties of the cognitive mapping technique within the beholder's mind result in distortions in the final image of the environmental setting such as *perspective* (Holyoak and Mah, 1982). *Distances* might be shortened (Briggs, 1973; Golledge and Zannaras, 1973) or overestimated (Kosslyn *et al.*, 1974; Sadallah and Magel, 1980; Sadallah and Staplin, 1980a ;Sadallah and Staplin, 1980b; Thorndyke, 1981; Newcombe and Liben, 1982; Lloyd, 1989). Finally and in accord with Gestalt laws describing the way humans perceive the environment as a relatively simple and approximate mode of what it really is, cognitive maps tend to simplify spatial relationships. This simplification could either be in adjusting angles towards the right-angle or familiar ones such as 30, 45, or 60 degree, or shapes towards familiar shapes such as squares, rectangles, circles, and triangles (DeJonge, 1962; Moore, 1979).

2) Incompleteness: considering the unlimited amount of information available in the environment, the limit of the human mind in storing this and the further limit imposed by the ability of that human to retrieve and represent this information on paper, it is not difficult to expect the cognitive map to be neither fully representative of the world nor of the individual's cognition. The incompleteness of cognitive mapping has been reported much in previous research (Carr and Schissler, 1969; Appleyard *et al.*, 1964).
3) Augmentation: Downs and Stea (1973) report this deficiency in the cognitive mapping technique which they describe as the possibility of having a non-existent phenomena included in the cognitive map either to fill a gap in the recognition or representing as a desire to see such a phenomena in a specific place.
4) Deformation: Marchand (1974) argues that asking the respondents to represent their mental image on paper is more likely to involve the deformation of their real mental image to fit on the sheet of paper given. Drawing a map itself is not a simple task for a professional let alone a lay person. The same could be said about any method for the collection of cognitive information.

External Limitations:

External limitations mainly refer to the countless differences between human beings in their ability to perceive, cognise, recognise and finally to draw the cognitive map. Moore (1979) reports a huge selection of these differences which ranged from individual to group differences. Individual differences might refer to individual's cognitive ability: gender, age, familiarity, travel mode, lifestyle etc. Group differences might refer to ethnicity, culture, social class etc. Moore also reports that these differences might result in differences either in the content, quantity of information or the structure of the cognitive map.

Considering the previous differences, it is not reasonable to discuss the cognitive map from the point of view of accuracy. Nevertheless, the value in using cognitive mapping as a reliable technique to investigate the relationship between the real environment and how humans perceive it, and thereafter reflect upon it in subsequent social behaviour, is still valid. What

gives cognitive mapping a special nature is the degree of freedom it gives to the respondent. Cognitive mapping is seen in many references as providing a useful tool for analysing the impact and influence of the physical built environment on the user at different environmental scales (Downs and Stea, 1973: Downs and Stea, 1977; Moore, 1979; and Kitchen and Freundschuh, 2000b).

Lynch's method has faced some criticism with respect to the methodology of inquiry itself or the types of results it comes up with. In spite of this, most of these criticism can only be categorised as comments, not as real drawbacks of the method. For example, Marchand (1974) comments that Lynch's method is mainly qualitative and only measures the components of the image and their geometrical relationships in the mind. Yet this comment can not deny the drawback that is found in the methods derived to measure this geometry, in the way that they influence the respondents by giving them 'spatial cues' in order to quantitatively analyse their responses (e.g. Kitchen and Fotheringham, 1997).

Another criticism which could be considered more as a comment than a criticism is the accusation that the method of Lynch is very much oriented towards objective and physical aspects of the urban environment with less attention given to social and cultural aspects (Gulick J, 1963). On the other hand, Marchand (1974) describes the method as including many cultural rules common to all maps. However, Lynch in his study (1960) stated that the social and cultural meanings are involved in the composition of the image, but it was just not included in his study (for the reasons mentioned in 2.3.3, 3rd par.). The current research introduces some modifications to Lynch's method of inquiry to account for the social and cultural components of the image as will be seen in Chapter Six.

4.2.4.b Proposed Use of the Method: Kitchen and Freundschuh (2000c) developed a framework of proposed future use on cognitive mapping divided to three fields, theory, methodology, and application. Despite mentioning a huge number of possible future developments in cognitive mapping, the most important and the most repeated need they put

forward is that for multidisciplinary research which links the various spatial knowledge techniques together. This multidisciplinary approach will help in requisitioning the existing ideas to find unconventional hypotheses. Kitchen and Freundschuh concluded, "central to any future agenda of cognitive mapping, research must be the development of appropriate integrative frameworks for study" (Kitchen and Freundschuh, 2000c: 261). Current research suggests that this is not a notion but has already transferred into real research (see Kim, 1999). Kim investigated the relationship among the three disciplines of cognitive mapping, spatial configuration and spatial behaviour. His research reveals many valuable results in comparing the findings of different analysis techniques applied to the same context.

From the above discussion, it is clear that the approach adopted by the current research is supported by some of the most recent publications in the field of spatial knowledge. The use of the method in the current research will have a number of objectives which are drawn from the above literature review and the analysis will try to follow the recommended techniques as described in Chapter Six.

4.3 SPACE SYNTAX

Space Syntax was developed at the Bartlett School of Architecture and Planning, University College, London (Hillier and Hanson, 1984). In general, it is an exploratory technique[6] in the field of spatial analysis (Hillier, 1998a). The method has been used in research involving movement analysis in general and its implications include strategic issues such as retail locations, distribution of land uses and locations of crime.

In the following subsections, the theoretical basis of the theory of the *social logic of space* (Hillier and Hanson, 1984), on which the Space Syntax technique was built, is reviewed. After the publication of 'The Social Logic of Space' in 1984 many others followed, either written by the founders of the theory or by other interested scholars. However there has been no attempt to comprehensively review and organise the literature written on Space Syntax. The following literature review is the author's attempt. The review also addresses the main concepts involved in the Space Syntax technique, the tradition of using Space Syntax as a research tool, the criticisms raised against Space Syntax and how the current research is making use of the method.

4.3.1 The Theoretical Background of Space Syntax

The concept of Space Syntax is found in literature as early as 1976 (Hillier, Leaman, Stansall and Bedford). In this paper they presented three main concepts. First, they suggested that spatial configuration is better seen as part of the 'morphologic languages' which refers to specific properties in the urban structure, which are shared across different urban patterns and which constitute the social properties of the space. The second concept proposes the existence of a "general syntactic theory of space organisation" or, in other words, common spatial configurational relationships between different urban structures on the levels of the settlements and buildings. Finally they used this general syntactic theory to integrate some propositions

[6] Exploratory in the way that it can be used to find either problems or potentials in the urban structure but not to offer solutions or to give definite results (Hillier, 1998a).

from the field of anthropology in respect to human spatial configuration (Hillier *et al.*, 1976: 147-185).

This general syntactic theory was later coined by Hillier and Hanson (1984) into the production of the Space Syntax technique, proposing that *space* is the most important element in the study of architectural artefacts. Hillier and Hanson consider space as the level which causes effects on human behaviour much more than the appearance of architectural structures. Space contains behaviour in which it has a *direct* link to social life, not only a *symbolic* link as appearance has. Space earns this link by providing the opportunity to move and meet others which are the main aspects of generating social relations (Hillier and Hanson, 1984: ix).

Hillier later defines three types of laws, or "the laws underlying the form", to be considered in the analysis of any urban object (Hillier, 1989: 5). These laws, according to Hillier, are not supposed to replace the social and cultural complexity but rather complement them. The three types of laws are as follows:

- Type 1: laws for the generation of the urban object itself, i.e laws governing the ways in which buildings can be aggregated to form towns or urban areas: these we might call the laws of the object itself;
- Type 2: laws of how society uses and adapts the laws of the object to give spatial form to different types of social relation: these we might call the laws from society to urban form; and,
- Type 3: laws of how urban form then has effects back on society – the old issue of architectural determinism, if you like: these we might call the laws from urban form to society. (Hillier, 1989: 6).

To Hillier (1996), architecture is made up of three disciplines: construction, style and space. Construction has the first type of laws only, while style has both first and second, but space has all three types of law (Hillier B, 1996). Elgohary (1996) argues that it is possible to add a fourth type of laws complementing the social and cultural aspects of the society. This fourth type of laws is defined as "of autonomous tutelage related to society, that are independent of space – i.e. laws of the society itself" (Elgohary, 1996: 252).

In a forthcoming publication[7] Hillier suggests that, because of the similarities found in studying the structures of cities, cities must have developed according to a certain logic, that is the generative logic of the city which is:

> ...essentially about space: more precisely about how the now piecemeal, now orderly aggregation of buildings creates a continuous pattern of space which links the buildings together into a system and, in doing so, constitutes in itself the essential structure of the city. By learning the language of this spatial evolution - a matter of understanding first of all what all cities have in common spatially, and then considering the range of differences - we can learn to ask questions of the city and get intelligible answers. But we can only have a common language of space to the extent that it is also a theoretical language, and we can only have a theoretical language to the extent that it is the language of the city itself.
>
> (Hillier, forthcoming: 10)

4.3.2 Implications of the Space Syntax Theory and Methodology

Early writings on Space Syntax mentioned that the way spaces are accessible from all other spaces in the spatial system is an essential key to urban spatial typology (Hillier and Hanson, 1984). The accessibility of a space – according to the original idea of Space Syntax methodology - is not defined in terms of metric distance but rather in terms of the number of changes in direction necessary to reach this specific space from other spaces in the system. It is measured by "calculating shortest journey routes between each link and all of the others in the network (defining 'shortest' in terms of fewest changes in direction)" (Hillier, 1998: 2). Moreover, the pattern of distribution of this accessibility in all the spaces in the system is strongly correlated with the number of pedestrians moving in each space (Peponis, 1989). Peponis went on to say that accessibility "seems to determine the distribution of pedestrian movement"(1989: 43).

More recently, Salheen and Forsyth (2001) have developed a model based on the axial model of Space Syntax which considers distance as well as changes in direction (see Chapter seven for details of the development process). Yet, in their research Salheen and Forsyth have found that the original axial line model is more capable of predicting pedestrian movement, and

recommend that both models be used together to gain a more comprehensive image of the spatial configuration.

4.3.2 .a The Axial Model and the value of integration: Penn (1998) describes the basics of the configurational model of Space Syntax as "...first breaking up the pattern of continuous open space through which one moves into the fewest and longest lines of sight and access that pass through all circulation routes. We call this the 'axial' map. Next, each line is presented as a node in a graph with each intersection between lines presented as a link in the graph" (Penn *et al.*, 1998: 60). Then (using a computer programme) the shortest routes through the whole model are measured according to the criterion of a minimum number of changes in direction from every axial line to every other. Each line is then given a value called an 'integration value', reflecting its accessibility within the system. Of all measures produced by the method, according to Hillier *et al.* (1993), Integration is:

> "...the most important global measure... which measures the mean depth of every other line in the system from each line in turn, relativised with respect to how deep they could possibly be with that number of lines, then standardised as shown in Hillier and Hanson (1984) and discussed by Krüger (1989). The most integrated lines are those from which all others are shallowest on average, and the most segregated are those from which they are deepest."
>
> (Hillier *et al.*, 1993: 35)

The most typical results of the analysis are as follows:

First, the most integrated line or lines are the most important retail area in the system.

Second, The most segregated areas represent either peripheral or insular housing areas that espouse or reflect urban concepts like territoriality and enclosure.

Third, using different radii, (see Hillier, 1996), it is possible to identify either existing or potential local sub-centres, although this distribution differs from one culturally determined urban structure to another (Karimi, 1998).

[7] Hillier, B. (forthcoming). The Common Language of Space: a Way of Looking at the Social, Economic and Environmental Functioning of Cities on Common Basis, found at http:// www.SpaceSyntax.com.

The concept of integration versus segregation became a central point in all of the implications of the theory and methodology of Space Syntax. For example, integrated sites became desirable locations for retail and other public services because of their high accessibility. On the other hand, segregated parts of the spatial system, because of their low accessibility, are likely to become potential places for crime. However, that should not mean that segregation is always negative and should be avoided or integration should be always targeted, but rather the design should acknowledge their effects on the relative accessibility of different parts of the spatial system, which should match the purpose or use of each part.

4.3.2.b Natural Movement and the Multiplier Effect: Hillier's main argument is that the configuration of the urban form is the main producer of different movement patterns (Hillier, 1993a). From this basic concept, he produced the concept of *natural movement*. He defines the natural movement in a grid as "the proportion of urban pedestrian movement determined by the grid configuration itself" (Hillier, 1993a: 32).

Hillier, in his discussion of movement, also considers another phenomenon, that is the allocation of various functions according to this natural movement, e.g. the allocation of retail centres and various attractors at the busy parts of the grid. After the allocation of these attractors takes place a phenomenon called 'the multiplier effect' becomes a key element in the decision of the next allocation action. The located functions then increase the importance of the location itself and other functions start to cluster around them. This process is governed by what Hillier named the 'movement economies' (Hillier, 1996a).

Considering the multiplier effect phenomena, Hillier refined the definition of natural movement to be:

> "...the proportion of movement on each line that is determined by the structure of the urban grid itself rather than by the presence of specific attractors or magnets... So movement tends to be broadly from everywhere to everywhere else. To the extent that this is the case in most cities, the structure of the grid itself accounts for much of the variation in movement densities."
>
> (Hillier, 1996a: 161).

In a recent article, Hillier (1999b) talks about the link between the economies of movement, metric distance, spatial configuration, and the process of centrality or the process that result in the allocation of centres within the urban structure. The acknowledgement of the role that distance plays in spatial functioning encouraged the development of the metric-axial model (Salheen and Forsyth, 2001).

4.3.2.c. Intelligibility; or the Local-Global Relationship: The 'part-whole problem', or the relationship between the local and the global aspects of the city, was raised as a major irregularity in the way designers deal with the urban form (Hillier, 1996a; Hillier, 1996b). Reflecting on it, and considering another irregularity, which is the complexity of multi-functionality of the city, Hillier (1996b: 152) argues that:

> "...all functions relate to the form of the city through two generic functional factors: how we as individuals find the city intelligible, and how we move around it."

In cases where a low correlation, contrary to the theory, emerged between integration and movement, it was hypothesised that the reason was the absence of another second-order configurational property called 'intelligibility'. This was defined as the degree of correlation between the connectivity of lines and their integration value, that is, between what can be seen of the line visually and locally, and how this relates to the importance of the line in the system as a whole (Hillier, 1993a: 61)

Both the intelligibility at the large scale, above the observer's level of immediate awareness, and the intelligibility at the smaller scale, potentially below the observer's level of awareness, are maintained by what appears to be a *principle of sufficient axiality*. If space becomes too complex above or below the level of the peripatetic subject, then intelligibility would be lost, and the most obvious route to this loss would be the loss of axiality (Hillier, 1993a: 61).

4.3.2.d Axial Integration versus Metric Integration: As mentioned earlier, Space Syntax technique, in analysing the spatial configuration syntactically, only considers the number of changes in direction occurring during the movement on the axial lines system. Salheen and Forsyth (2001) propose a new model which also considers metric distance. In their analysis they differentiate between the Conventional Axial Model (CAM) and the new model, which they call the Metric Axial Model (MAM). Although Hillier, in a previous publication (1996b) refers to the possibility of producing such a model, such a step had not previously been taken. Hillier has also anticipated possible benefits in superimposing two such models (CAM and MAM in Salheen and Forsyth's terms) into a third model that would benefit from the pros and minimise the cons of each of the two models. This third model was referred to as the Super-Imposed Model (SIM).

The findings of Salheen and Forsyth recommend the use of all models in the spatial axial analysis because each one of them is able to capture a specific property of this spatial analysis. CAM was more correlated with pedestrian movement, but to a limited extent (considering the small number of observations included in the correlation analysis). MAM was more able to capture the local properties of the spatial system, especially the points of intensive interaction such as intersections and local centres with small block length. Despite Hillier's (1996b) expectations of the possible value in using the SIM, Salheen and Forsyth did not find it of specific value beyond being a third point of view in how spaces could be analysed.

4.3.2.e Implications of Space Syntax on Urban Design: One research is of a particular interest and which illustrates how Space Syntax technique can help in the design stage of urban areas is the study of Trafalgar square (Hillier, 1998a) done by the team of Space Syntax Laboratory, UCL. The author acknowledges that the technique has been used in other design works, for example in the appraisal of some designs of Sir Norman Foster, yet detailed information about such applications is not currently available. In the Trafalgar square study, the working team had four aims to insure that: 1) the space is accessible and intelligible to all

pedestrians; 2) all parts of the space are used to some degree; 3) the square is used all the year round, again to some degree; and finally 4) there is space for future use.

Space Syntax was used at two stages in Trafalgar's study. The first was in the analysis stage of the pre-design situation and the second was in the appraisal of the final design among different options. In the analysis of the pre-design situation other techniques were used such as detailed field observation of pedestrian movement and activity, on-site interviews, and a physical field survey. On the other hand in the design stage Space Syntax worked as a sketchpad for testing different design proposals giving, in a matter of seconds, a schematic image of how the space would be used.

The critical evaluation of the study of Trafalgar square on one hand raises a very promising approach to rapid and accurate appraisal – accurate in a sense of comprehensiveness not in a sense of actual life. On the other hand a question mark remains over the relative importance of this technique, the use of knowledge obtained from other analytical techniques and the experience of the designer in the appraisal of different design alternatives and strategies.

Moreover, the figures which show the analysis of the existing and proposed situations (Hillier, 1998a: 36, Fig. 2, 3) clearly stress on a deficiency exists in Space Syntax, that is the lack of an automated generation technique of axial lines. For a discussion on definitions of linear representation of spatial configuration and the ways in which they can be generated see Peponis *et al.* (1998).

It worth noting that although Peponis *et al.* devised this automated generation technique, the resulting axial map was not the best representation of the real axial behaviour within the case study they used. The absence of such an automated technique has resulted in differences between the two maps just because of the axial lines drawn in each of them and not to the spatial system itself. Therefore variant result supported a slightly different point of view.

4.3.3 Space Syntax as a Research Tradition

According to Hillier[8], it appears that there are, theoretically, three kinds of research with built environment:

> - **Type 1** research which treats the built environment as an *autonomous* variable, in which we ask such question as: what are the possible forms for cities to take, what are the laws of emergence from local decisions to global patterns - how in short does the built environment behave as a form of complexity in itself? ...
> - **Type 2** research which (preferably in the light of type 1 research) treats the built environment as the *dependent* variable, and asks what kinds of social, economic and cultural processes modify the autonomous processes and give rise to the different kinds of built environment complexity we associate with different types of society and culture; and
> - **Type 3** research which (preferably in the light of types 1 and 2 research) treats the built environment as the *independent* variable, and asks what follows functionally from selecting one 'complexity strategy' for the built environment rather than another.
>
> (Hillier, forthcoming: 12)

It is possible to categorise the methodology of the current research as being a mixture of the second and third types. This thesis does not consider the built environment either as a dependent nor as an independent variable, but rather as an interactive component of the environment. This component influences and is influenced by, the social components of the environment.

4.3.4 Criticism and Proposed Use of the Method

4.3.4.a Criticism: Little criticism has been aimed at the theory of Space Syntax and the applications which followed. The implication of this is that either the theory is robust enough to defend itself against any criticism or the concept and the literature behind it is not accessible enough or otherwise obscured from the common researcher. Two aspects support the second notion. The first is that the software licensing procedure and its technical precautions and expertise is held mainly in the founders' institute, which in this case is the Space Syntax Laboratory[9], and the second is the absence of any attempt to comprehensively review the literature written on Space Syntax. The importance of a comprehensive literature review of

[8] Hillier, B. (Forthcoming). The Common Language of Space: a way of looking at the social, economic and environmental functioning of cities on common basis, found at http://www.SpaceSyntax.com.

Space Syntax is raised by the uncontrollable attitude of inventing new terms and citing new definitions with respect to aspects, variables and properties of the outcomes of the analysis. However, early comments on Space Syntax are found in the literature from three sources (Leach, 1978; Angell and Ashr, 1983; McLeish, 1987).

Hillier *et al.*'s (1976) interpretations of their preliminary findings were also criticised by Leach for their generalisation of rules despite the existence of many exceptions known to Leach. Considering buildings, Leach disagreed with the distinction Hillier *et al.* made between the syntactic form of buildings according to their major function, sacred or profane, setting up his argument on Hocart[10] (1933) and Lord Raglan[11] (1964), who both argued that there is a direct homology between the layout of a domestic house and the layout of a temple. On the other side, Space Syntax does not force a "stereotypical" syntactical form on each function, rather it studies each function separately, and studies certain characteristics of syntactical form across functions. For example the result that was found across many functions that the person in power and control in a building is located in the deepest space apart from one function, where the deepest space is occupied by the least in power and control, which is the prison and the prisoners. This idea suggests a stereotypical syntactical relationship between depth and control.

One of Leach's criticisms that could be considered as confirmation of the value of Space Syntax analysis was in his citing of five examples of sacred places: English Parish Church, Ancient Egyptian Temple, the Sinhalese temple from Dambadeniya, Hindu temple from Khajuraho, and Angkor. Each of these examples follows the 4-syntax rule of Hillier *et al.* (1976) apart from Angkor which needs extra information from evidence other than the archaeological remains in order to follow the rule. Although Leach considered that as a weak point in the method, it is the most fundamental use of it, that is, to establish a general rule concerning the genotype of building artefacts in order to understand the phenotype. So in the case of Angkor, the analysis

[9] Space Syntax Laboratory is part of the Bartlett School of Architecture, University College London, London.

[10] Hocart, A.M.1933. The progress of man. London.

[11] Raglan, Lord, 1964. The Temple and the House. London.

is useful in either knowing the syntactic form to suggest the function or the function in order to fill the gap in the existing form.

There are two other comments by Leach which seem to have found an echo in the later applications of Space Syntax. The first is the simplification of the study to the ground floor neglecting other levels of the building, which is not the case in the most recent space syntax applications. The second is to define the social use that is most likely to be affected by the syntactical configuration of space and which variable that is most likely to correspond to that social use. In later works on Space Syntax *movement* was found to be the most likely space usage that is affected by syntactical configuration. Also the variable that is most likely to correspond to movement was first suggested as the *traffic* variable, but subsequent studies suggested *depth* and finally *integration* on both levels - global and local - to be the variables most correlated to movement. In one of the recent studies, the radius of local integration that best correlated to field observation was investigated in different cultures (Karimi, 1998).

The following criticism of Space Syntax was found under the title "Mission Impossible?" in the Architect's Journal of 21 & 28 December 1983 in response to an article of Hillier *et al.* in the same Journal, of 30 November 1983. The article included seven responses and contained both reservations and encouragements. John McKeans supported the method but objected to the tone of novelty used in Hillier *et al.* (1983), as he thought that the concept was there in previous texts or knowledge. Richard MacCormac criticised the method for its hypothetical bases which are difficult to prove, e.g. to what extent intelligibility affects movement in comparison to located facilities. MacCormac's criticism can find its answer in Hillier *et al* (1993a), which handles the concepts of 'natural movement', 'attractors' and 'multiplier effect'. John Angell and Lord Esher thought that quantifying the problem was not likely to enhance our understanding or lead to a solution, rather they recommended using the common designers' intuition.

Finally, McLeish (1987) provided the most important of all these criticisms:

1) The role and value of the 'virtual communities' are mainly dependent on the culture and social properties of each society and not universally generalised.
2) The role of strangers in the local control of communities is questioned in the light of the existing contradiction between Hillier's and Newman[12]'s opinions. This contradiction might also suggest a cultural or social difference in dealing with spatial configuration and its relation to social behaviour.
3) The impossibility of testing the social interaction, which Hillier suggested to be the result of the spatial configuration in traditional urban form. The changes that have happened to urban lifestyle questions the comparison between current social interaction and the interaction that existed when these forms were built.
4) The danger of planners using Space Syntax without complete understanding of the ideologies behind it which might lead to "other equally important design issues being treated as secondary" (McLeish, 1987: 108).
5) The language and terminology used in the writings on Space Syntax are "complicated and, at times, ambiguous e.g. Hillier uses a plethora of terms to describe the same property – depth, integration, asymmetry all mean the same thing, and the term 'control' has overtones of social power structures" (ibid: 108).

4.3.4.b Proposed Use of the Method: Borrowing the framework of 'cognitive mapping future use' developed by Kitchen and Freundschuh (2000c) which suggests three fields – theoretical, methodological, and application – it is possible to apply the same division on the future use of Space Syntax. Considering the recommendation of the research works of Young (1999) and Salheen and Forsyth (2001) it is possible to suggest that research using Space Syntax should also consider other techniques looking into spatial configuration and properties. They also encourage multi-disciplinary research which is seen as a huge opportunity for new and genuine research.

On the other hand, given the objectives of the current research, it is possible to conclude that the use of Space Syntax does not question the validity of Space Syntax theory or its methodological techniques. The research limits itself to the application of the technique as a major spatial analysis technique that provides, mathematically, results describing how the built form is interrelated. The application will be on the scale of Cairo as the global site and Cairo City Centre as the local site. The analysis uses both the appearance of maps and the mathematical output of the analysis in the shape of tables.

[12] Oscar Newman's 'Defensible Space' (1972).

4.4 CRITICAL DOCUMENT ANALYSIS

Critical document analysis is used to investigate the rules governing the reproduction of the structure of the pedestrian environment in CCC. It is used to analyse data collected from planning reports, research works and media reports. A series of structured interviews were conducted with a number of professionals involved in the production process of the pedestrian environment in the case study area. Both the analyses of the documents and the interviews are used to give a comprehensive insight into various aspects involved in the reproduction process. However, as with all other research methods used in the thesis, the findings of the analysis might have some reflections on other parts of the inquiry, i.e. other modes of interaction within the structure of the pedestrian environment.

4.4.1 The Theoretical Background of Critical Document Analysis

The critical analysis of documents involves *critical analysis* as a distinct methodologic approach and *documents* as a specific source of information or data. It is important to distinguish between *criticism*, as used in daily life, from *critical analysis* as used in research. Criticism refers to a negative judgement or opinion about something and which also attributes fault to the criticised subject.

Document analysis is an old research technique which has developed a lot in the last twenty years. The reason for its recent development is the growing need to search into written material from the past covering either theories or case studies which are only available in documents. It also serves as a low cost and rapid research tool because of its nature which enables a single researcher to study a huge resource of documents related to a single institution or to a specific topic across various institutions. In comparison to other time- and cost-consuming research methods, document analysis is a more economic method, particularly if the availability of data and information is considered. For example, in the current research, access to planning policies and plans is only possible through reviewing planning reports. In other cases, as in research

reports, the amount of information included in the report far exceeds the amount that could be gained from a single interview with the author of the research report.

Critical analysis is derived from *critical theory*. Critical theory was established by three thinkers from the Frankfurt School: Herbert Marcuse, Theodor Adorno and Max Horkheimer. They used critical theory to investigate the forces, called *instruments*, that led to the domination of the capitalist way of life (Jones, 1993: 60-63). However, critical theory was later brought from the field of political science into the field of social science through the efforts of social scientists such as Albrecht Wellmer (1971).

A major advantage of document analysis is that the data collected is considered as *unobtrusive* data. An *unobtrusive* measure of observation is "any method of observation that directly removes the observer from the set of interactions or events being studied" (Denzin, 1978: 256). Jupp (1996) points out that the main benefit of using such a measure is that it improves the internal validity of data as it reduces the effects of the observer on the data. However, the process of analysis of documents itself could involve some researcher bias as can be seen in the review of the advantages and disadvantages.

Although critical analysis is explicitly theoretical, much empirical work which uses it as an analytical technique has been done (see Harvey, 1990). Harvey's work aimed at filling the gap with respect to the nature and properties of the critical analysis tradition. The following subsection presents a detailed account of the properties of critical analysis, and document analysis.

4.4.2 The Properties of Critical Document Analysis

4.4.2.a Primary versus secondary sources: Some literature refers to documentation as a secondary source of data (such as Dunsmuir and Williams, 1991; Kumar, 1999) others have considered it as a primary source of data (see for example May, 1993; Silverman, 1993). This conflict might arise from the existence of various definitions in the literature of what constitutes

a secondary or a primary source of data. The definition of secondary sources refers to all the data that have been collected previously by others in contrast to primary sources, which have been collected specially for the research under consideration (Dunsmuir and Williams, 1991; Babbie, 1995; Kumar, 1999). Based on that definition all documents that form the theoretical basis of the current study should be categorised as secondary sources of data.

On the other hand, according to Finnegan (1996: 141), primary sources are those sources "that were written (or otherwise came into being) by the people directly involved and at a time contemporary or near contemporary with the period being investigated". She defines secondary sources as "those that discuss the period studied but are brought into being at some time after it, or are otherwise somewhat removed from the actual events" (ibid: 141). That definition distinguishes between the two types of sources according to the 'contemporaneity' of the source and its 'closeness' to the origin of the data.

Duffy (1993) agrees with Finnegan's definition but further subdivides primary sources into *deliberate sources* and *inadvertent sources*. The former is defined as the sources "which are produced for the attention of future research". The latter is defined as the sources "which are used by the researcher for some purpose other than that for which they were originally intended" (Duffy, 1993: 68). It should be noted here that these definitions follow the historians' approach, as they were the first to use documents as a major source of data (Brundage, 1997). The current research adopts the definitions of Finnegan and Duffy as they label the source to be secondary when the credibility of the information included within the sources is affected by a third party's subjective interpretations. To this end, the data resources used can be said to be primary in nature.

4.4.2.b Documents and Discourses: An important distinction should be made between *document* and *discourse,* a term referring to human thoughts. A *document* is defined as a human thought recorded on a physical object (such as written materials, videotapes or

audiotapes) (Travers, 1964). A *discourse* is "carried out or actualized in or by means of texts" (Marin, 1983: 162), and it includes:

> "ideas, statements of knowledge that are dominant at a particular time among particular sets of people (for example, 'expert professional') and which are held in relation to other sets of individuals (for example, patients or offenders)."
>
> (Jupp, 1996: 300).

When analysis of both documents and discourses, is considered, several techniques and approaches could be adopted, including content analysis, discourse analysis, and critical analysis, all of which might be combined in a single case study analysis.

4.4.2.c Types of Documents: Jupp (1996) mentioned seven types of document which can be used in social research: life histories; the diary; newspapers and magazines; letters; stories, essays and other writings; official documents and records; and research reports. The current research employs only three types of these documents, which are newspapers, official and research reports. They are explained in the following paragraphs.

Newspapers and magazines, also referred to as media reports. These offer various points of interest. The current research analyses these reports from the side of speakers, which gives an indication of access to public media from various actor groups. The subject of each report is another aspect that is considered, as is the message that the report apparently aims at conveying to its readers. Critical comments are offered on each report.

Official documents and records. These are defined as all documents which are produced by any governmental institution or body. They are important in presenting what is seen as problematic by the government and how an explanation is offered for this problem. They also show how the government approaches a solution to this problem. In the course of the current research, and considering the specific topic of planning for pedestrian environment in the city centre of Cairo, many official reports have proved useful in giving a practical insight of how the process of

planning is run at the local government level. This local level effectively influences the design and implementation of the pedestrian environment, if not the whole urban environment.

Research reports. These include reports written by academics and other researchers and sometimes government-sponsored researchers or consultants. Adopting the critical analysis technique directs this research not to deal with these reports as facts, but rather examine the same aspects examined in all other reports. Jupp (1996) highlights the importance of adopting the critical approach especially with documents that have a "high profile to hold influential position in the public domain" (Jupp, 1996: 302). It is not difficult to understand the motives of Jupp in such a recommendation, as the higher the report goes in its influential power and relation to public domain, the more the possibility it has of being affected by public policy.

4.4.2.d Authorship and access: The classification of documents according to their authorship and access was produced by Scott (1990)[13]. *Authorship* stands for the source of the document or the writer. *Access* stands for the availability of the document to other individuals apart from the author. Table 4.1 illustrates the classification of documents according to these two criteria. The classification of documents used in this chapter is in Appendix D.

		Authorship		
		Personal	Official	
			Private	State
Access	Closed	1	5	9
	Restricted	2	6	10
	Open-archival	3	7	11
	Open-published	4	8	12

Table 4.1 – Classification of Documents (Numbers refer to the code of each cross-category).
Source: Scott, 1990: 14.

4.4.3 Document Analysis as a Research Tradition

4.4.3.a Content Analysis: The analysis of documents can involve a systematic analytic approach to handling the data presented in them. This approach is called *content analysis*. It is

[13] For Scott (1990) the usefulness of a classification based on the criteria he suggests is that it poses four key questions pertaining to the validity of particular documentary sources. Who has and has not authored a document, and the degree to which a document is accessible or withheld, influences its *authenticity* (whether it is original and genuine); its *credibility* (whether it is accurate); its *representativeness* (whether it is representative of the totality of documents of its class); and its *meaning*.

seen as an objective way to analyse documents or any other sort of communication (Berelson, 1971). Although the greatest advantage of using this approach is the neutrality in data collection the apparent weakness is the span of inferential reasoning (Marshall *et al.*, 1999).

Content analysis in general involves a mechanical and an interpretative operation (Kirppendorf, 1980). The former includes the organisation and subdivision of the data into groups or categories, which are related to the main topic of the research. On the other hand, the interpretative operation involves deciding which categories are important and meaningful in a way that gives answers to the main research questions.

According to Millward (1995), there are three types of content analysis: qualitative, quantitative and structural (see table 4.2). Abercrombie *et al.* mentions that the quantitative type of content analysis could be "criticized as involving subjective judgements which may create data that are quantifiable but not valid" (Abercrombie *et al.*, 1988: 50). Duffy (1993) argues that the techniques used in the analysis of documents are just the application of 'common sense'.

Type	Definition
Qualitative	Tends to be more subjective and less explicit about the process by which interpretation of the target material occurs. The emphasis is on meaning rather than on quantification. The system of classification may be derived from the research question but additional conceptual codes may arise from a closer examination of the data as a whole. However, the aim is not normally to assign numbers to data.
Quantitative	This seeks to generate numerical values, which might be frequencies, rankings or ratings, from the target material. It involves three subsequent stages: first, selecting the materials to be analysed or what is called universe of material. Second, deciding on a unit which represents the discrete bits of information that will be assigned to categories in the subsequent analysis. Finally, proposing a theme and a coding frame to govern the appearance of one category rather than the others in the analysis.
Structural	It involves the development of the representation of relationships between elements in the target material. In order to do this both qualitative and quantitative aspects of the data have to be considered. The rules governing the relationships between response categories also need to be defined. These relational rules will vary depending upon the research aims.

Table 4.2 – Types of content analysis.

Source: Constructed from multiple texts (Millward, 1995: 288-291)

4.4.3.b Discourse Analysis: The tradition of discourse analysis has routes that can be traced back to various research disciplines such as speech act theory, ethnomethodology, conversation

analysis and semiology (Coyel, 1995). However, its use was accelerated after the publications of Potter and Wetherell (1987), Middleton and Edwards (1990) and Edwards and Potter (1992).

The basic and main element of analysis that discourse analysis considers is the language written or spoken. It considers language as a construction of psychological and social life. It opposes the concept of the 'truth is out there' and that if one employs the right research method one can reach it. The language in the form of discourses is considered the only component of *social reality*. The study of discourses aims to acquire "a better understanding of social life and social interaction from our study of social texts" (Potter and Wetherell, 1987: 7).

Discourse analysis presumes that there is an *action orientation* behind any linguistic material. In other words, it is a means of achieving a specific social function such as "justifying, questioning, and accusing" (Coyel, 1995: 245). It is not difficult to argue that this is a common sense presumption, but what is different in the way discourse analysis deals with this common sense is that it looks for this social function, from which it proceeds with how it was performed and why (ibid).

In research practice, discourse analysis takes a further step in the analysis of documents than content analysis does. This further step involves not only the contents but also other components of the document such as "its author (who says it?), its authority (on what grounds?), its audience (to whom?), its objective (in order to achieve what?)" (Worrall, 1990: 8, cited in Jupp, 1996: 300).

4.4.3.c Critical Analysis: One of the main assumptions of the critical analysis technique is that the aim of it is not to consider current data as some 'truth of facts', but to probe deeper into it to elicit the underpinning ideology behind it. The provision of an alternative ideology to change the final product is the ultimate goal of this type of analysis. This ultimate goal is called *emancipation* (Fay, 1987).

According to Jupp (1996: 298), critical analysis comprises:

> "...an examination of the assumptions that underpin any account (say, in a document) and a consideration of what other possible aspects are concealed or ruled out. It can also involve moving beyond the documents themselves to encompass a critical analysis of the institutional and social structures within which such documents are produced."

Critical analysis technique differentiates itself from positivism and interpretativism (sometimes referred to as phenomenology) according to the following differences as Jupp (1996: 304) explains:

> "...firstly, positivism emphasizes explanations cast in causal terms, whereas critical research does not; secondly, while both interpretative and critical perspectives are concerned with social meanings, the former places emphasis on how these are generated in small-scale interactions, whereas the latter seeks to analyse them critically in terms of structural inequalities in society."

Critical social research does not feed its findings back into social life as a problem for researchers. According to Jürgen Habermas, the critical theorist (1971; 1973), theory and, eventually, research using the theory, is evaluated according to its ability to find and diagnose the ills of a society and as a component in the whole process of political actions needed for the treatment.

In order for critical analysis to reach its objective of the fundamentals of social phenomena it employs two processes known as *deconstruction* and *reconstruction*. Deconstruction is the process in which the conventional knowledge is broken down into its basic components or elements. Reconstruction is the process of restructuring a construct in the light of the "oppressive social structural arrangements which underpin it and sustain it" (Jupp, 1996: 305). The elements involved in the process of deconstruction and reconstruction in critical social research are listed and defined by Harvey (1990: 20-29) as follows:

1) *Abstraction*: a core argument of sensory perception of the world of objects into conceptual categories which are then utilised to get below the outside appearance.
2) *Totality*: the conception that social phenomena are interrelated and constitute a total whole, which suggests that the constituent are interrelated into a coherent structure and that they

only have meaning in terms of the structure and, in turn, the structure depends on the constituent parts.[14]

3) *Essence*: refers to the essential element of an analytic process. It can be used as the key to unlocking the deconstructive process.

4) *Praxis*: the realistic reflective operation is what changes the world. The critical social research is not interested in the individual actions or reasons for action, but in some way, the changes in social structures as the result of praxis.

5) *Ideology:* (for critical social research) is a kind of screen obscuring relations of production. Ideology itself has two different definitions, one according to a positive view and another according to a negative view. Although it is out of the current research focus to discuss the difference between them, it is possible to say that the way to remove this screen depends on which definition is adopted by the research (see Harvey (1990: 23-25) for more details).

6) *Structure:* seen holistically as a complex group of interrelated elements which are interdependent and which can only be adequately thought of in terms of the whole phenomena[15]. A structure involves the idea of wholeness, transformation and self-regulation[16] (Piaget, 1971).

7) *History*: is the reconstructed version of past phenomena and the process by which this reconstruction is made, that is, the process of history being made. The study of history in critical social research is a huge task in itself as it involves a thorough field survey of all sources of history to be followed by an in-depth explanatory procedure of all collected data, as history is not always treated as comprising pure 'facts'.

[14] According to Harvey (1990: 215) this is slightly different from the similar concept of holism. The latter is the view that an organisation, institution, or society, as a functioning whole, has an effect on all the parts of which it is made up, and that therefore one should not study these parts in isolation. Totality is similar but emphasises the coherence, importance and reciprocal nature of the structure.

[15] This is the same definition of structure in the structuralism terms. On the other hand, the structural functionalist's or the reductionist's definition does not acknowledge the relationships between the parts and the whole and which could be better referred to as a system of congealed patterns of interaction between various parts (Harvey, 1990: 25-26).

[16] Wholeness means an internal coherence, not a simple composite or aggregate of independent elements, but parts conforming to intrinsic laws which determine the nature of the structure and of the parts. Transformation means that the structure is not static, the intrinsic laws make it not only structured but [also] structuring. Self-regulation means that the structure makes no appeals beyond itself in order to validate its transformational procedures (Harvey, 1990: 25).

4.4.4 Criticism and Proposed Use of the Method

4.4.4.a Criticism: Dunsmuir and Williams (1991) put a checklist of the advantages and disadvantages of using secondary data including documents using factor analysis (table 4.3). The discourse analysis has received a lot of criticism, which raises many doubts about its reliability as an analysis technique[17], especially in the issue of how it deals with language.

Advantages	1) Time and cost effective, thus also up to date. 2) Sometimes it is the only way of doing research, as in historical research. 3) Statistics and censuses are important types of documents which are essential to many research projects. 4) Qualitative data deduced from documents are available for interpretation, but documents can be also systematically analysed using content analysis.
Disadvantages	1) Working with documents forces the research to accept definitions and concepts used in the production of the document of which the research either is not aware of or does not agree on. 2) Documents might include biases and inaccuracies which cannot be checked. 3) Quantitative data found in documents are merely numerals which give no indications of their meanings and implication in real life. 4) Personal documents are often very subjective and difficult to generalise. 5) The way of collecting the data included in documents is essential but is not reported in the document. This makes it difficult to reuse it.

Table 4.3 – Advantages and disadvantages of document analysis using factor analysis.
Source: Dunsmuir and Williams (1991: 58) with modifications by the author.

Little criticism was found of critical theory and analysis. One reason for this is the modifications that occurred in some aspects of critical theory after the advent of postmodernism and poststructuralism (May, 1993). The only serious criticism, although little more than a suspicion, is that the theory claims to know the "wishes and struggles of the age" although the people themselves might not have been aware of them. That might, in time, sustain a gap between the recognised version of the social theory and what the people experienced in their social life (May, 1993).

4.4.4.b Proposed Use of the Method: The thesis will use the critical analysis technique to underpin the ideology stage without an emancipation of an alternative ideology, as the main

objective is to explore the interrelationships between different components of the environment. The proposed analysis technique is a critical analysis of the qualitative content of documents according to an analysis agenda which.

This agenda was outlined by Jupp and Norris (1993) based on a 'discourse analysis'. It includes many questions that could be tested in documents. It is unlikely that all of these questions can be tested against any one document, rather for some documents a specific question would be central and others would be of less importance in analysing the document. The current research will test the agenda against the available documents and the research objective in order to reach the final agenda. This is described in Chapter Eight.

[17] See for example Coyle (1995) and Coolican (1994), but most important of all is Parker and Burman (1993).

4.5 SUMMARY

This chapter has reviewed the four main research methods used in the thesis questionnaires, cognitive mapping, space syntax and document analysis. The review was based on four main discussion points in each research method.

The first point is the theoretical background of each of the four methods. Document analysis and the questionnaire were only established after the method became known as an acknowledged research technique, whereas cognitive mapping and Space Syntax have evolved from theoretical backgrounds.

The second and third points are the properties of using each one of the research methods, and a brief account of the tradition in using the method. Document analysis is shared in almost all research fields and used extensively in most history and social science research. The questionnaire is considered as a very popular research method in the fields of social science, education, marketing, politics and psychology. Cognitive mapping is about forty years old but has been used in urban design, geography and psychology research. Finally, Space Syntax was only developed about twenty years ago and its use is still limited to architecture and urban planning and design with some attempts to apply it in archaeology and anthropology.

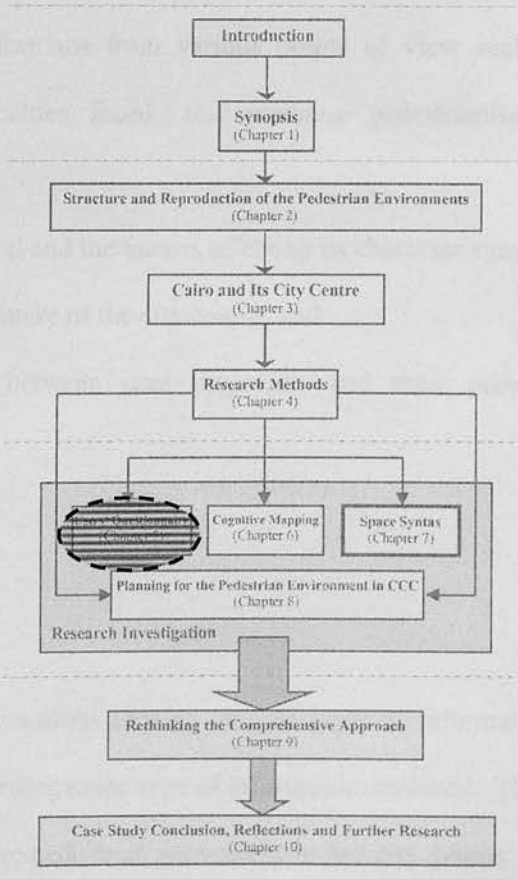
The fourth point is a discussion of the criticism of each method and to present the proposed use of each method in the current research in a way that achieves the objectives of the research and minimises the negative aspects of each method. The detailed application of each method is included in the following four chapters.

Part Three

THE INVESTIGATION

Chapter Five

USERS' QUESTIONNAIRE



INTRODUCTION

This is the first of the four empirical analysis chapters on the pedestrian environment in CCC. Using a questionnaire this chapter sheds light on the users' point of view of the situation in CCC. They express their opinions, attitudes and expectations with respect to the case study. The chapter contains six main sections: the objectives of using the questionnaire, the questionnaire design, data handling, descriptive analysis, association analysis and summary of findings.

5.1 OBJECTIVES

Urban dwellers represent the *demand* side of the balance between involved actor groups in urban environment. On the other side, the professionals represent the *supply* side of the balance. Professionals' opinion is explored in Chapter Eight. Therefore, this questionnaire is to explore the users' opinion of the pedestrian environment offered to them in CCC. The detailed objectives of this chapter are to explore the users' opinion on:

1) their preference of Cairo as the envelope that includes the city centre;
2) the suitability of the city centre for pedestrians from various points of view such as preference, way-finding problems, difficulties faced, and previous pedestrianisation schemes;
3) the nature of pedestrian movement in general and the factors affecting its characteristics;
4) the users' expectations and desires for the future of the city centre; and
5) to explore any significant association between user responses and their personal backgrounds.

5.2 QUESTIONNAIRE DESIGN

The questionnaire included different kinds of questions seeking various types of information. The questions were grouped into four parts according to the type of information required. These were: personal information; the City as a whole; pedestrian movement in the city centre; and

future prospects. In these parts the questions were given different forms to suite the specific objective of each. Some questions were included which will be used in the Cognitive Mapping Chapter or to reflect on the results of Space Syntax in Chapter Seven. An optional fifth part was included giving the respondents the freedom to answer it or not. This part contained only one question which was to request the drawing of a cognitive map of Cairo to be analysed in the Chapter on Cognitive Mapping. The first four parts of the questionnaire are described in 5.2.1-5.2.4.

5.2.1 Personal Background Information

These questions aim to obtain personal information about the respondent in order to understand each individual answer within the context of the respondents' background. These include: sex, age, salary (optional), place of birth, occupation, period of living in Cairo, education qualifications and the method that the respondent usually uses to go to work. Prior to these questions the respondents were asked for their name (optional), place and type of residence (flat, villa etc.).

5.2.2 The City as a Whole

This group of questions aims to start the inquiry by gaining a brief idea of the respondent's opinion of the macro scale of the case study area. Four questions are included in this group. One requests a verbal image of Cairo, and this question will be analysed in Chapter Six (Cognitive Mapping). The other three questions examine the respondents' liking for and attitude to the city and their relationship with CCC as a major retail and service centre compared to recently constructed commercial centres in the suburbs.

5.2.3 Pedestrian Movement and the Current City Centre

This group of questions forms the main body of the questionnaire, focusing on the case study area of CCC and the specific topic of pedestrian movement. It includes fifteen questions covering different aspects of the city centre and pedestrian movement. The questions are given in three main forms **multiple choice, attitude scaling,** and **open-ended response**.

5.2.3.a Multiple Choice Questions: This form of question is employed in two instances in the questionnaire:

First, questions aiming at establishing an idea of how frequently the respondent interacts with the city centre, for what reasons, and by which mode of transport. It is important for the interpretation of responses which are not brought about by apparent factors. For example, the degree of familiarity with CCC is not only affected by length of residency in Cairo but also by frequency of visiting the area. The perception of those visiting CCC mainly for work is also expected to differ from that of those visiting it mainly for shopping or entertainment. Finally, the mode of transport used to visit and browse in CCC affects the way the area is perceived.

Second in the subjective test of Space Syntax, one question was given for the respondents to identify their route of choice, either a short twisting route or a longer one with fewer changes in direction. They were also asked to mention the reasons for their reply. This question was mainly looking for a subjective justification of Space Syntax theory (Hiller, 1996; Penn *et al.*, 1998).

5.2.3.b Attitude Scaling: These questions are designed to be answered in one of two ways:

- *The first* way is on a five-point scale combined with a request to mention the reason for the answer. With such questions respondents were asked to evaluate the success or failure of previous pedestrianisation schemes in CCC.
- *The second* way requested the subject to give a score out of ten for the importance of factors affecting pedestrian movement on a list drawn up from the literature. Although a large number of factors (40) was found, this method was thought useful in seeing how the respondents might differentiate between them. The respondents were also asked to mention the way they would try to achieve a factor if it was a positive one or to avoid it if it was a negative one.

5.2.3.c Open-ended Response: The open-ended form of questioning requested the respondents to give their answer to a question without any restrictions on the variety of possible

responses. Despite its apparent difficulty for later analysis, this provides a very useful tool for exploration into unexpected responses. Therefore it was used to seek two types of information:

- *First*, questions about factors, difficulties, and design aspects. The main aim of these questions was to enrich the results with new and genuine notions emerging mainly from the respondent's experience, and with minimum influence from the question design.
- *Second,* There were four object-oriented questions, or those questions asking either to mention places and things or to draw maps. Two of them are analysed in the Chapter on Cognitive Mapping to give the respondents' verbal and graphic image. One of the other two questions aimed at exploring place preferences in CCC and the reasons for such preferences. The last question investigated into way-finding problems by asking the respondents to mention the areas they get lost in and the reason for that.

5.2.4 Future Prospects

Two questions asked the respondents to offer their expectations for the pedestrian environment in CCC and their general comments on the topic. The first, an open-ended question asked the respondents to mention the five most important changes they think are needed in CCC. The second question gave the respondents the chance to mention any other comments they think had not been covered in the questionnaire but were important to the understanding of the situation.

5.3 DATA HANDLING

The responses to all the questions were first gathered in their raw format. The categorisation of the data into smaller sets of categories was the next step in the data handling. The importance of this categorisation lies in two reasons: one is general for all research work and the other is more specific for the current research. The general intention is to put the data into comprehensible groups to facilitate their description and clarify their inter-associations. The specific reason is to facilitate for the association among different research methods used in the research.

However, the analysis of the direct responses which are mentioned by 5% or more of the respondents are also described ad analysed. That should help in building an image of the current knowledge of the sample about the case study.

However, gradual levels of categorisation are needed to go into greater detail within each major category, as is seen later. The details of numbers and percentages calculated from very immediate responses is likely to vary significantly with a change in the population sample, but the categories of the responses is not likely to change at the same rate. Boulton and Hammersley say that grouping the raw unstructured data from qualitative research into categories is more about providing "stable characteristics or recurrent patterns, not just with what happened at particular points in time" (1996: 292).

The targeted aspect of the response in the ESC is the response itself, i.e. the immediate meaning of the response, and it is employed in most of the questions unless otherwise stated. The starting categories used are those mentioned by Harrison and Howard (1972) as components of imageability (see 2.2.4). However, after the examination of their validity against the findings of the questionnaire, they were modified to fit the collected data. This modification included renaming, redefining and rearranging the categories and their sub-categories (see appendix A for the amended list and definitions). The most important change is renaming the physical and social-grouping into consideration related to the built-environment and social-grouping respectively. That is to reflect on the scenario of structure production in urban contexts and that was proposed by the research in subsection 1.1.5.

There are three levels of categorisation referring to the degree of detailing in the categorisation. The **First** Level of Categorisation (LC1), which is the broadest, includes two main groups: one is more focused on the *built environment* and the other is more focused on *social-grouping* considerations. The **Second** Level of Categorisation (LC2) includes categories of *configuration , description, operation* and *association*. The **Third** Level of Categorisation (LC3) subdivides the second level into further divisions as seen in table 5.1.

First level (LC1)	Built Environment Considerations		Social-grouping Considerations	
Second level (LC2)	Configuration	Description	Operation	Association
Third level (LC3)	• aerial location • spatial relationships • scope • associated features • signs and markers	• size • design and character • shape, pattern, and form • construction materials • condition and upkeep • general visual appearance • management system tools	• economic • political and social • religious and ethnic • historical • functional • convenience and welfare • general significance • congestion	• atmosphere • familiarity • affinity

Table 5.1 – Environmental Structural Considerations (ESC).

Tables of findings up to the second level of categorisation (LC2) are included within the body text of the thesis. Tables including the (LC3) are grouped in Appendix B.

ERA targets the practical action that is related to the response, either to achieve it if it was a positive response or to avoid it if it was a negative one. In total there are 7 categories, three dealing with built environment aspects, three with social-grouping aspects, and one of mixed and complex nature (table 5.2). The three of physical nature are: planning, urban design, and maintenance. The three of social-grouping nature are: legislation, administration, encouragement and education. The last category, co-ordination, includes actions which are too complex to be included in one of the previous categories and need a multi-party actions. An example of the complex actions is the relocation of the governmental and official institutions outside the CCC. This action does not only require new place for relocation, but needs an enormous amount of procedures and complex processes to be finally achieved.

Type of action required	Category of action
Physical action	Planning
	Urban design
	Maintenance
Complex action	Co-ordination
Social-grouping action	Legislation
	Administration
	Encouragement & education

Table 5.2- Environmental Reproduction Actions (ERA)

5.4 DESCRIPTIVE ANALYSIS

5.4.1 Personal Background Information (sample description)

The questionnaire sample was selected in order to closely reflect the actual user groups. It did not target any certain users group, but focused mainly on groups that are likely to be familiar with Cairo as a whole and have more interactions and relations with the city centre specifically. The respondents' ability to answer the questions was also taken into consideration, as the questionnaire was a self-completion document. A total of one hundred and twenty five questionnaires were distributed. Eighty-five forms were returned, that is 68% of the distributed forms. Out of the total returned forms eighty were selected for further analysis. The other five responses were eliminated for their high percentage (more than 25%) of missing answers and unfamiliarity with the area (giving incorrect answers). The following is the descriptive analysis of the main configuration of the respondents.

5.3.1.a Gender: According to recent national statistical counts of Cairo, the whole population is approximately divided into male (51.3%) and female (48.7%) (Centre Agency for Public Mobilisation and Statistics, 1997). In practice the male group is more involved in public life (Abu-Lughod, 1971) and this makes them more familiar with the built environment especially with the crowded areas like CCC. About 90 forms were given to males and 35 to females. The returned forms consisted of 66 males and 19 females. The considered forms included 62 males and 18 females with a percentage of 77.5% and 22.5% respectively.

5.4.1.b Age: Naturally, as people grow older they become more familiar and associated with the environment they are living in. But it could also be noted that at a point in time they might start to isolate themselves from the present and live in the past. Therefore, the sample was built from a broad age-range to ensure sufficient familiarity with the environment but with reasonable experience of the present situation. The sample consisted of the age groups listed in table 5.3 with the number of distributed questionnaire forms for each group and the final number of considered forms.

Age Range	Distributed Forms	Collected Forms	Considered Forms
Under 20 years	5	0	0
From 20-30 years	26	20	18
From 31-40 years	28	15	14
From 41-50 years	30	23	23
From 51-60 years	28	24	23
Over 61 years	8	3	2
TOTAL	**125**	**85**	**80**

Table 5.3 – Age groups and number of forms in each group.

5.4.1.c Social class: selecting the appropriate social mix to be investigated is an important criterion in order to get reliable and valid responses within the research limitations. The social classes that compose the population of Cairo vary from lower class to upper class according to the publications of the Centre Agency for Public Mobilisation and Statistics (CAPMS). However the CAPMS does not provide a solid measure of these social classes and their breakdowns. This thesis and in order to ground the argument adopts a categorisation which relies on various indicators of the social class. The place of residence is one indirect indicator of class, as Cairo is divided into different districts each with a specific social class. Second, the type and size of the residential units were also taken into consideration to correct any error produced by certain socially specific values that could motivate a respondent to live in a district that does not comply with his class, for example to live close to their elderly parents. Third, there was a non-obligatory question that asked about the monthly income, but few subjects answered it. Finally, the occupation and education levels are indicators of the social status.

The first source used to justify the selection of the targeted social class of the subjects was the author's experience. This experience points to the fact that most of the users familiar with the city centre as pedestrians are not from the upper class, who tend to use their cars in almost all of their movement trips around the city. Therefore they prefer to go to places that are closer to parking places, that offer high standard goods and entertainment facilities and where the majority of users are from the middle or higher class. The middle and lower classes' interests in goods, entertainment facilities and a lot of public transportation are generally met in CCC. The

author focused more on the lower class to find out which sub-class of it should be most relevant to the research. The upper-lower and lower classes were found more suitable for the research interests and limitations than the lower-lower class, because of the high illiteracy ratio in the latter which conflicts with the questionnaire being in a self-completion format.

The author approached several individuals from the lowest class bracket and invited them to assist in the survey. This information was intended to be gathered orally, as most members of this class are unable to read or write (Abu-Lughod, 1996). The researcher found them unforthcoming and reluctant to engage in any interview.

The outcome of the above argument was to concentrate on the middle class with representatives of the 'lower' and 'lower upper' classes. Table 5.4 presents the social classes of the subjects deduced according to the previously mentioned criteria.

Social class	Collected Forms	Counted Forms
Lower class	5	4
Upper lower class	20	19
Lower middle class	21	20
Middle class	24	22
Upper middle class	14	14
Lower upper class	1	1
TOTAL	**85**	**80**

Table 5.4 – Social class of the Respondents involved.

5.4.1.d Place of birth: The forms were not distributed exclusively to subjects born in Cairo, they were distributed to persons familiar with Cairo and the city centre specifically. Combined with the question about Cairo being the 'mother' town of the subject, there were four categories within the considered sample group. The following is a description of each of them and the number in each group:

- Those who were born in Cairo and considered it to be their mother town, numbered 54 subjects (67.5%).
- Those born in Cairo but who considered another town to be their mother town. That is explained by the fact that most of Cairo's population has its roots in either Upper Egypt or

Lower Egypt, some of whom have lost their connection with their 'motherland'. Others, even though born in Cairo, have kept their relations with their roots and considered Cairo as only a place of residence. Only 4 subjects (5%) were in this group.

- Those not born in Cairo and who considered their roots in their town of birth. These numbered 13 subjects (16.25%).
- Those not born in Cairo but who considered it to be their mother town. This could be explained with regard to their length of residency in Cairo and also the positions they occupy. All of them had lived more than thirty years in Cairo and held steady and good jobs in the capital. This group consisted of 9 subjects (11.25%).

5.4.1.e Occupation: Table 5.5 presents the distribution of the sample over different occupations.

Occupation	Number of subjects
Architects and planners	6
Engineers	12
Doctors	6
Traders	5
Students	3
Accountants	10
Managers	3
Lawyers	4
Clerical jobs	31
TOTAL	**80**

Table 5.5 – Occupation of respondents.

5.4.1.f Education: As a result of the targeted social group and their age range, the majority of the subjects held a college degree. Obtaining a college degree is considered one of the important values of this group. Table 5.6 lists the subjects categorised according to their education status.

Education	Number of subjects
Post graduate degree	8
Diploma	13
BSc or Licentiate	46
Mid degree	12
None	1
TOTAL	**80**

Table 5.6 – Education of respondents.

5.4.1.g Method of transportation to work: The most frequent trip was considered as an indicator of the main interaction mode between the user and the built environment. As 'work place' is not necessarily in the city centre, the method of transportation used to reach the city centre is investigated in another question. The methods of transportation were divided into two main categories walking and motorised, the latter was further subdivided. Table 5.7 presents the number of subjects using each mode of transportation.

Mode of transport			Number of subjects
Walking			**2**
Motorised	Public transport	Underground	8
		Surface transport	15
		Mixed	12
	Private transport	Private car	31
		Company car	12
	Sub-total		**78**
Total			**80**

Table 5.7 – Respondents' mode of transport to their work places.

5.4.2 The City as a Whole

Three questions investigated the subject's attitude towards living in Cairo and the relative importance of CCC as a shopping magnet compared to recently constructed shopping centres in the peripheral areas of the city.

5.4.2.a Attitudes towards living in Cairo (80 cases): subjects scored their opinions about living in Cairo (likes/dislikes) on a five-point scale and mentioned the reasons behind their scoring. The majority of subjects went for the 'like' side of the scale, with 80% of all subjects divided almost equally between moderate and extreme fondness (see figure 5.1). 11% scored the middle of the scale and 9% did not like living in Cairo. Only one subject did not mention a reason for his expressed response.

Surprisingly, 43% of the respondents mentioned the reason to like living in Cairo as their personal attachment either to the place or to their family and friends. After this reason comes the more functional reason of the dominance of Cairo on the national level in all aspects, economic, social and political. That dominance provides a level of services that allow for a standard of

living which is not achievable elsewhere in the country. Also considering the opportunities and potentials to promote in the social hierarchy.

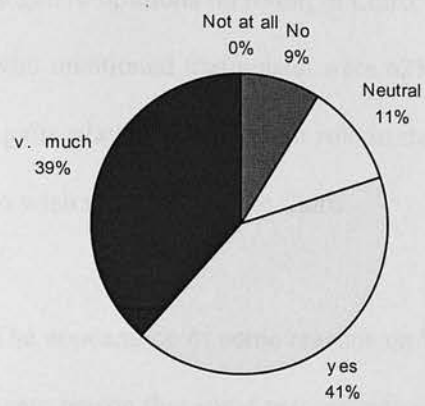


Figure 5.1 - Attitudes towards living in Cairo

On the other hand, the general conception of Cairo as being crowded, polluted and, in many cases, a stressful metropolis was the major category of the negative opinions on living in Cairo with 12.7%. It was followed by 'congestion' with 7.6%. Another noticeable result is that none of the reasons was mentioned for both positive and negative opinions by different respondents. This is an indication of a shared subjective reasoning behind their opinions of Cairo.

5.4.2.b Attitudes towards living outside Cairo (80 cases): In contradiction to their opinions in the previous question, the majority of the sample (56%) would like to live somewhere else. Only 35% would not like to live somewhere else and 9% were neutral (see figure 5.2).

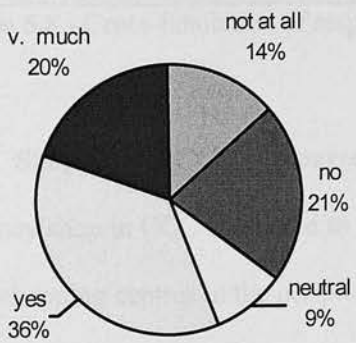


Figure 5.2 - Attitudes towards living outside Cairo

14% subjects did not mention a reason for their scoring, 91% of these would not wish to either leave Cairo or were neutral. Familiarity and social and emotional relationships within Cairo were accounted for 86% of the major reasons for remaining in Cairo.

Reasons for wishing to live somewhere else were dominated by the major category of the negative opinions on living in Cairo, that is its inconvenient living environment in Cairo. Those who mentioned that reason were 62% of all those who wanted to live elsewhere. 'Congestion', again, played an important role in motivating a relatively large proportion of the sample (10%) to wish to move outside Cairo.

The appearance of some reasons on both sides of the scale can be noticed in this question. The same reason that some respondents would not leave Cairo, which is their familiarity and affinity with the city, was the reason for others who wanted to move back to their native towns. This confusion also suggested the cross-tabulation of the responses of both questions that asked about the degree of loving Cairo and the desire to live somewhere else (see table 5.8). Surprisingly, 31 subjects, despite their preference of living in Cairo, would like to live somewhere else. One subject did not like living in Cairo and at the same time did not want to live anywhere else!

		Preference of elsewhere					**Total**
		not at all	no	neutral	yes	very much	
Preference of Cairo	not at all						**0**
	no		**1**			6	**7**
	neutral			1	5	3	**9**
	yes		8	3	**18**	**4**	**33**
	very much	11	8	3	**6**	**3**	**31**
T o t a l		**11**	**17**	**7**	**29**	**16**	**80**

Table 5.8 - Cross-tabulation of respondents' preference to live in Cairo against elsewhere.

5.4.2.c Shopping in CCC compared to other retail centres (80 cases): Subjects scored the degree they shop in CCC compared to where they used to shop before the construction of many modern shopping centres in the peripheral areas. 55% stated that they shopped less in CCC than they used to (see figure 5.3). On the other hand, another 38% of the sample said they do the same proportion of shopping in CCC as elsewhere and only 7% shopped more in CCC than they used to.

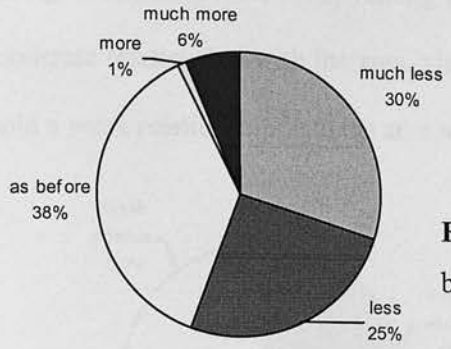


Figure 5.3 - Degree of shopping in CCC compared to before the construction of modern shopping centres.

Three main reasons were behind the decrease in the rate of shopping in CCC. The first (41% of reasons on that side of the scale) was the construction of many modern shopping centres in the suburbs which provide quality goods, pleasing environments for shopping and plenty of parking places. The second (27%) was the longer distance between CCC and the respondent's residence compared to the distance to a nearby local shopping centre such as Roxy or Nasr City. The third (18%) was the traffic congestion that is expected during the trip and in CCC itself. Three subjects did not mention a reason for their choice, 2 of these chose 'as before' and one 'less'.

On the other hand, those who shop as before in CCC provided totally different reasons. Three main reasons were observed. The first (33% of reasons for responses on the middle of the scale) is a consequence of the respondents working in CCC, so they make the trip to CCC anyhow. The second (22%) is the general significance of CCC as a place not only for shopping but also for entertainment, work and a variety of other services and activities. Finally the reasonably priced goods available in CCC in comparison to modern shopping centres was raised by 19% of those who shop with the same rate in CCC.

5.4.3 CCC and Pedestrian Movement

In this subsection opinions and attitudes of respondents regarding CCC and their walking experience in it are investigated. The investigation also raises some general questions which help to shed more light on the nature of pedestrian movement from the user's point of view.

5.4.3.a Frequency of Going to CCC (80 cases): This is an indicator of to what extent the subjects are familiar with the case study area. It was found that 43% of the sample have a

strong relationship with CCC, visiting it two times or more a week. 36% were found to have a moderate relationship with the area, visiting it weekly or monthly (see figure 5.4). Those who hold a weak relationship with the area were found to comprise 21% of the sample.

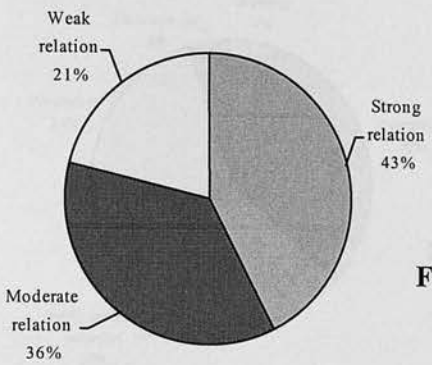


Figure 5.4 - Frequency of Going to CCC

5.4.3.b Purpose of Visiting CCC (80 cases): The purpose of the visit, together with other functional characteristics of the trip affects the psychological mode of the respondent while interacting with the city centre. It also gives an indication of the type of walking that is experienced by the respondent (see page 2). It was found that 61% of the respondents experienced walking in CCC mainly as a mode of transport (i.e. for purposes of work, study, administrative visits, visits to the doctor and so on). 6% used the area for entertainment, which might include walking as an activity in its own right. Finally 33% mixed walking experiences with social visits and shopping (see figure 5.5).

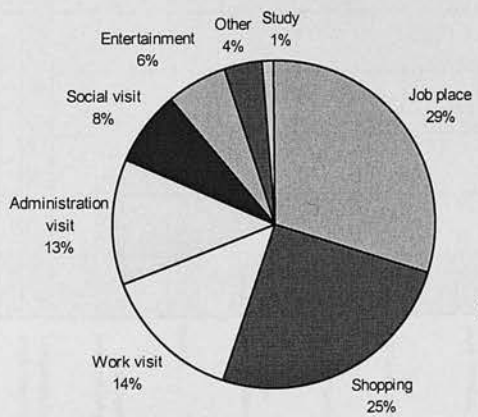


Figure 5.5 - Purpose of Visiting CCC

5.4.3.c Mode of Transport to CCC (79 cases): This affects the starting point of the pedestrian route in CCC, thus has an impact on the whole trip plan. It may also affect the psychological mode of the trip and the flexibility in changing the plan and thereby the factors

affecting pedestrian movement and the user. Only 4% of the sample arrived at CCC by foot. 32% arrived with the underground (the highest single transport mode) and the rest, 64%, arrived using some kind of surface transport (see figure 5.6).

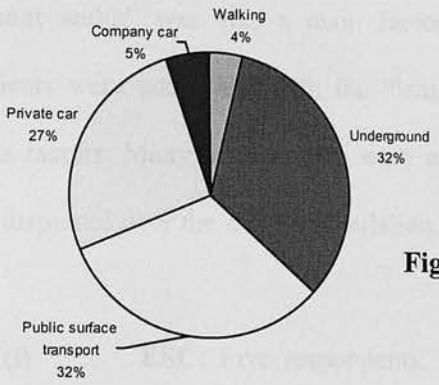


Figure 5.6 - Mode of Transport to CCC

5.4.3.d Factors Affecting Pedestrian Movement (208 factors): The search for these factors may not uncover all that influences the unconscious decisions of the respondents. However, it attempts to establish all factors that the respondents consciously considereds as important, and this is satisfactory for the current investigation. The important direct responses are described and then categorised using the two methods mentioned earlier, ESC and ERA. Only the responses that were mentioned by 5% or more of the respondents are analysed in the analysis of the immediate response as seen in figure 5.7.

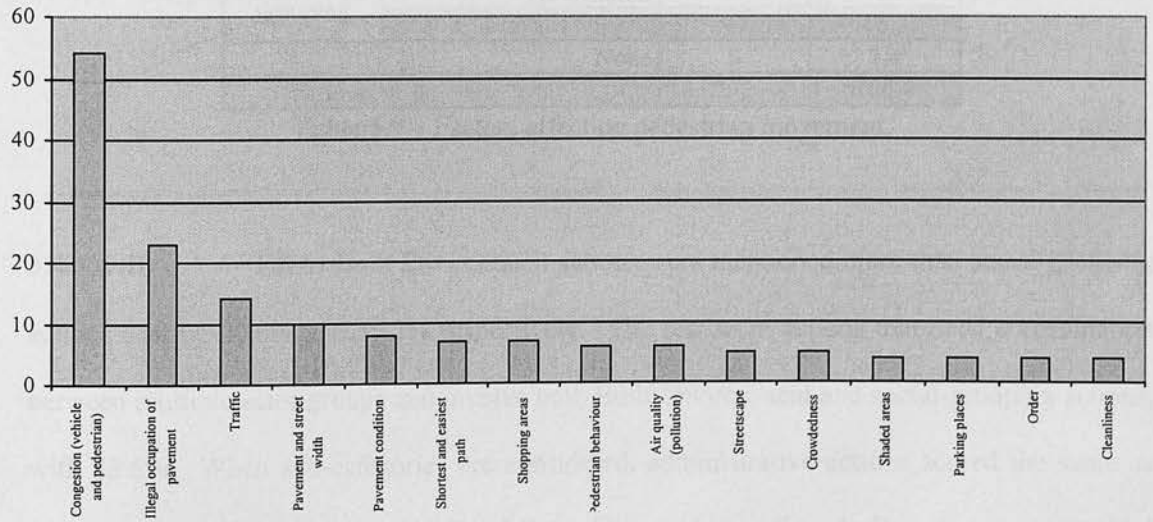


Figure 5.7 - Factors affecting pedestrian movement

'Congestion' in CCC is the main concern of most of the respondents as 54 of them refereed to it, among them 9 referred to 'pedestrian density' as well as 'traffic'. 14 responses mentioned

"peddlers" and "illegal pavement occupation" as factors influencing their walking trips in CCC, as the respondents have to manoeuvre to avoid them, which results in stepping off the pavement. The same number of responses was concerned of the "condition of the pavement". "Pavement width" was also a main factor and was mentioned by 10 respondents. Other respondents were concerned with the "length of route", though to a lesser degree than the previous factors. Many other factors were mentioned (65 factors in total), however they were greatly dispersed over the sample population.

5.4.3.d (i) **ESC:** Five respondents, 2.4%, said that there was nothing affecting their movement. Looking at the LC1, built environment categories were mentioned in 52.3% of the responses and social-grouping categories accounted for 45.3%. The *description* in the LC2 was the highest scoring 44.2%, and was followed by *operation, association,* and *configuration* with 29%, 16.3%, and 8.1% respectively (table 5.9). Within the LC3 *management system tools* was the highest with 23.6% followed by *congestion, atmosphere,* and *condition and upkeep* with 21.2%, 12.1%, and 10.6% respectively (see appendix B).

LC1	LC2	Frequency	Percent
Built Environment	Configuration	17	8.1
	Description	92	44.2
	t o t a l	**109**	**52.3**
Social-grouping	Operation	60	29
	Association	34	16.3
	t o t a l	**94**	**45.3**
	None	**5**	**2.4**
G r a n d t o t a l		**208**	**100.0**

Table 5.9 – Factors affecting pedestrian movement.

5.4.3.d (ii) **ERA:** Built Environment actions were mentioned more than social-grouping actions scoring 40.8% and 35.7% respectively. The rest were actions that need co-ordination between multiple actor groups and involve both Built Environment and social-grouping actions, with 23.5%. When sub-categories are considered, administrative actions scored the same as actions requiring co-ordination (23.5%) followed by planning, urban design, encouragement and education, and legislation with 16.9%, 14.5%, 10.8%, 9.4%, and 1.4% respectively (Table 5.10). The top and bottom of the list are quite interesting in that the respondents mentioned factors that

are associated with the administration of the place more than any other category and that legislation came in as the least important factor.

Required action	Action sub-category	Frequency	Percentage
Built Environment	Planning	36	16.9
	Urban design	31	14.5
	Maintenance	20	9.4
	Sub-total	**87**	**40.8**
Complex action	Co-ordination	**50**	**23.5**
Social-grouping	Legislation	3	1.4
	Administration	50	23.5
	Encouragement and education	23	10.8
	Sub-total	**76**	**35.7**
T o t a l		**213**	**100.0**

Table 5.10 – Associated actions with factors mentioned.

5.4.3.e Place Preference in the Pedestrian Environment in CCC (195 responses): The aim of this question is to explore the relationship between the preferences for pedestrian place and reasons behind those preferences which would affect pedestrian movement and route choice. The places mentioned by more than 5% of the respondents are illustrated in Figure 5.8. The reasons behind their preferences varied but there were two significant attitudes for these preferences. The first was the function of the place such as 'a major traffic road' as in 26th of July Street, or as 'a famous shopping street' as in Kasr El-Nil. The second was a place that accommodates or is close to another feature, such as 'because it accommodates the Egyptian museum', as in the case of Tahrir square. Figure 5.9 presents a map of the location of these elements (apart from Al-Azhar and Al-Hossain districts that lie outside the city centre area), ordered according to their preference.

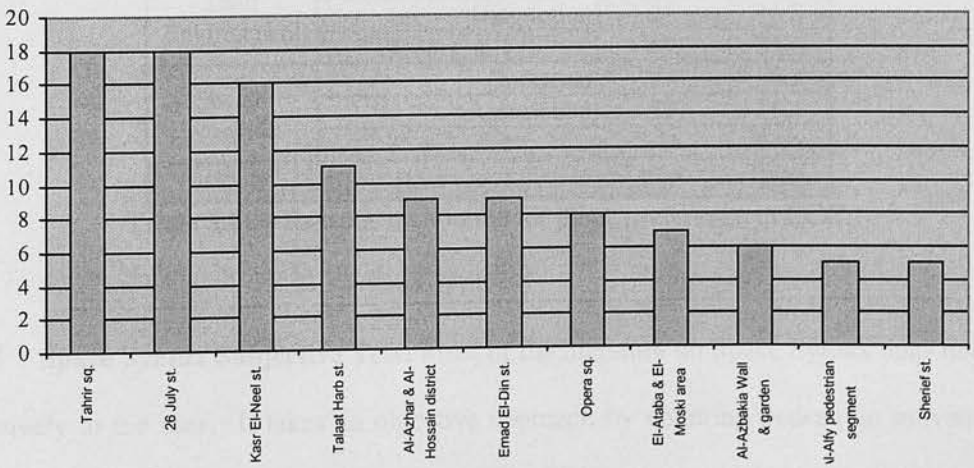


Figure 5.8 - Place preference in the pedestrian environment in CCC

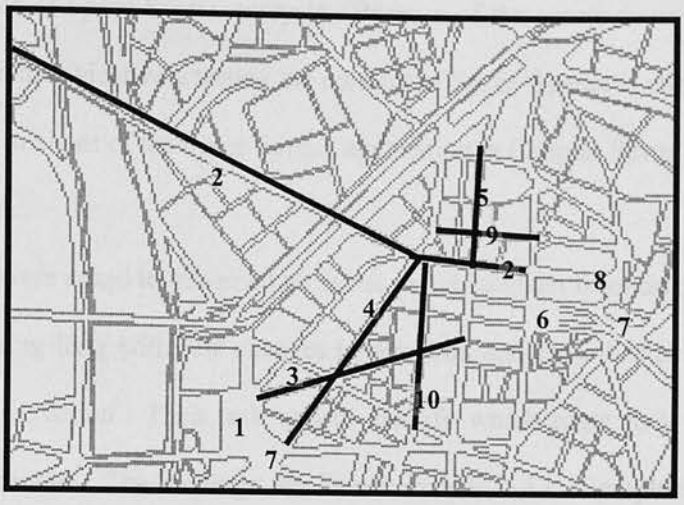


Figure 5.9 - Map showing the location of the most preferred places in CCC.

Key: 1) Tahrir square; 2) 26 July street; 3) Kasr El-Neel street; 4) Talaat Harb street;5) Emad El-Din street; 6) Opera square; 7) El-Ataba & El-Moski area; 8) Al-Azbakia Wall & garden; 9) Al-Alfy pedestrian street; 10) Sherief street

From table 5.11 it is clear that about 2/3 of the reasons for preferences are of a social-grouping nature. More significant is that the *operation* was slightly less than 50% of all reasons. *Configuration* was second after operation with 24.6%. *Description* on the other hand, which include all immediate visual properties of the space scored just 10.8% of all reasons, a relatively low percentage considering the weight it is given subjectively in the literature. Reasons of *association*, which might differ according to personal differences, rated even higher than those of *description*. On the LC3, *functional* reasons were in the first place with 30.2% followed by a clear gap before *associated features* and *affinity,* with 16.4% and 11.8% respectively.

LC1	LC2	Frequency	Percent
Built Environment	Configuration	48	24.6
	Description	21	10.8
	T o t a l	**69**	**35.4**
Social-grouping	Operation	94	48.2
	Association	32	16.4
	T o t a l	**126**	**64.6**
G r a n d T o t a l		**195**	**100**

Table 5.11 – Reasons mentioned for place preference in CCC.

5.4.3.f Space Syntax Subjective Test: Most of the literature on Space Syntax does not relate subjectively to the user. It takes an objective approach by counting pedestrian movement or other behavioural social variables such as crime distribution and relates these spatial data to its

syntactic measures of Space Syntax analysis. Because of the comprehensive approach used in the current research, subjectively testing the concept of Space Syntax is considered necessary in underpinning the analysis of the Space Syntax application in Chapter Seven.

The respondents were asked to imagine two routes could be taken from origin 'A' to destination 'B', one route being long with few changes in direction and the other being shorter but with more changes in direction. Their task was to identify which route they would take and the reason for this choice. The findings are listed in table 5.12 (Complete list of findings is included in appendix B).

Category	The longer route with fewer direction changing points	The shorter route with more direction changing points	Depends on circumstances
Time and distance	40	5	1
Ease	12	2	
Safety	10		
Personal	3		1
Perceptual	1	3	
None	2		
T O T A L	**68**	**10**	**2**

Table 5.12 – Route choices and reasons mentioned by the respondents

100% of the sample answered this question. Of these, 68 respondents would choose a longer route for reasons categorised into: time saving, ease, safety, personal differences and perceptual reasons. Ten respondents chose the shorter route, these are mostly for time saving reasons. Only two respondents declined to choose one of the two choices, saying that each could be suitable in certain circumstances, and their reasons referred to the time available and importance of the trip.

These results correspond to the suggestion offered by Space Syntax methodology that people tend to minimise the number of changes in direction in route choice. They also highlight more the role of those independent factors. As defined earlier in the review of literature on Transportation Planning (2.2.2) either totally inherent in the built environment as physical qualities (distance) or attributed as social qualities to the living environment (safety). Space

Syntax theory suggests that these social qualities are, in fact, consequences of the spatial configuration of the physical built environment (Hillier B., 1988).

For a majority of the group (58%, a subtotal of 40 out of the total 68), saving time and distance was the most important reason for choosing the longer route. This result was surprising in two ways. First, it endorses the theory of Space Syntax even on the cognitive level of the user although it contradicts, to a certain extent, most of the literature on pedestrian movement in Transportation Planning and Spatial Behaviour research, of which suggest that the pedestrian takes the shortest route to save time and effort. At the same time it supports an earlier study on pedestrian behaviour by Marchand (1974) (see subsection 2.2.1), who found, from a cognitive mapping approach, that the behaviour of the pedestrian in choosing their route is "a characteristic of a car driver much more than of a pedestrian" (p 505).

Another result worth noting is that the percentage of those who chose the longer route with fewer changes in direction is higher than those who chose the other route for all reasons apart from the perceptual category (giving reasons such as "To avoid getting bored"). This highlights the need to explore the extent to which perceptual aspects play a role in determining the route choice in pedestrian movement.

5.4.3.g Evaluation of Factors Deduced from Literature: The number of responses for each factor gives an indication of the familiarity of the respondents with that specific factor but this is also affected by the location of the factor in the list. Factors provided towards the end of the list tended to gain more missing responses due to the length of the task respondents were asked to undergo. The full set of the descriptive analyses of the 40 factors is presented in appendix B. The comparison of Built Environment factors with social-grouping is presented in table 5.13.

Measure of individual factors		N	Mean	
Type		Statistic	Statistic	Std. Error
Built Environment factors	Mean	25	6.611	0.408
	Median	25	6.660	0.409
Social-grouping factors	Mean	15	7.552	0.351
	Median	15	7.493	0.341

Table 5.13 - Statistical descriptive analysis of factors

Social-grouping factors gained a higher mean of *mean* than those of Built Environment factors, which. points to the social-grouping factors being of more importance to the subjects than the Built Environment ones for the subjects involved in the sample.

Another way of looking at the responses to this question is the way the scores for each factor relate to each other. The factors in each group, Built Environment and social-grouping, were sorted in descending order of importance with three intermediate categories. The highest factors with social-grouping nature are safety, security, cleanliness, regulations, protection, crowdedness and pollution. On the other hand the highest factors with physical nature are Pedestrian crossing, parking, greenery, sidewalk, shortcuts, window shopping and public services or utilities

Some concepts, which are more related to the architectural and urban design professions than they are to the layman, have received contradicting responses. For instance, on factors like 'diversity', 25% of the sample said that this was not important at all and at the same time 29% said it was an important factor. Moreover, factors like 'mystery' were shown to be significantly debatable. On one hand, much literature on architecture and urban design (Gehl, 1987; Krier, 1979; Lynch, 1960) promotes exploration of the mysterious parts of urban settings, but on the other 35% of the subjects of the current case study thought it was not important at all.

5.4.3.h Wayfinding Problems (58 responses by 22 respondents): Subjects were asked to mention three places where they feel lost or where they might become lost. They were also asked to mention the reasons they think might lie behind this problem. 34 respondents replied that there are no areas that they feel lost in. Another 18 respondents did not answer this question. The responses are first analysed in their direct terms and are then analysed according to the categories of the ESC only as the ERA did not reveal important information.

As seen in figure 5.10, 'Garden City' was the most frequently mentioned area causing way finding problems in Cairo (12 responses). That perfectly matches the findings of De Jonge (1962). De Jonge found that the planning pattern known to present in wayfinding difficulties was built about the turn of the century, where the street pattern shows Art Nouveau influence, with its streets run mostly in gentle curves and the interrelations of which (if any) cannot be comprehended in the field. This is exactly the same as Garden City.

Other areas such as 'Al-Ataba and El-Moski' (8 responses) 'Al-Azhar and Al-Hossain District' and 'Bab El-Khalk' (6 responses each) were mentioned because of their irregular planning pattern, which is the traditional Islamic pattern. Other areas such as 'Bab El-Louk' and 'Ramsis Square' (5 and 4 responses respectively) were mentioned and were referred to the congestion at these places which causes the pedestrian to lose concentration and therefore loses direction. Similarity of building facades was also mentioned for the districts 'Nasr City' and 'Heliopolis'; however both of these districts were mentioned by less than 5% of the subjects (3 and 2 people respectively).

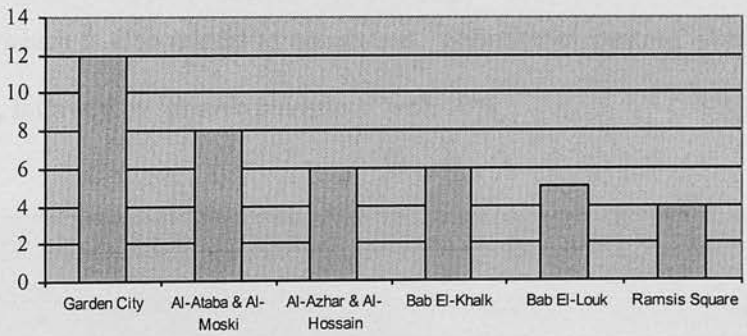


Figure 5.10 - Places where the respondents lose they way most within Cairo

5.4.3.h (i) **ESC:** The role of the built environment's aspects was highlighted as the main cause of way-finding problems, accounting for 72.2% of all reasons mentioned. As seen in table 5.14 the *description* and details of the immediate environment were the most important aspects, with 50% followed by the *configuration* of the built environment, with 22.2%. The *operation* and *association* aspects scored 14.8% and 13.0% respectively. Within the LC3,

shape, pattern and form were the highest, scoring 33% of all reasons mentioned for becoming lost in an environmental setting.

LC1	LC2	Frequency	Percentage
Built Environment	Configuration	12	22.2
	Description	27	50.0
	t o t a l	**39**	**72.2**
Social-grouping	Operation	8	14.8
	Association	7	13.0
	t o t a l	**15**	**27.8**
G r a n d t o t a l		**54**	**100.0**

* Number of respondents who mentioned that no problems exists: **34**
* Number of respondents who skipped the question: **18**

Table 5.14 – Reasons for way-finding problems.

5.4.3.j Difficulties Facing Pedestrians in CCC (182 responses): Subjects were asked to mention three difficulties they face while walking in CCC. The direct responses are first analysed and then the categorisation of the ESC is looked at.

Figure 5.11 illustrates the difficulties mentioned by 5% or more of the respondents (161 responses with an agreement ratio of 88.5%). As 71% of the respondents mentioned 'congestion' as having a negative influence, it becomes apparent as the main difficulty. In the second rank comes the 'pavement illegal occupation' with 33%, after which comes 'traffic system' (19%) which is also related to congestion. 'Shortage in parking' comes in the fourth place with 16%, followed by 'uneven pavement' with 10%.

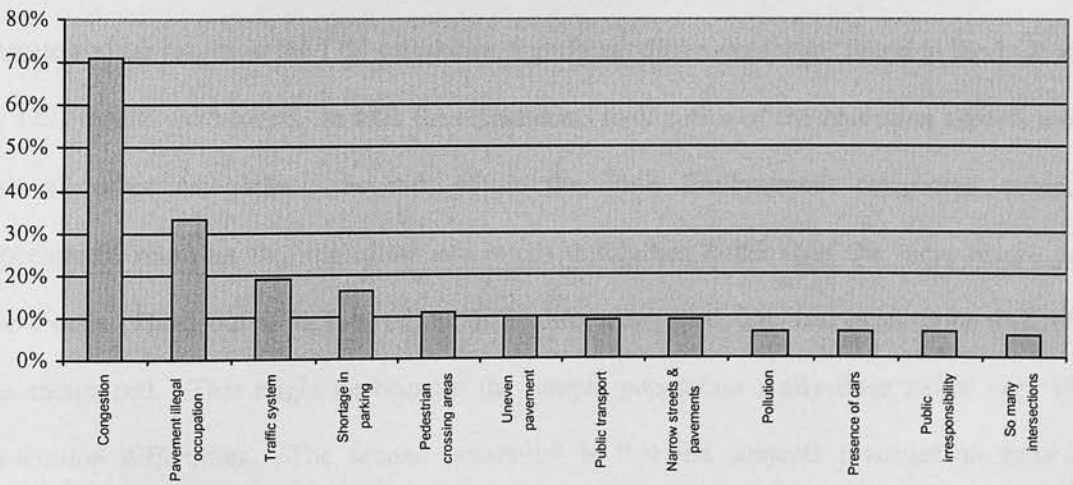


Figure 5.11 - Difficulties Facing Pedestrians in CCC

One of the latter responses which is worth noting is the 'public irresponsibility' which was mentioned by 6% of the respondents. This refers to the users who do not follow the rules or who do not care about an area's cleanliness and condition. The importance of this response relies in it being a self-assessment, although the respondents did not mean themselves directly, nor did they blame the provider of the environment, such as the government, for this negative aspect.

5.4.3.j (i) **ESC:** The difficulty pool as seen in table 5.15 contained an almost equal amount of Built Environment and social-grouping difficulties with 52.2% and 47.8% respectively. However, when the LC2 is considered, *operation* difficulties exceed other categories (47.3%). It was followed by *description* difficulties (41.2%). *Configuration* and *association* difficulties (11.0%) and (0.5%) respectively. On the LC3, *congestion* scored very high (34.1%), followed by *condition and upkeep*, *management system tools,* and *associated features* with 15.9%, 12.1% and 9.4%\ respectively.

LC1	LC2	Frequency	Percentage
Built Environment	Configuration	20	11.0
	Description	75	41.2
	t o t a l	**95**	**52.2**
Social-grouping	Operation	86	47.3
	Association	1	0.5
	t o t a l	**87**	**47.8**
G r a n d t o t a l		**182**	**100.0**

Table 5.15 – Categories of difficulties facing the respondents in CCC.

Despite similar results in the LC1 categories, significant differences were found in the LC2 and the LC3 results were found. In LC1 the respondents took notice of the *operation* aspects more than all other categories. Second, within the Built Environment categories, subjects concentrated more on the immediate and micro difficulties rather than the more macro and global ones. Third, out of the total of 182 difficulties mentioned, only one *association* difficulty was mentioned. That might be because the sample population really does suffer very few *association* difficulties. The second possibility is that the subjects managed to refer to *configurational, descriptive*, or *operation* causes of their *association* difficulties rather than referring to the second order results which could be categorised as association. Findings from other parts of the questionnaire support the second notion, for example that congestion was

considered as a major cause of tension, loss of temper and of negative feelings about the place although this comes under the category of atmospheric difficulties.

5.4.3.k Pedestrianisation schemes: The most significant pedestrian-oriented action in CCC has been the pedestrianisation of El-Shawarby (1989) and El-Alfy (1997/1998) streets. The respondents opinions of the schemes were sought in two questions and future pedestrianisation plans were targeted in a third question.

5.4.3.k (i) El-Shawarby Scheme (75 cases): 77% of sample thought it was a success, another 14% thought it was as much a success as a failure and 9% saw that it was a failure (figure 5.12). The most important factor for its success (35% of reasons given) was the shops located on the street. This factor was followed by the sense of freedom (27%) and the high degree of safety (25%) that a pedestrian street offers to the pedestrian. The low rate of responses which suggest it is a failure did not allow for a reliable clarification of the reasons behind that opinion.

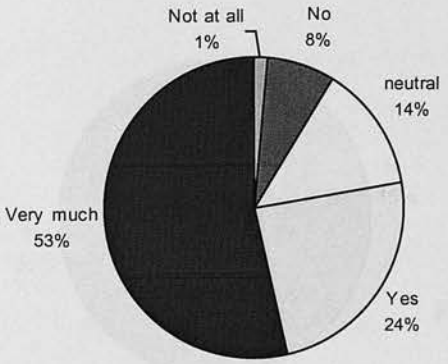


Figure 5.12 - Evaluation of El-Shawarby Scheme

5.4.3.k (ii) El-Alfy Scheme (73 cases): Being only one year old at the time of the questionnaire, the pedestrianisation of El-Alfy generated more uncertain responses than those of El-Shawarby. Whereas 66% thought it was a success (see figure 5.13), another 17% thought it was a failure and 15% were neutral about it. Contradictions were apparent in that different subjects used the same reason for success and failure. For example some said it was a success because 'it was not a major traffic artery', whereas others said it was a failure because 'it used

to hold important traffic'. Others considered the 'existence of many food shops and less shopping' a reason for success, and others mentioned the same reason to justify their opinion of it as a failure.

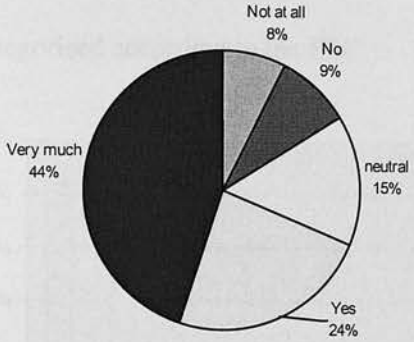


Figure 5.13 - Evaluation of El-Alfy Scheme

5.4.3.k (iii) More Pedestrianisation (74 cases): Out of those, 45% thought that there should not be any more pedestrianisation schemes in CCC, which seems to be in contradiction to the high percentage of those who supported both previous pedestrianisation schemes (see figure 5.14). The reason behind that change in attitude from one question to the other might rely on the respondents fearing that they will not be consulted in the next project, as happened in the previous two, and that the new one might conflict with their interests in other areas of CCC.

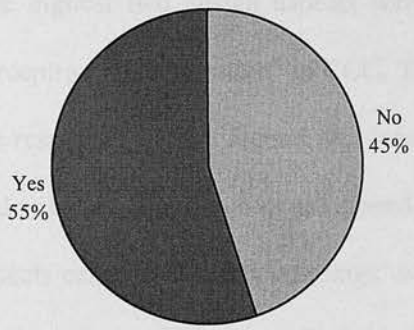


Figure 5.14 - Attitude towards more Pedestrianisation

5.4.4 Future Prospect: After the exploration of the subjects' opinions of the current situation of the pedestrian environment, two questions were asked to explore their expectations and prospects for the future of CCC. The first question considered the design aspects that the respondents thought the designer should take into consideration while planning for pedestrians in CCC and the second question considered the changes the subjects would like to see in the CCC area either in the near future or in the long run.

5.4.4.a Design Aspects in CCC for Pedestrian Planning (201 responses): The design aspects that were mentioned by 5% or more (169 responses with agreement ratio of 80%) of the respondents are analysed in their direct format (see figure 5.15). The responses were also categorised according to the ESC.

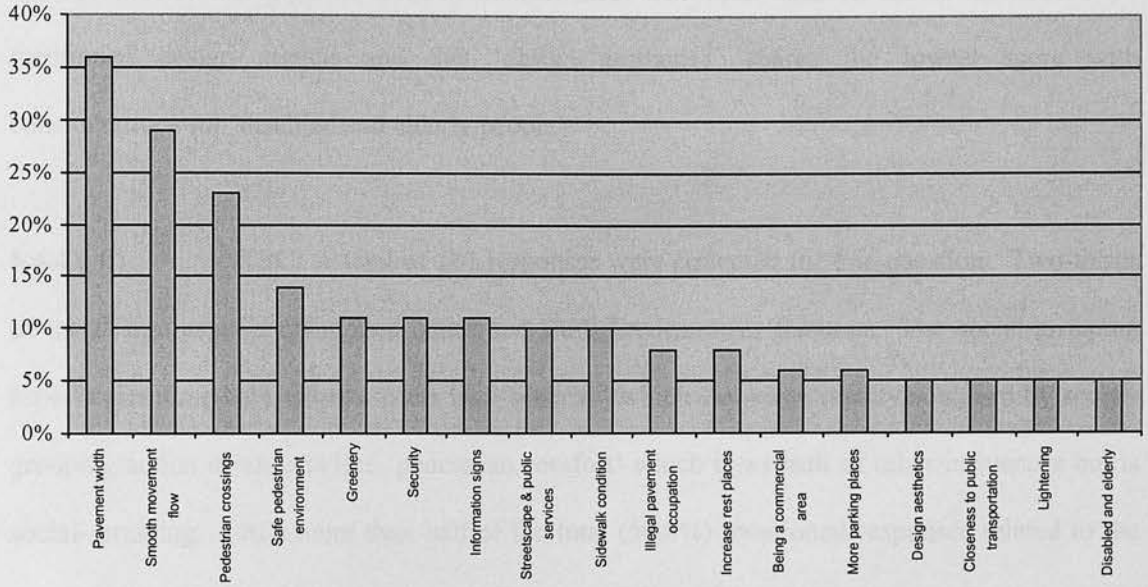


Figure 5.15 - Design aspects that designers should consider in planning for pedestrians in CCC

The highest two design aspects were mentioned with significant reflection on the negative perception of 'congestion' in CCC. The first was 'pavement width' was mentioned by 36% of the respondents. The second was 'easy and smooth movement flow', covering both pedestrian and vehicles, and this was mentioned by 29% of the respondents. After these two main design aspects came 'pedestrian crossings' with 23%. 'Pedestrian crossing' here includes location and distance between crossing places. It also includes the need for pedestrian tunnels or bridges at some busy intersections such as Ramsis Street. Then came 'safe pedestrian environment' with 14%. Although it seems strange that the respondents mentioned 'safety' related aspects less than functional aspects such as smooth movement, but that is referred to the fact that CCC is a relatively safe place. Even the request for more care of pedestrian crossing areas is not a sign of lack of safety, but lack of consideration for smooth pedestrian traffic, which is interrupted too frequently with vehicle priority intersections.

Design aspects like 'greenery' were only mentioned by 11% of the respondents, which is a relatively low score considering that CCC once had one Garden, which is Al-Azbakia Garden, but not any more. Al-Azbakia Garden has been divided into pieces, each belonging to one institution or another, and much of its area has been subject to construction works. The only remaining part of this garden for the public is permanently and securely fenced off to prevent its use in order to minimise the cost of maintenance. One final note on the lower end of the mentioned design aspects and that 'design aesthetics' shares the lowest score with considerations for 'disabled and elderly people'.

5.4.4.a (i) **ESC:** A total of 201 responses were collected for this question. Two-thirds of the design aspects mentioned concerned Built Environment features. The social-grouping aspects mentioned are either aspects like 'security' which can more readily achieved by social-grouping action or aspects like 'pedestrian comfort' which is a result of other influences but is social-grouping. Little more than half of the total (50.8%) mentioned responses related to the *description* of the built environment. This was followed by *operation, configuration,* and *association* aspects with 25.9%, 15.4%, and 8% respectively. The main categories of responses and the sub-categories are included in table 5.16.

The LC3 of the responses reveals more interesting results (see appendix B) It shows that the category that should be given more attention by the designer is *size*, with 16% of the total responses, followed by *construction materials* (12.9%). Both are parts of the description sub-category in the Built Environment category. They were followed by *convenience and welfare* and *atmosphere* with 9% and 7.5% respectively. Four categories, *signs and marker, condition and upkeep, management system tools,* and *functional* aspects, followed with 7% each.

LC1	LC2	Frequency	Percentage
Built Environment	Configuration	31	15.4
	Description	102	50.8
	t o t a l	**133**	**66.2**
Social-grouping	Operation	52	25.9
	Association	16	8.0
	t o t a l	**68**	**33.8**
G r a n d t o t a l		**201**	**100.0**

Table 5.16 - Recommended design aspects in CCC.

5.4.4.b Desired Changes in CCC (297 responses): These 'changes' are different from 'design aspects' partially in their immediate relation to the case study area as they are of a wider nature and can include many responses which are not seen as design aspects. Therefore, the respondents were asked to mention five changes compared to three design-aspects in the previous question. The changes which were mentioned by 5% or more (209 responses with agreement ratio of 70%) of the respondent are discussed in their direct terms (see figure 5.16). These responses are then categorised according to the ESC.

Contrary to their responses for design aspects in the previous question, 'increasing greenery' comes in the first place (36% of the respondents mentioned it) with a significant gap to the change that follows it. That might be referred to the changes in this question being related to CCC directly an area in which the respondents appreciate a lack of green areas, unlike the design aspects in the previous question related to a more general area. In the second place came 'more pedestrianisation schemes' with 21%, followed by 'solving parking problems'.

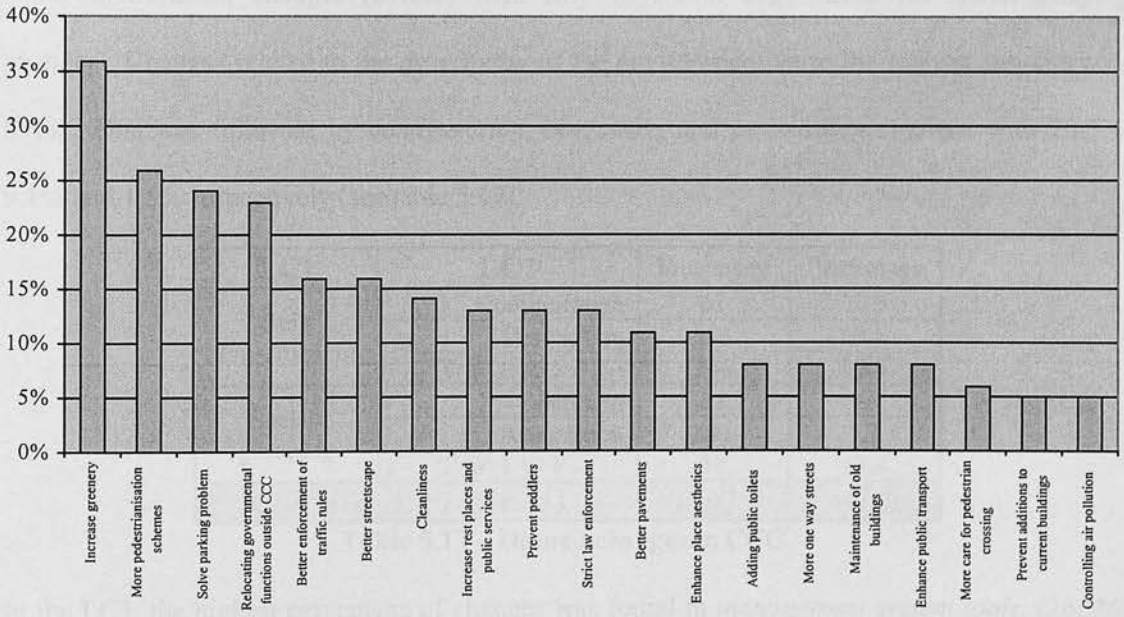


Figure 5.16 - Desired Changes in CCC, from the pedestrians' point of view

What is significant is that the influence of 'congestion' is not directly found in these first three changes. The fourth change (relocating governmental functions outside CCC) might refer to a deep awareness among the respondents of one of the main reasons behind the congestion in

CCC. Many of these functions are only offices, which does not have a direct contact with the public, but hold rather a large number of workers who need to travel daily to CCC, putting pressure on the road network with the transportation mode they use, which is, in many cases, the institutions' own buses.

Four of the remaining changes are related to the urban management and urban administration. They directly point to the loose management system of outlying areas in Cairo, as CCC is the strictest of all. These four changes are ' better enforcement of traffic rules' (16%), ' prevent peddlers' (13%), ' strict law enforcement' (13%) and 'prevent additions to current buildings' (5%). Other changes which involve some kind of urban management are also found with in the list such as 'cleanliness' (14%) and 'controlling air pollution' (5%).

5.4.4.b (i) **ESC:** Despite the stated difference between design aspects and changes for the latter being of a wider nature, the responses for the changes were significantly dominated by Built Environment changes (89.6%) with only 10.4% of suggestions for social-grouping changes. Changes related to the *description* of the environment were the highest sub-category 69%. This was followed by *configuration*, *operation*, and *association* changes with 20.5%, 9.1% and 1.3% respectively (see table 5.17).

LC1	LC2	Frequency	Percentage
Built Environment	Configuration	61	20.5
	Description	205	69.0
	T o t a l	**266**	**89.6**
Social-grouping	Operation	27	9.1
	Association	4	1.3
	T o t a l	**31**	**10.4**
G r a n d t o t a l		**297**	**100.0**

Table 5.17 – Desired changes in CCC.

In the LC3, the highest percentage of changes was found in *management system tools*, (26.3%) referring mainly to traffic system tools. It was followed by *construction materials* and *condition and upkeep* with 16.8% and 14.8% respectively. All these three factors represent parts of the Built Environment *description* sub-category of the Built Environment changes. The next highest-rated factor was *aerial location* with 9.4% referring, mainly, to their desire to reallocate most of the centralised governmental services and institution outside the city centre.

Design and character came in fifth place (7.7%) and *associated features* followed with 5.4%. All other categories scored less than 5%. It is significant that none of the social-grouping categories reached the threshold 5% of the total responses.

5.5 ASSOCIATION ANALYSIS

The association analysis involves cross-tabulation between various responses and subjects' backgrounds. The aim of this analysis is to search for any significant relationship between them which might reveal important tendencies among people of a certain background.

The subjects' backgrounds refer to all the personal information included in their answers. It includes all the responses to the first part of the questionnaire the 'Personal Background Information'. Also it includes one question from Part Two regarding shopping in CCC. Finally, three questions from part three dealing with the frequency of visiting CCC and the purpose and mode of transport for the visit are also part of the subjects' background.

All other parts of the questionnaire are considered to be subjective responses conveying the respondent's opinions. These opinions are considered by their categories and their subdivisions. A thorough cross-tabulation analysis was run between the two sets of information and what follows are the significant relationships concerning gender, age, social class, occupation, relation to CCC; and mode of transportation.

5.5.1 Gender: It was found that a greater proportion of male subjects enjoy living in Cairo than do female subjects, 43.5% compared to 22.2%. When reasons are reviewed, it is found that female subjects do not like the quality of life in Cairo, and at the same time more male subjects like the benefits of the size of Cairo, in respect to job opportunities. Both gender groups seemed uncertain about their opinion on living somewhere else. 55.6% of female subjects mentioned that they shop much less in CCC since the construction of modern shopping centres in the suburbs compared to 24.2% of male subjects. Moreover, none of the female subjects shop more

in CCC compared to 9.7% of male subjects. That points to CCC as becoming less attractive to the female than it is for the male.

In the Space Syntax subjective test, 5.6% of females chose the shorter route with more changes in direction compared to 19.7% of the males. That might be related to the females feeling more vulnerable to danger in narrow alleys. This suggestion is supported by the finding that females gave higher priority to 'security', 'safety' and 'protection'.

In the evaluation of the relative importance of factors derived by the researcher from the literature, females gave significantly more importance to most factors especially: safety, regulation, security, protection and management (see appendix B). Only one factor was given higher importance by the male group, and that was 'greenery'.

In the appraisal of existing pedestrianisation schemes in CCC, the female group gave more positive opinions about the schemes than the male group. None of the female group thought that either of the schemes was a total failure and only one female thought that El-Alfy scheme was not successful. Reasons behind their opinion reveal that the female group care more about that safety the these schemes provide than did the male group.

5.5.2 Age Groups: It should be noted first that the older age group (61 and over) included only one subject. In practice, age does not have clear definitions between different groups, because it is a continuous scale, therefore the changes in responses might be developmental and not unique to each group. But because of the long time interval used (ten years for each group in this research), this developmental continuity in changes of responses may not be evident. Thus, age is dealt with as a discrete scale of measurement by looking for significant associations within each age group individually (for an extensive description of continuous and discrete scales of measurement see Coolican, H. 1997: 196).

The cross-tabulation between age groups and subjects' attitudes towards the city as a whole reveal exciting observations. The younger age group (21-30) seemed to be the most uncertain in their opinions, as their responses were dominated by the 'neutral' response in both 'loving Cairo' and 'loving somewhere else' questions and even the response of 'as before' in shopping in CCC. The next age group (31-40) was the most extreme in loving Cairo, as 55% of this group said they loved Cairo very much, but they were almost neutral about living somewhere else and none of them thought that they now shopped more in CCC than before the construction of modern shopping centres. The next age group (41-50) expressed high preference for living in Cairo over living somewhere else, but with more of them shopping less in CCC than before. The results of the age group (51-60) were more interesting, showing that this age group was the most extreme in liking and disliking living in Cairo.

In the Space Syntax subjective test, the 21-30 age group was the highest in choosing the shorter route with more intersections with a percentage of 33.3%, as they enjoy wandering in narrow and small alleys. This was followed by the 51-60 age group with a percentage of 16.7%. On the other hand, the 31-40 age group was the highest in choosing the longer route with a percentage of 94.7% as they were mainly mid-age professionals who would want to reach their destinations as directly as possible. This were followed by the 51-60 age group with a percentage of 83.3% for being the oldest age group and want to avoid the poor condition of the inner street network.

The 21-30 age group gave the highest importance to window-shopping and public transport but gave the lowest scoring for factors of mystery and building shape. The next oldest 31-40 age group cited the highest factors to be safety, security and management. The 41-50 age group was the pollution and building shape highest scored. The 51-60 age group gave greater significance to the factors of legibility and aesthetics.

5.5.3 Social Class: The social classes included in the sample ranged from middle-lower to lower-upper class. At the lower-upper class was underrepresented, therefore a likely attitude of these groups can not be reasonably justified. Social classes in Egypt, as mentioned in Chapter

Three, have dramatically changed because of the economic liberation policy and the change in the economic system in Egypt; thus an individual does not have to take a long time to change social class. Moreover, because of the narrow categories of social classes used in the current research, the search for significant associations between the responses and the social class classification can be better done by observing a significant change in responses as a persons the social standing increases or decreases, and not by observing discrete social groups, in other words as a continuous scale measurement.

The results of the respondents preference of living in Cairo suggest that, lower and higher social classes like living in Cairo more than the middle social classes in the. On the other hand as the social class increases subjects tend to like living somewhere else out side Cairo. The relationship with CCC as a place for shopping was shown to become weaker as the social status increases. This result shows that higher social classes have positive views about both living in Cairo and living elsewhere. The possible reason for that is their interests in the level of services and financial opportunities in Cairo but at the same time they like to enjoy a better quality of life away from the stressful Cairo, especially that they have the financial ability to do that.

The two pedestrianisation schemes in CCC were found to be less acceptable as the social class increases, and that is as a result of not being able to reach every chosen destination by car. Only one factor derived from the literature was found to gain higher importance as the social class increases, and that was 'disliking crowdedness'. The following factors were found to gain higher importance as the social class decreases: safety, security, aesthetics, continuity, unfolding views and diversity. All other factors either gained almost equal importance across different social groups or did not reveal any significant increase or decrease in importance from one social class to the other.

5.5.4 Occupation: Only one significant relationship was found with occupation, and that concerned route choice. In this question, architects were the only group who selected a shorter route with more changes in direction over a longer route with fewer changes in direction.

5.5.5 Relation With CCC: The analysis revealed that 4 out of 6 subjects who said that they shop more in CCC are in fact working in CCC. It also showed that almost 50% of those who selected the shorter route in the Space Syntax subjective test work in CCC. There are two factors that might have affected their decision: their knowledge of the area and their experience of the real time consumed on each route.

In the evaluation of pedestrianisation experiments, in contrast to what was expected, 60% of those who visit CCC mainly for entertainment did not find the El-Alfy scheme a success at all. Also shoppers were not very enthusiastic about the El-Alfy scheme in comparison to their opinion of the El-Shawarby scheme, which might be referred to the former being relatively a recent scheme which has yet to engender public approval. Subjects who have a work or an official relationship with the area have more positive opinions about both schemes.

It was found that subjects who visit CCC more frequently mentioned more reasons of a social-grouping nature (*operation* and *association*) for their preference of places in the area. On the other hand, those who visit the area less frequently mentioned more reasons related to the built environment (*configuration* and *description*). When design aspects given by the respondents are considered, the opposite was found. 93.8% of frequent visitors mentioned more detailed *description* aspects than any other aspect and, as the rate of visiting the area decreased, more social-grouping responses started to appear. Almost the same correlation was found for reasons for going to CCC, as frequent visitors are mainly working or have some kind of ordinary activity-based relationship with the area, and the less frequent visitors go there mainly for social, administrative, shopping, and entertainment reasons.

5.5.6 Mode of Transport to CCC: The mode of transport to CCC was found to have a significant influence on the degree of shopping in CCC. Users of a *company car* and the *underground* are the groups which maintain the rate of shopping in the area, 50% and 46.2% respectively, compared to the average of 36.7% for all groups. Users of *surface transport* and

walking modes kept almost the same ratio as the average of all groups 36.0% and 33.3% respectively. Finally users of *private car* were the lowest at 23.8%.

In the route choice task all the three subjects who were using *walking* as their main of mode travel to CCC chose the longer route with less intersections. Other modes of transport did not show any specific association, again confirming the findings of the subjective test of Space Syntax.

In the valuation of factors derived from the literature some significant observations were found. First, it was found that *underground* users are much less influenced by most of the factors than are users of *surface transport*. Second, the comparison of *underground* users to *surface transport* users shows the following observations for the 40 factors used in the questionnaire:

1) They gave almost the same valuation in the five factors *of safety, regulations, maintenance, greenery* and *public transport.*

2) Users of the underground gave *cleanliness* as a more important factor than users of surface transport. This result points to the difference in the actual cleanliness of the underground network in Cairo compared to the surface streets.

3) Interestingly, all the other 34 factors were given more importance by *surface transport* users than underground users[1]. Ten factors were found to be significant but the obvious (visual) factors of *unfolding views* and *diversity* were by far the most important over *land use pattern,* with percentages of 57.5%, 54.2% and 27.7% respectively.

These results raise the influence that the dominant transport mode has on people's tastes and the characteristics of their interaction with environmental variables. For example, a passenger in an underground is in fact much less influenced by unfolded views than a passenger using surface transport. This is confirmed by the frequency of 57.7% *unfolding views being mentioned.* The same can be said for the factors of *mystery, legibility* and *building shape.*

[1] Within these 34 factors, the total percentage of each group who gave each factor a score between 8-10 are added together and compared between the two groups. When the difference becomes significantly wide (more than 25%) the factor is isolated for further explanation.

Users of private cars as the main mode of transport to the city centre falmed the main opposition to both El-Shawarby and El-Alfy pedestrianisation schemes. The reasons given were: not being able to reach the shops in both streets directly by car, and restrictions to traffic and parking in both areas.

The results of the evaluation of factors deduced from literature were supported by the subjective open-ended question on factors affecting pedestrian movement in CCC, as users of the underground mentioned a smaller percentage of factors categorised as related to *description* of the built environment compared to any other user groups of transportation. Users of *private cars* were clearly biased towards factors categorised as *description* related. Users of public surface transport and the underground were biased toward factors categorised as those related to *operation*.

5.6 SUMMARY OF FINDINGS

On the scale of **Cairo as a whole**, a great percentage (80%) of the sample claimed to like living in Cairo for reasons of their emotional bond with the city and family and friends living in it, or for reasons of the dominance of Cairo on the national scale in Egypt. However, the majority of the sample would like to live somewhere else if they had the chance because of the inconvenient living conditions in Cairo, especially the congestion. On the other hand, the construction of many new suburbs, which contain modern shopping facilities, is a significant incentive towards leaving the city. These two mutually supportive factors can be said to have caused the role of CCC as the major shopping centre in the city to decline.

In the response to the three **factors most affecting pedestrian movement,** *congestion* has a remarkable influence in the subjects' responses. It is followed by factors which are related to it such as *pavement illegal occupation* and *peddlers* obstructing the pedestrian movement. The *condition* of the pavement and its *width* are also important factors, however not as much as the previous ones.

In **place preference** Tahrir square and 26th of July Street are the most preferred places in CCC, and were followed by Kasr El-Nil Street. The main reason behind the subjects preference of places was the function of the place such as the being a shopping place. On the other hand many places where mentioned as preferred not for their them selves but because of their association with another feature.

In the **Space Syntax subjective test**, 68 subjects selected the longer route with fewer changes in direction and 10 subjects selected the shorter route with more changes in direction. The result supports the Space Syntax criteria, but the reasons for the selection provide a new dimension to the understanding of independent factors affecting route selection. It can be argued that they perceive the longer route with fewer changes in direction as a more *time-saving* route than the shorter route. *Ease* and *safety* were also important factors in route selection.

In the **evaluation of factors** from the literature on pedestrian movement, social-grouping factors were found to have more important among the sample. Factors involving *mystery* and *diversity* received more confused responses than straightforward factors such as *safety* and *sidewalks*.

The role of the built environment was emphasised in the question considering **way-finding tasks**. The most important reasons behind way-finding problems in CCC were found to be the road pattern., such as in Garden City and Islamic quarters, and similarity of building facades, such as in Nasr City and Heliopolis, yet with less influence than the road pattern. Congestion was also an important reason for way-finding problem.

Difficulties facing pedestrians in CCC were found to be significantly dominated by *congestion* as mentioned by 71% of the sample. It was also followed by difficulties which are also related to it such as *pavement illegal occupation* and *traffic system*. Many other difficulties were mentioned, among them *public irresponsibility* which gain its importance from being a self assessment response of the users rather than the system.

Evaluation of the two existing pedestrianisation schemes shows that they are relatively successful. It also shows that the most important factor in the selection of areas to be pedestrianised is their main function of the street and the functions associated with it such as shops and restaurants, with the former more important than the latter. The most important reasons for having more pedestrian areas are the *freedom* and *safety* they offer the pedestrian. However, subjects' anxiety about future proposals which might not meet their requirements has motivated them to object to any further pedestrianisation plans.

Design aspects that respondents mentioned included Built Environment aspects twice as much as social-grouping aspects. However, on the level of the direct response, *pavement width* and *easy and smooth movement flow* were the highest. It is apparent that both of them are related to the main problem of CCC which is *congestion*. They were followed by *pedestrian crossing* and *safe pedestrian environment*. Other important factors for current urban design profession such as *place aesthetics* and *consideration for disabled and elderly* were at the bottom of the qualified responses.

In the **association analysis**, some significant association relationships were found between respondents' backgrounds and their responses:

1) *Gender*: more males like living in Cairo. Females shop much less in CCC. In the Space Syntax subjective test, more males would take the shorter route with more changes in direction. Females gave more importance to the factors from the literature. Females hold more positive opinions about pedestrianisation schemes in CCC.
2) *Social class*: as the social class increases, subjects develop negative opinions about Cairo and its current centre. This and the degree of shopping done in CCC support the notion that the main social classes using the current city centre are the middle and lower social classes. Also the pedestrianisation schemes gain more agreement as the social class decreases.
3) *Relation with CCC*: familiarity with the area was a good indicator of the subject's tendency to select the shorter route with many changes in direction. Pedestrianisation schemes in

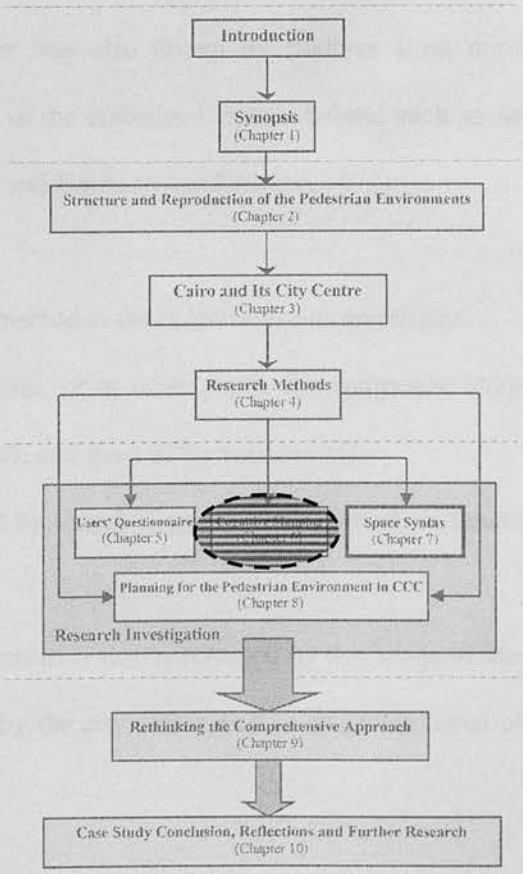
CCC are seen as successful more by people familiar with them through work than by those who visit it for entertainment and shopping. Frequent visitors to CCC mentioned more social-grouping reasons for their place preference in CCC and the opposite was found for occasional visitors. However, frequent visitors gave more detailed design aspects than any other aspects and as their visits rate decreases, more social-grouping design aspects appear.

4) *Mode of transport to CCC*: users of the underground and company cars do almost the same amount of shopping in CCC and users of other modes of transport do less shopping there, with users of private cars doing least of all. All three subjects who go to CCC on foot selected the longer route with fewer changes in direction. Users of the underground showed a remarkable result in that, in their evaluation of factors affecting their movement, they seem much less influenced than users of surface transport by all factors apart from cleanliness. The detailed association of underground users and their valuation strongly suggests a need for research on the effect of the underground on peoples' perception of the environment[2]. In the evaluation of pedestrianisation schemes, users of private cars were the main opposition to pedestrianisation.

[2] The study could imitate "View from the Road" (Appleyard, D. *et. al*, 1964), which dealt with change in perception of the car user. The proposed study might then be named "View from the Underground".

Chapter Six

COGNITIVE MAPPING



INTRODUCTION

This chapter presents the results of applying the cognitive mapping technique. First the objectives of this technique are described. The methodology used in the analyses follows. The findings are presented in detail and summarised at the end of the chapter to allow for the integration of this chapter's findings with findings from other parts of the research.

6.1 OBJECTIVES

Many disciplines are involved in research aimed at understanding the relationship between human behaviour and the environment. Among those are sociology, psychology, geography, architecture and planning. These disciplines have employed different research techniques to reach their goals.

The main evaluation technique used in this chapter was founded by Lynch (1960) and this provided the framework for investigating the interaction between the built environment and the social-groupings. The analysis in this chapter was also driven by findings from previous research which recommended the investigation of the embedded factors behind such an image (see for example De Jonge, 1962; Gulick, 1963; and Harrison and Howard, 1972).

The **objectives** of using the cognitive mapping method in the research are to investigate:

1) how all subjects recognise the city centre area, or in other words the composite image of what they have in mind about it (Lynch, 1960, and most of his successors);
2) the extent to which this image is affected by visual (Lynch, 1960), social or functional attributes (for example Gulick, 1963);
3) the relationship between this image on the macro scale, represented by the image of the city as whole and the micro scale, represented by the city centre area as the main focus of the research;

4) to what extent does presence of pedestrians in streets correlates with the frequency of the appearance of these streets in the cognitive image;

5) the relationship between the user group and the professional group image of the city; and

6) evolution and change of the image by comparing current research findings with that of an earlier study on the image of the centre of Cairo by Abu-Zekry (1983).

By looking at previous research on cognitive mapping, each of the first two objectives is considered in one or more studies. Asking the respondent to draw two cognitive maps one for a micro scale like CCC and the other for a macro scale like Cairo is an innovation that this research applies over and above the usual method. It is inspired by the global and local analysis of Space Syntax (described thoroughly in the next chapter). Two results were expected from this analysis: first how the city centre area is located in the global image of the whole city, second to highlight the differences in recognising these two different scales as an approach to scale-attributed environmental cues. The comparison of data obtained from counting pedestrians in some streets with the frequencies of paths mentioned in the maps was a further extension of the standard method of cognitive mapping, inspired by Space Syntax, to compare theory to real behaviour.

Following one of the objectives of the research in general, which is to see if professionals see the environment differently from non-professionals, maps of subjects with professional backgrounds and those of ordinary users were analysed and contrasted. Images collected from architecture and planning related respondents in the questionnaire in Chapter 5, and professionals interviewed in exploring the process of planning for pedestrians in Chapter 8, are compared to image from the ordinary users in the questionnaire.

Furthermore, as cognitive mapping has received much attention from previous researchers, the chance to trace changes in cognitive mapping over time is taken. The findings of a study of cognitive mapping of CCC carried out in the early 1980s by Abu-Zekry are compared with the

findings of the current research. However, differences in the research methodology adopted by the two studies limited the comparison.

6.2 METHODOLOGY

It is important to note, before going into the analysis, that cognitive mapping is mainly an interpretative technique which depends on finding a reasonable interpretation of the research results. In this technique the respondents do not always give the reason for their responses and it is up to the research to find the reason for such responses and construct the findings.

6.2.1 Methods of Inquiry

To reach the most comprehensive picture of the cognitive image held of the study area, two tools and methods of inquiry were employed. Both of them were introduced in Lynch's study. *First*, the sketch map of the most distinguished features drawn by the subjects. *Second,* the verbal map of the most distinguishing features was requested. Both maps were requested for both scales, Cairo and CCC, 4 maps from each subject, but with variations in the question phrasing to double check the results.

6.2.2 Subdivision of the Data Analysed

The image was divided into several categories according to different criteria with regard to the operation used to obtain it. The *first* was the division between the two scales of Cairo and the city centre area. The *second* was the subdivision between maps representing users' and professionals' points of view, or targeted group division. *Finally*, collected images were divided according to data collection as sketch maps and verbal maps. The verbal map did not follow the same line of inquiry that Lynch established to explore the differences, which might appear as a result of variations in the question. Table 6.1 illustrates these divisions.

Sub-division levels	Cognitive Maps							
Scale	CCC				Cairo			
Target group	User		Professional		User		Professional	
Data collection type	Sketch	Verbal	Sketch	Verbal	Sketch	Verbal	Sketch	Verbal
Number of cases	39	75	8	12	11	75	3	12

Table 6.1 - Levels of sub-division of the maps used in the analysis based on their method of inquiry.

6.2.3 Data Analysis Strategies

The analysis employed two strategies for the aggregation of data in the maps: *collective aggregation* and *individual aggregation* as described by Kitchen and Fotheringham (1997). In *Collective aggregation* (Figure 6.1 - b), the data is aggregated before doing the analysis. In this case only one analytical process is run on the data. As a result of bringing all the data into one pool, no individual differences between cases could be noticed. In the *Individual aggregation* (Figure 6.1 - c), the data is first analysed on the individual level and the results are pooled and averaged. Kitchen *et al.* mentioned a third strategy used to summarise data from cognitive maps, that is the *Disaggregation* strategy. This aims to make statements of generalisation about the results. In this strategy the data from each individual are analysed separately and the results are pooled only for comparison, (see Figure 6.1 - a). The third strategy was found not to be useful for the purpose of the current analysis as it focuses more on the individual's immediate answers. As mentioned in the Chapter Four (see 4.2.2.a), the categories of the responses are the main target of this research and not the individual's responses to avoid having results which are "heavily content-loaded" (Downs and Stea, 1973: 12).

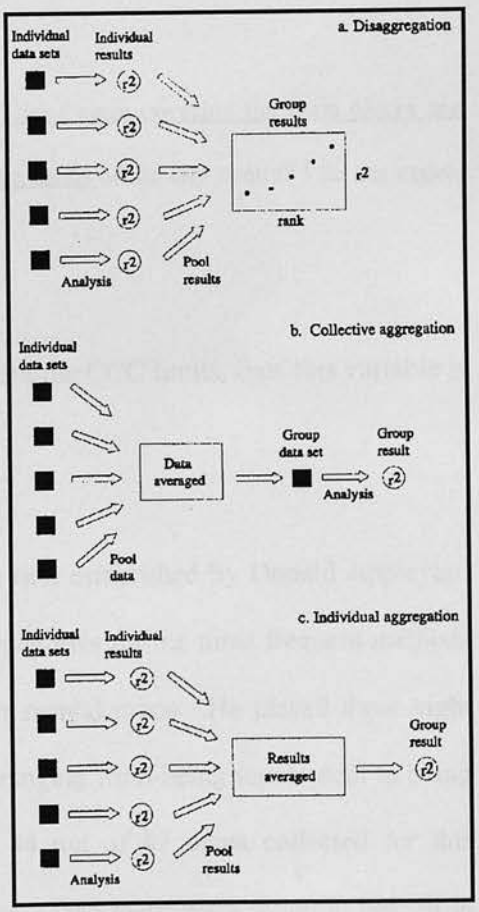


Figure 6.1 – Strategies of Analysis of Cognitive maps.

Source: Kitchen and Fortheringham, 1997: 270.

6.3 FINDINGS

The findings are presented in the order of the six objectives mentioned in 6.1. These findings are followed by a summary of the important points raised by the analysis.

6.3.1 The Image of CCC

Two methods of inquiry were employed in considering the image of CCC. First, the subjects were requested to draw sketch maps of what they think distinguished in the area according to their personal experience, and second they were asked to mention a specific number (five) of the most distinguishing characteristics in the area.

6.3.1.a The Sketch Map of all Subjects: Subjects were asked to draw a sketch map of CCC in question 3.15 as follows:

> 3.15) I would like you to draw a quick map of Cairo City Centre covering the main places and distinguishing characteristics. Could you also show the limits of the city centre? I do not expect an accurate drawing, just a rough sketch.

It was noticed that none of the subjects had clearly defined the CCC limits, thus this variable is excluded from the analysis.

The categories used in the *individual aggregation* were first established by Donald Appleyard (1969) (see figure 6.2). He found that there are eight categories for the most frequent methods of structuring the urban areas when subjects draw their mental maps. He placed these eight categories into two groups, sequential and spatial, each ranging from being topological to being positional. Using these categories it was found that 44 out of 47 maps collected for this research fitted reasonably into one of the eight categories. Two maps were found to best fit in another category that is 'point-based' (figure 6.3 (a) & (b)) as they have a unique perceptual quality. This quality is the dominance of one single reference element and all other elements in the map are related directly to it. This category has been observed by Lynch before as noted in

page 102 of this research. One map has properties belonging to many categories and it has been categorised as a mixed map (figure 6.3 (c)). On one hand, these preliminary results support the validity of Appleyard's categories but on the other they highlight that these kind of subjective responses allow for an infinite variety of responses. Table 6.2 reports the frequency of each category and is further illustrated in figure 6.4.

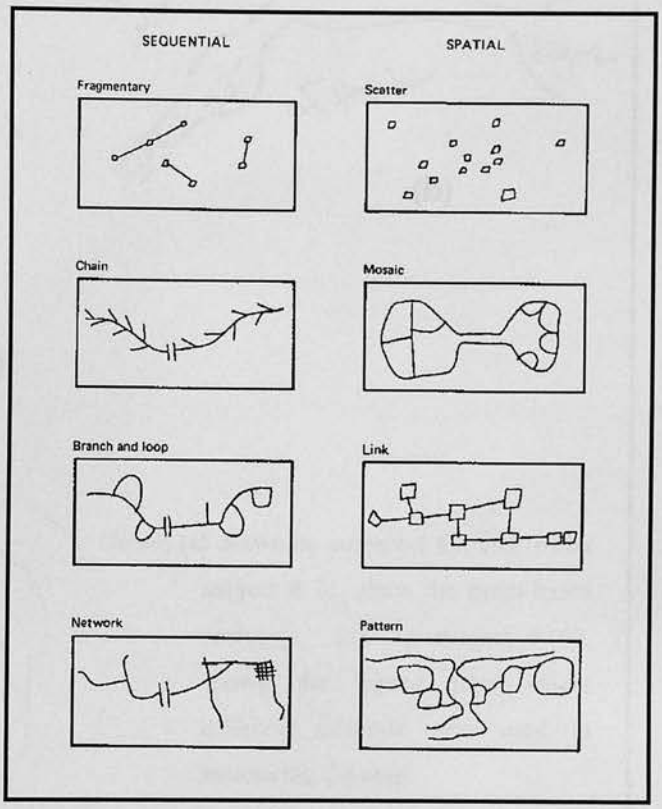
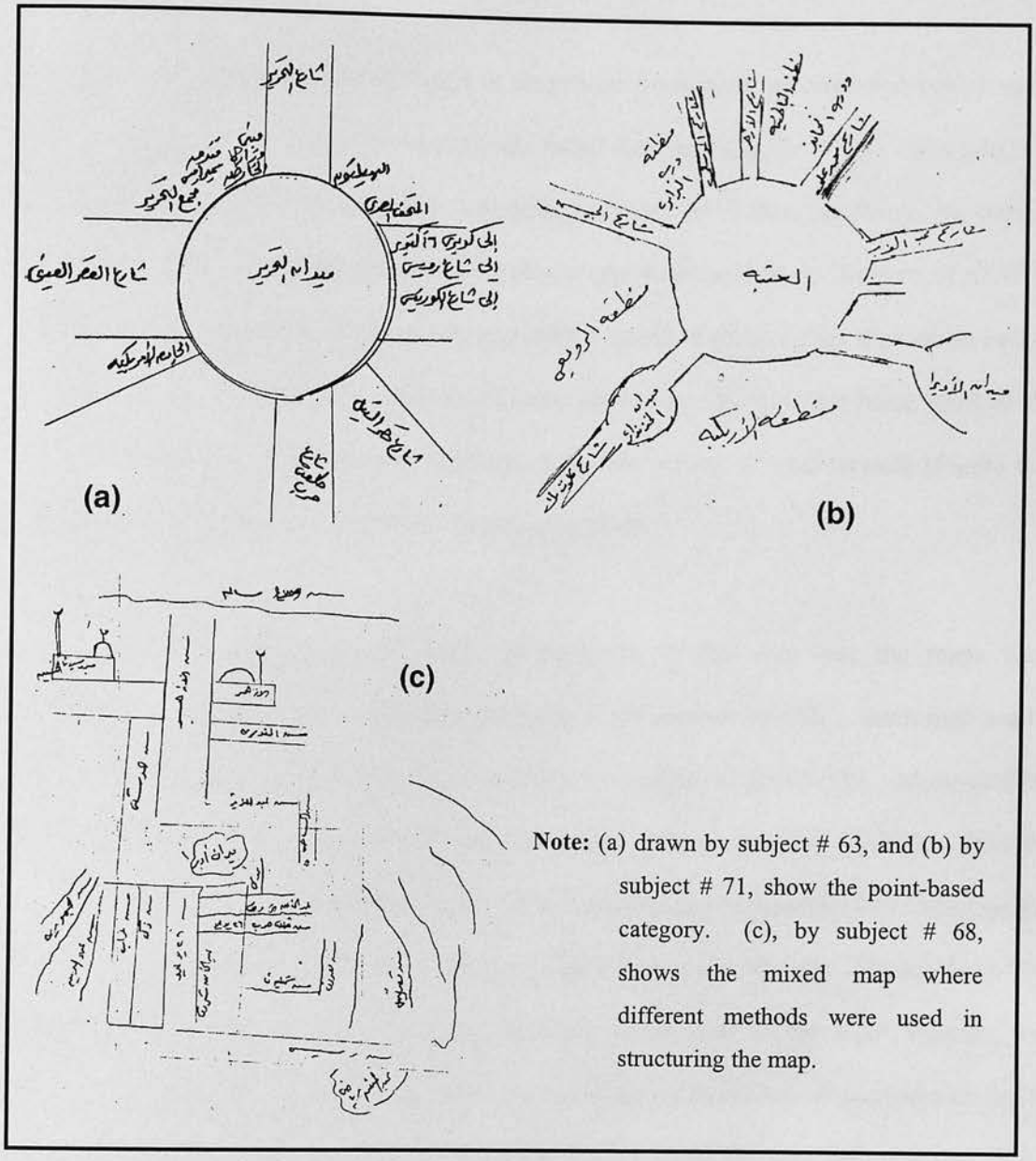


Figure 6.2 – The most frequent methods of structuring the city when drawing mental maps.

Source: Appleyard D. (1968: p 437).

Main category	Secondary category	Number of cases	Sub-percentage	Percentage
Sequential	Fragmented	1	2.56%	2.13%
	Chain	3	7.69%	6.38%
	Branch and Loop	8	20.51%	17.02%
	Netted	25	64.10%	53.19%
	Single referenced	2	5.13%	4.26%
	Sub-total	**39**	**100%**	**82.98%**
Spatial	Scattered	2	22.20%	4.26%
	Mosaic	1	11.10%	2.13%
	Linked	3	33.40%	6.38%
	Patterned	1	11.10%	2.13%
	Subtotal	**7**	**100%**	**14.89%**
Mixed		1		2.13%
Total		**47**		**100.00%**

Table 6.2 – Frequency of map structuring strategies found in the sketch maps.



Note: (a) drawn by subject # 63, and (b) by subject # 71, show the point-based category. (c), by subject # 68, shows the mixed map where different methods were used in structuring the map.

Figure 6.3 - Maps that could not be categorised in Appleyard's (1968) categories.

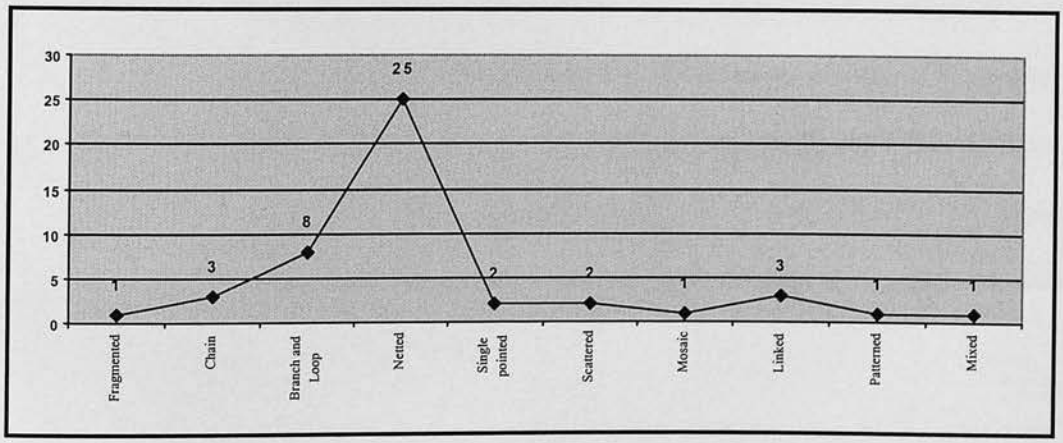


Figure 6.4 – The distribution of sketch maps according to structuring categories.

From this result it was clear that the image of the city centre is more recognised as netted routes (53.2%). Moreover the maps were sequentially rather than spatially structured. This points to CCC being more legible on its micro, immediate, sensory level than on its macro, overall, sensory level. Thus, pedestrians are more likely to locate themselves in the area of CCC by recognising what they have just passed by and what is ahead of them, rather than on an overall image of the spatial relationship between different elements. On the other hand, most of the maps included in the netted category witnessed a convex pattern of road network (Figure 6.5) rather than the linear pattern reported by Appleyard (1968).

The point-based category was a unique phenomenon in the way that the maps were comprehensive images regardless of their symbolic representation of CCC. Each map used a major node, El-Tahrir square (figure 6.3.a) and El-Ataba square (figure 6.3.b), and many other elements whether directly attached to the square or presented as a possible destination from the square. Although in some other maps, a few elements were used to represent CCC which might be due to poor knowledge of the area, in these two cases it was not the case. The number of the complementary elements, that is elements drawn in connection to the main element, was thirteen in one map and twelve in the other and this gives an indication of good knowledge of the area. It was found that the subjects are not socially related in any way that might cause this similarity.

In the *collective aggregation*, all the sketch maps of all subjects, a total of 47 maps, were aggregated in one composite map. First, all the elements were categorised into Lynch's five categories of: landmarks, edges, paths, areas, and nodes. Then data found in the maps were filtered according to a threshold of the frequency of each element in all maps to eliminate infrequent elements and simplify the data.

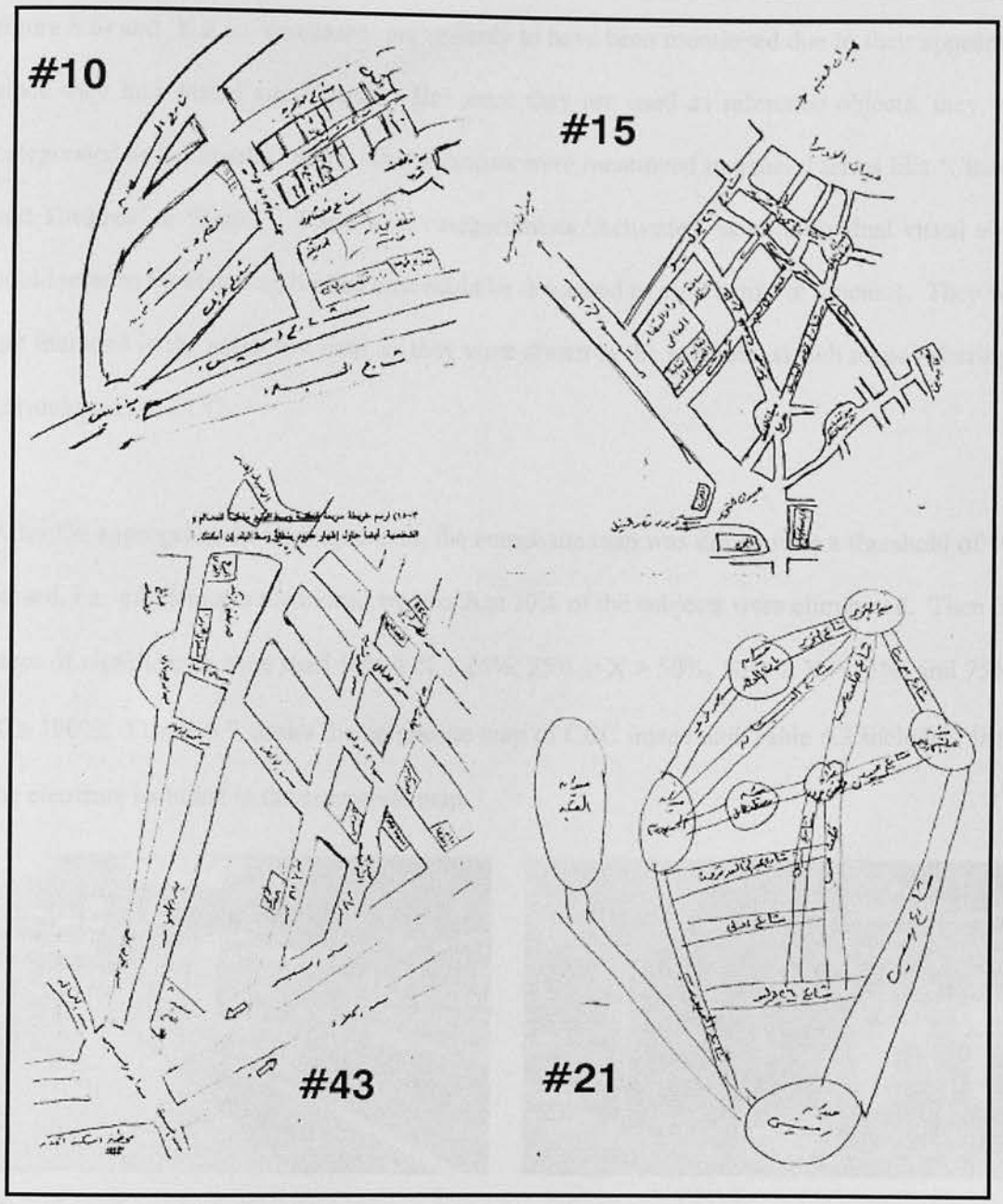


Figure 6.5 - The convex pattern of road network in the netted category maps.

Note: These maps are selective examples and the pattern was not only limited to them.

Most elements mentioned fitted in one of these five categories, some less clearly than others. For instance, 'El-Azbakia fence and garden' despite the impression of being a district for the sake of its overall size, was categorised as a node in that it is well known for its function as a place for buying used and rare books. Also, although the 'Underground Lines' are not visually seen from the outside urban structure, their function goes with that of streets (see figure 6.6). As a result they were categorised as paths. Individual elements, like 'El-Sewedy company' (see

figure 6.6) and 'K.F.C. restaurant' are unlikely to have been mentioned due to their appearance since they lack visual significance. But since they are used as reference objects, they were categorised as landmarks. Some other elements were mentioned in general terms like 'Cinemas and Theatres' or 'Banks'. These were categorised as 'Activities' as no individual visual object could refer to them and no limited area could be described as only banks or cinemas. They were not included in the collective map, as they were drawn in the subjects' sketch maps referring to various parts of CCC.

After the aggregation of all frequencies, the composite map was drawn with a threshold of 10% record, i.e. all elements mentioned by less than 10% of the subjects were eliminated. Then four steps of significance were used $10\% \geq X > 25\%$, $25\% \geq X > 50\%$, $50\% \geq X > 75\%$, and $75\% \geq X \geq 100\%$. Figure 6.7 shows the composite map of CCC image and Table 6.3 include a list of the elements included in the composite map.

Figure 6.6 – Odd features in the cognitive map (the underground and El-Sewedy Company).

Category (total freq.)	Frequency	Agreement ratio
Landmarks (96)	33	34.4%
Edges (4)	0	0.0%
Paths (306)	231	75.5%
Areas (9)	0	0.0%
Nodes (159)	119	74.8%
Activities (8)	5	62.5%
Total (582)	388	66.7%

Table 6.3 – Frequency of elements in the composite map of CCC at percentage of ≥ 10%.

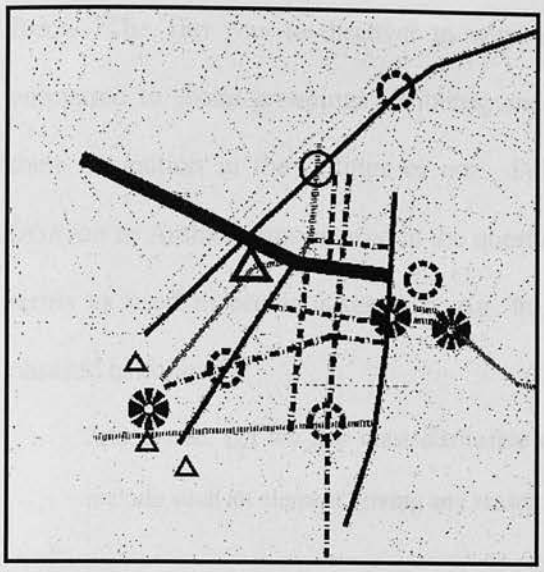


Figure 6.7 – The composite cognitive sketch map of CCC.

The composite map shows some interesting results. *Paths* were mentioned 306 times, 52.6% of all elements drawn in all maps. In the second place came *nodes* with 159 responses and a percentage of 27.3%, and followed by *landmarks* (96 and 16.5%). *Areas* scored 9 and 1.5% and *edges* 4 and 0.7%. None of the last two categories reached the threshold needed for inclusion in the composite map. The last category is *activities* scoring 8 and 1.4%.

The dominance of *paths*, *nodes*, and *landmarks* on the map clearly shows that CCC is recognised as a network of routes that start or meet at movement nodes and are further articulated by landmarks.

Areas seem very rarely used by the subjects on the scale of CCC. Also there was a low response rate in *edges*. That suggests that neither 'Areas' nor 'Edges' are important in Cairenes cognition of CCC.

6.3.1.b The Verbal Map of All Subjects: Question 3.6, aimed at obtaining the verbal image of CCC from the subjects, was different from that usually asked in cognitive mapping questionnaires. Usually the question requests the respondents to name the places they think are distinctive to the study area. The question in using the term *places* might be a leading question which directs the respondent to choose a physical element (see question 1. in Lynch, 1960: 141). In this study it was seen as more appropriate to give the question in a more open-ended

form. The aim was to discover to what extent subjects report built environment features compared to social-groupings attributes, and further to see if the latter play a role in guiding their navigation in the settings or not. Following this aim the question asked for 'things' (*Ashyaa* in Arabic terms as used in the questionnaire form) instead of places (*Amaken* in Arabic terms as used in previous research, e.g. in Abu-Zekry, 1983). Therefore, the question was phrased as follows:

> 3.6) Please, *list* the *five* most distinctive things of Cairo City centre. Explain briefly why you include such an element, giving any reason that you can think of.

The results were surprising, as only 31.4% (106) of all responses (338) referred to one of the five physical elements previously mentioned by Lynch (1961) and which have been further validated by many of his successors. The rest of responses, 68.6% (232), were either referring to *activities* or *qualities* in CCC. It is apparent what the term *activities* refers to. *Qualities* refer to those properties of the environment which can not be categorised as one of the five physical elements and are not an activity. The detailed results of all sub-categories are reported in table 6.4 and figure 6.8.

	Frequency	Sub-percentage	percentage
Landmarks	31	26.7%	9.2%
Edges	3	2.6%	0.9%
Paths	24	20.7%	7.0%
Areas	18	24.1%	5.4%
Nodes	30	25.9%	8.9%
Subtotal	116	100%	31.4%
Activities	93	40.1%	27.5%
Qualities	139	59.9%	41.1%
Subtotal	232	100%	66.6%
Total	338		100%

Table 6.4 – Response categories in CCC sketch map.

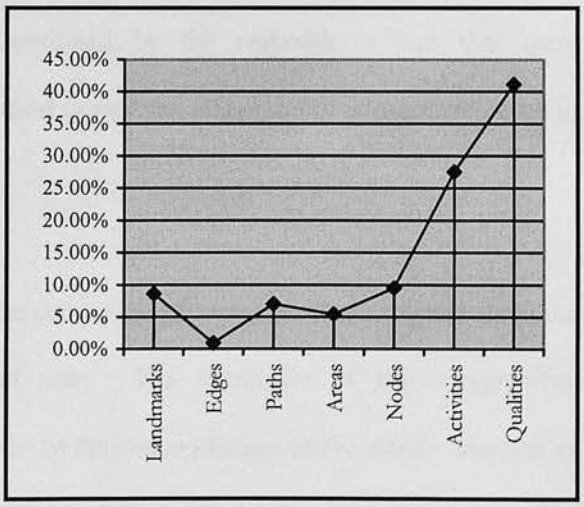


Figure 6.8 – Response categories.

None of the physical elements reached the threshold of 10%. The nearest were 'El-Azhar and El-Hossain District' and 'Tahrir Square' with frequencies of 8% and 9.2% respectively. On the other hand two activities and three qualities reached the 10% threshold. The two activities were

'entertainment' (cinemas and theatres) and 'shopping' with percentages of 27.6% and 25.3% respectively. The three qualities that scored above the 10% threshold are 'traffic system', 'pedestrian congestion', and 'old architectural style of the buildings' with percentages of 13.8%, 12.6%, and 11.5% respectively.

These results highlight the importance of activities and other attributes related to social-grouping in giving a place identity for its users. However, to what extent can any of these activities and qualities shape movement patterns or affect pedestrians in their navigation in the area? The answer for this question is found in Chapter Five and suggests that both built environment features and social-grouping attributes have various roles to play (see 5.4.3.d, g).

6.3.2 Factors Influencing Map Imageability

This section contains an inferential analysis of the descriptive results mentioned in both sketch and verbal maps. It is driven by built environment and social-grouping influences. For the sketch maps, these influences could be deduced by first studying their physical appearance and the major elements in each category, searching for the reasons that lent significance to each of them. On the other hand, the reasons mentioned by the respondents and that were accompanying the verbal maps are the vehicle used to find the imageability components used in this map.

Harrison and Howard (1980) first established the concept of the *imageability components* in the analysis of reasons mentioned in the verbal map. The categories of the imageability components are used in this research to refer also to the two resources of the urban structure as explained earlier (see 2.2.4). Some modifications were made to the components cited in Harrison's research to suit the case study and the responses collected. They are used in this thesis to refer to the Environmental Structural Considerations (ESC) (see Appendix A).

6.3.2.a Influences Affecting the Sketch Map: Two groups of influences are found. The first group is those that affect the physical appearance of the map and the second is those that affect the accumulative frequencies of each element and category, and then the composite map.

6.3.2.a (i) The Physical Appearance of the Sketch Maps: The majority of the maps (53.2%) were classified as netted maps but show a more convex pattern than the one reported by Appleyard (1969). That is a result of the radial pattern of CCC streets and its dependence on several important nodes or squares where most streets meet of start. The explanation of this result might also rests on the fact that, although the streets of CCC have a similar architectural treatment, the functions located on each differ greatly and each street has its own visual elements which give it the uniqueness needed for their identification.

For example Talaat Harb Street has the unique vista of Mogamaa El-Tahrir at one end which almost single-handedly gives it a unique identity in the direction towards this end. In the other direction towards 26th of July street, consequent elements could be found that help to give the street its identity and work as distinguished significant cues. Starting with the 'diplomatic club', then 'Evergreen tower', 'Talaat Harb square', the famous shoe shops, 'Metro Cinema', and ending with the intersection with 26th of July street.

All the maps demonstrated a low percentage of features located in the spatial category group compared to the sequential category. This could reflect the fact that the scale of the area under consideration is relatively small. This suggests that the small scale enhances the ability of pedestrians to concentrate on details and minimise their interest in a more macro cognitive representation of the area. The aspect of area size or scale will be further explored later in this chapter.

All central facilities and services used to be in CCC until the new sub-centres like Roxy started to appear in the suburbs in the seventies and more recently peripheral service centres and towns have sprung up. This centralisation encouraged many Egyptians to visit the city centre

regularly. These regular visits resulted in a 'good' knowledge of the CCC structure to the extent that many maps appeared to be a schematic approximation of its 'real' physical shape. It can be anticipated that, with the construction of suburban centres, the image of CCC will become less clear, moving towards a fragmented or chain category in the sequential category, or even towards more overall image within the spatial group of categories.

6.3.2.a.(ii) The Frequencies and the Composite Map: In this analysis several points are discussed:

1) categorisation using the five elements proposed by Lynch (1960),

2) the effect of the percentage threshold as a condition for inclusion in the composite map;

3) the characteristics of the composite map.

Categorisation using the five elements proposed by Lynch (Table 6.5): The dominance of *paths* can be referred to the clear road pattern that CCC enjoys. It is, then, easy for users to navigate in the settings using their knowledge of both the identity and structure of the road network.

	Complete Image			Composite Image (10% threshold)			
	# elements	frequency	Mean frequency	# elements	frequency	Mean frequency	Agreement ratio
Landmarks	47	96.0	2.0	4	33.0	8.25	34.4%
Edges	2	4.0	2.0	-	-	-	
Paths	48	306.0	6.4	16	231.0	14.4	75.5%
Areas	8	9.0	1.1	-	-	-	
Nodes	19	159.0	8.4	7	119.0	17.0	74.8%
Activities	2	8.0	4.0	1	5.0	5.0	62.5%
Total	126	582	4.6	28	388	13.9	66.7%

Table 6.5 – Categorisation of imageability elements.

Nodes, are mainly squares and are of two types either the starting point of streets or an intermediate, but essential point for changing direction. Thus they are recognised for their relationship to important arteries of movement. This explanation is strengthened by the fact that the three nodes mentioned most: Tahrir, El-Ataba and Opera squares, are transport interchange which contain generous parking facilities. Thus they are starting points for both public transport users and car owners. The next two nodes in the list were intermediate change in direction

points where major streets intersect, Talaat Harb and Mostafa Kamel squares. The only exception of these two major types of nodes that was mentioned by significant numbers of subjects is El-Azbakia fence and garden, which is known for its activity as a book market.

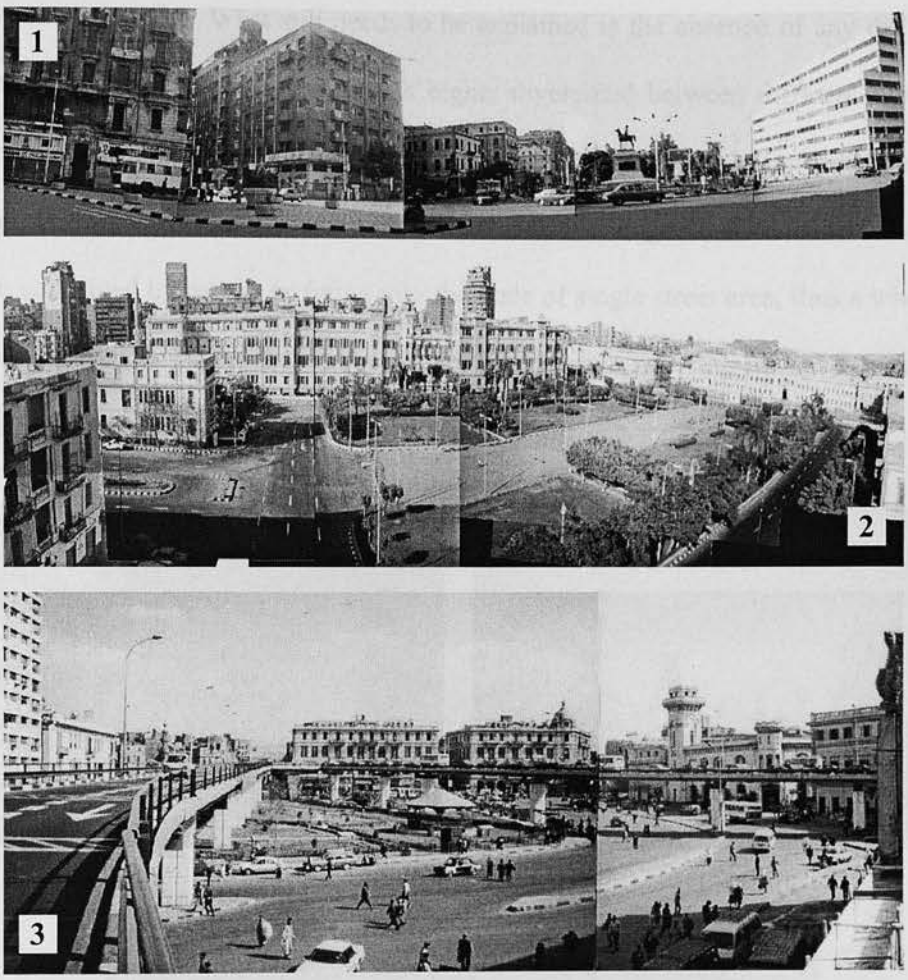


Figure 6.9 – Famous squares in CCC.

Source: Photos by Emad El-Masry.

Notes: 1) Opera Square, **2)** Abdin square, **3)** Ataba square.

Surprisingly, *landmarks* did not score the frequency one might expect for a very stylish area like CCC. Even within the total number of landmarks, few elements reached a reasonable frequency. The area is full of a variety of features, both visually and functionally distinct. The reason for this may be that the landmarks are not registering with the users or that the users are unable to draw them. These two reasons will be checked against the frequency of landmarks in the verbal map.

Areas were also rarely mentioned, 1.5% of all elements and none with significant frequency. It is, thus, possible to conclude that CCC is imaged as a whole and not as being composed of identifiable parts. The unity in visual appearance throughout CCC makes it difficult to differentiate it visually. What still needs to be explained is the absence of any differentiation based on functional criteria, as the area is highly diversified between different functions, i.e. commercial or administrational functions etc., and among one function such as different types of commercial activities. Because of its limited area and its huge diversification in functions, it might be conceived by people as fitting into the scale of single street area, thus a whole area of CCC was referred to by the main street name, for example referring to 'spare parts area' by 'Shambelion street'.

Figure 6.10 – River Nile as one of the most important features in Cairo and adjacent to CCC.
Key: 1) The view of Zamalek Island from the East bank; **2)** The potential for activities on the banks of the Nile; **3)** The view towards the East bank sector which is the closest to CCC

Edges were only drawn if the subject extended the map to include the River Nile and its Corniche, both of these are mentioned four times. A possible explanation for this low response rate might be referred to the nature of the relationship between CCC and the Nile. Despite their geographical proximity, the situation of many semi-private buildings - the Egyptian Museum,

Faisal Bank, the Hilton Hotel, the Arab league headquarter, the Ministry of Foreign Affairs, and Semiramis Hotel - minimises the direct interaction between CCC and the Nile. This interaction could, otherwise, be enriched by locating public functions that integrate both areas.

Effect of percentage threshold as a condition for inclusion in the composite map: This effect is studied by comparing the agreement ratio of each visual element category. The agreement ratio is defined as the accumulative frequency of all elements that satisfy the threshold condition (10% in this case which is equal to 8 responses) of the accumulative frequency of all elements mentioned or drawn. It is clear that it can only be studied for the categories whose elements have already passed the threshold, which limits these to various paths, nodes and landmarks (see table 6.5).

Paths scored a high agreement ratio of 75.5%. This implies a consensus among the public on the most distinguished elements. The eliminated elements were 32 paths with a mean frequency of 2.4.

Nodes obtained the second rank in the agreement ratio with 74.8%. Again they are significantly recognised. The 12 nodes that were eliminated with a mean frequency of 3.3 shows a higher distribution of the image of a wide range of nodes with reasonable, but insufficient, significance to be included in the composite image.

Landmarks scored a significantly lower agreement ratio of 34.4%. 43 elements were eliminated with a mean frequency of 1.5. Both figures indicate that respondents rarely use the same landmarks in recalling the mental image of the area. This could be further explained by the numerous attractive landmarks in the area. In the verbal map, the huge governmental administration building of Mogamaa El-Tahrir (9 times), which is monumental in all aspects - function, appearance, and location was in second place. It was noticed that the remaining landmarks were not frequent destination of the respondents, if they visited them at all. They probably were brought up as a result of being widely known, for instance the high court of

justice (12 times) and the American University at Cairo (5 times), or as a result of being greatly enjoyed, such as the Egyptian museum (7 times).

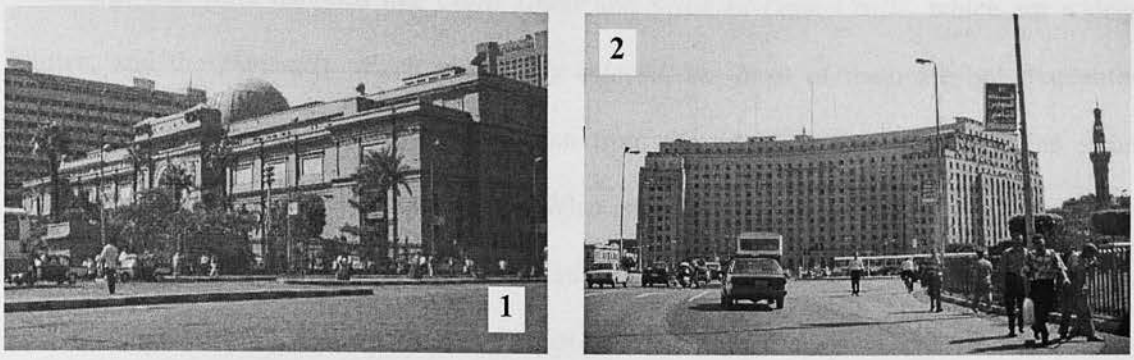


Figure 6.11 – Two of the most famous landmarks in CCC: **1)** The Egyptian Museum, **2)** Mogamaa El-Tahrir.

Characteristics of the composite map (see figure 6.7): All major streets in the CCC were represented, which infers that the legibility of the area is significantly high. The marginal importance landmarks have in guiding descriptive navigation becomes clearer in the composite map. All four landmarks reported in the map fall on the border of the area. The most important path was 26th of July street which gained its dominance for several reasons: it is the entrance to CCC from Ramsis street; it is the node linking major longitudinal streets in the area; it is the widest street in CCC with a great variety of commercial activities; it is a direct link to western Cairo; and historically it is the main approach to the famous El-Azbaika Garden. That reflects on Downs and Stea (1973) argument that objects and their attributes could switch places if the scale of the analysis changes. However in the current case the switching was between individuals at the same scale. This suggests that objects and their attributes, which in other terms might be physical and non-physical, are not separable in reality.

6.3.2.b The Imageability Components of the Verbal Map: The analysis of the imageability components of the cognitive map employs the same three levels of ESC used in the users' questionnaire (see section 5.3, table 5.1). It is important to note here that the cognitive image is the origin of these categories (Harrison *et al.*, 1984). The use of the same categorisation assists in summing the various research methods in Chapter Nine.

In the verbal map landmarks that are frequently used were not included, either on the individual level like places of work or study or on the general level like *Misr* railway station. The landmarks that were included like *Cairo Tower* and *Salah El-Deen Castle,* which are widely known, and the *Pyramids,* which are *greatly enjoyed,* but most of them are not frequently visited. Some of them are in remote location from the city like the Pyramids. The same phenomenon was found in the sketch maps. What is noteworthy about *Landmarks* is that they scored the highest percentage for element mentioned for their physical *description* alone, with 25.8% compared to 20.4% and 10.3% for 'qualities' and 'nodes' respectively. But they were primarily mentioned for their operational contribution to imageability, with 54.8%.

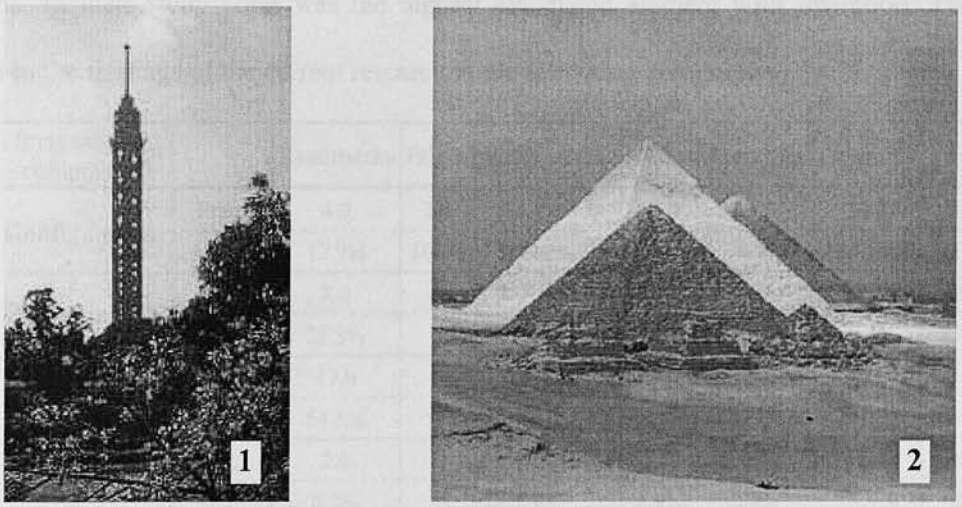


Figure 6.12 – Two widely known landmarks: **1)** Cairo Tower, **2)** Giza Pyramids.

It worth noting that many subjects put 'distinguished things' and 'the reason for mentioning them' in the opposite order. For instance, in some cases 'presence of cinemas and theatres' was the reason for mentioning 'entertainment' as the distinguished thing. Where in other cases, 'to be entertained' was the reason for mentioning 'cinemas and theatres'. The strategy used in dealing with such confusion was to categorise things and reasons as the subject mentioned them without amending their order. So in the first case the distinguished thing was categorised as *Activity* and the reason was categorised as *Associated features*, where in the second case the distinguished thing was categorised as *Activity* and the reason was categorised as *Functional.* This result reflects on what Downs and Stea (1973) say that objects and their attributes could

switch places if the scale of the analysis changes, e.g. from inter-urban scale to intra-urban scale. However, here it is the same scale but it happened between different individuals.

The complete findings of the analysis according to the imageability components in Harrison and Howard's (1980) terms, or the ESC as used in the current research, are listed in table 6.6. The imageability components referring to subcategories of 'operation' dominated all response categories with 55.1%. One of the most interesting results of Harrison and Howard was that operation components, meaning components in their terms, were also dominating all elements apart from paths which was dominated by configuration components, location components in their terms. In their study areas was the highest associated element with operation. This is compared to the findings of the current research in the following paragraphs.

Major category	Imageability component		Landmarks	Edges	Paths	Areas	Nodes	Activities	Qualities	Total
Built environment	Configuration	Freq.	4.0	2.0	2.0	1.0	12.0	13.0	24.0	58.00
		%/col.	12.9%	100%	10.6%	5.6%	41.4%	16.7%	24.5%	21.2%
	Description	Freq.	8.0		2.0		3.0	5.0	20.0	38.00
		%/col.	25.8%		10.6%		10.3%	6.4%	20.4%	13.9%
Social grouping	Operation	Freq.	17.0		10.0	17.0	13.0	58.0	36.0	151.00
		%/col.	54.8%		52.5%	94.4%	44.8%	74.4%	36.7%	55.1%
	Association	Freq.	2.0		5.0		1.0	2.0	18.0	28.00
		%/col.	6.5%		26.3%		3.4%	2.6%	18.4%	10.2%
Total			31.00	2.00*	19.0*	18.0	29.0*	78.0*	98.0*	275.0

Table 6.6 – Imageability components of the verbal image of CCC.

Note: The * (asterisk) indicates that the total number is less than what is recorded in table 6.4 because the elements considered here are only those which the respondents mentioned a reason for.

94.4% (17 out of 18 times) of *areas* were mentioned because of the *operation* of the area. This matches the relationship the findings of Harrison *et al.* (1980) but with increased weight. The difficulty in relating visual significance to a single area in CCC is a likely reason for this; CCC enjoys visual unity and its size is not big enough to distinguish areas by their discrete differences in location.

Paths were internally more related to *association* imageability components (26.3%) than any one of the remaining six elements of the image. The reason is that paths are the major spaces in

CCC, so they are frequently associated with their atmosphere as being busy, crowded or quiet. However, the majority of paths (52.5%) were mentioned on account of operational reasons. This does not match Harrison *et al.*s' findings, especially when the percentage of associating paths with configuration components is sharing the last place with description components.

Nodes were imaged for *configuration* reasons in 41.4% of all cases, very close to their percentage for their *operational* reasons (44.8%). They were mainly related to features associated with them, like important buildings, bus stations and streets radiating from them. One of the most interesting results of Harrison and Howard (1980) was that operation components, meaning components in their terms, were also dominating all elements apart from paths which was dominated by configuration components, location components in their terms.

By comparing the above results of paths and nodes with those of Harrison and Howard (1980), it is possible to suggest that they have different conceptions in each context or case study. Configuration components are to a high degree about movement and know where is what. The increased importance for nodes in the current study suggests a higher conception of them as way finding and navigation aids in CCC. On the other hand the decreased importance of paths suggests that its conception is not only about leading from point A-B, but they function as a place which holds activities as well as a link between various origins and destinations.

For the imaged categories related to social-grouping, *activities* were mentioned more for operational reasons than for configuration reasons, 74.4% and 16.7% respectively. On the other hand *qualities* that were imaged as distinguished features in the CCC had imageability components closely distributed on all four groups of imageability components (configuration, description, operational, and association), however the highest of these was the operational.

6.3.3 The Image on Two Scales

Fourteen subjects drew two cognitive maps, CCC and the whole of Cairo. Eighty-seven verbal maps were also collected for both scales. The importance of such a comparison is that:

1) No pervious research has been found that reports on two cognitive images of one setting, but at micro and macro scales, and from the same subjects were obtained and analysed.
2) The comparison of both scales demonstrates the differences and similarities in users' recognition of each scale, and therefore could be used to enhance the imageability of each according to its own criteria as an approach to scale-attributed environmental cues.

The study of the relationship between the image of a city centre and that of the whole city was inspired by other research works like Space Syntax analysis (Hillier, 1996b). This places emphasis on the relationship between the local and global scales of the urban settings. It further establishes the measure of *intelligibility*, defined as the relationship between the global integration of each street in the system and its direct connectivity (number of streets directly intersecting it). Intelligibility is considered an important indication of an areas' degree of imageability.

This research requested both the sketch image and the verbal image at both scales. The image of CCC is described in 6.3.1. The investigation into the image of Cairo as a whole followed the same format with certain differences. For the sketch map, the question designed to request the image of Cairo was put after the main questionnaire as an optional, but important, question. This takes into consideration the time needed to complete the rest of the questionnaire.

The verbal image of the whole city, instead of the question being open to all possible responses, it was designed to elicit only the built environment features. The reason for that change is that the scale of Cairo involves too much variety and difference to be useful in a descriptive, or comparative, analysis. As a consequence, the number of responses requested in the CCC verbal image was five and in Cairo's verbal image was three.

6.3.3.a The Sketch Map at Both Scales: As mentioned before 47 sketch maps were collected for CCC. Only fourteen respondents opted to also draw a sketch map for Cairo. The comparison between these concentrates on two dimensions: comparing the overall frequencies of all maps, and comparing the two maps supplied by the same subject. The first dimension is

accomplished by comparing the agglomeration of each category in both cases. The second is achieved by comparisons done on a case-by-case basis.

6.3.3.a.(i) Comparing the Overall Frequencies of All Maps: When comparing the results of the *individual aggregation* strategy for Cairo maps with CCC results, the following results were found (table 6.7). 12 of the 14 maps of Cairo fit into one of the original eight categories of Appleyard (1969). Another map was found to best fit the *single referenced* category stimulated by CCC maps (see 6.3.1.a and figure 6.3) with only a minor change in the definition of the category, to 'the dominance of one single reference element and all other elements in the map related, directly or *indirectly*, to it'. The reference point in this case was Tahrir square. The last map stimulated another category, *multi-referenced*. This category is defined as having 'the appearance of more than one reference point in one sketch map'. In this case there were two reference points, the River Nile and Salah Salem Street, with all other elements connected to one of them.

Main category	Secondary category	CCC			Cairo		
		Number of cases	Sub-percentage	Percentage	Number of cases	Sub-percentage	Percentage
Sequential	Fragmented	1	2.56%	2.13%	1	16.67%	7.14%
	Chain	3	7.69%	6.38%	1	16.67%	7.14%
	Branch and Loop	8	20.51%	17.02%	1	16.67%	7.14%
	Netted	25	64.10%	53.19%	1	16.67%	7.14%
	Single referenced	2	5.13%	4.26%	1	16.67%	7.14%
	Multi referenced	0	0.00%	0.00%	1	16.67%	7.14%
	Sub-total	39	100%	82.98%	6	100%	42.86%
Spatial	Scattered	2	28.57%	4.26%	3	37.5%	21.44%
	Mosaic	1	14.29%	2.13%	1	12.5%	7.14%
	Linked	3	42.86%	6.38%	1	12.5%	7.14%
	Patterned	1	14.29%	2.13%	3	37.5%	21.44%
	Subtotal	7	100%	14.89%	8	100%	57.14%
Mixed	Mixed	1	100%	2.13%	0		0.00%
Total		47		100%	14		100%

Table 6.7 – Comparison of the most structuring strategies used in the cognitive maps of CCC and Cairo.

However, the results as shown in the table contain a clear statistical oddity in the frequency of Cairo maps (8 out of 11 categories were only mentioned once, two were mentioned trice and one was not mentioned at all), which might be a result of the low response rate. Therefore the results are considered more an opportunity for discussion than for drawing solid conclusions.

Contrary to the dominance of the sequential categories in CCC sketch maps, sequential is less than spatial category groups in Cairo sketch maps. In CCC the dominance of the netted, or sketching the map as a network of roads was clear with 53.2% of all maps. Cairo maps were equally distributed apart from the scattered and the patterned with 21.44% each.

In the comparison of the *collective aggregation* of both scales the frequencies are employed to check for any significant differences, but only the categories and their frequencies are looked at. Again in this analysis the accumulative frequencies of both maps and the case by case frequency of each category will be studied. The composite map of Cairo is illustrated in Figure 6.13.

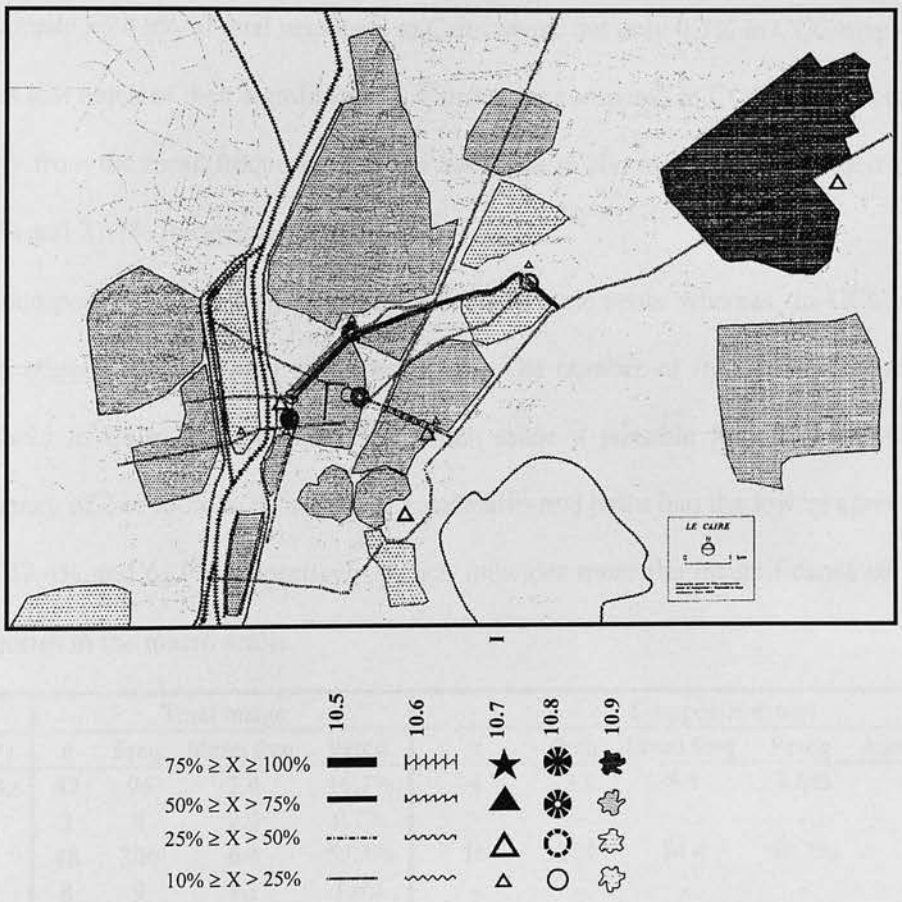


Figure 6.13 – The composite cognitive sketch map of Cairo.

Table 6.8 lists the *total and composite frequencies* of both scales and they are graphically presented in figure 6.14. From the table several observations can be made.

1) The mean number of elements per map is 12.2 in CCC maps and 17.6 in Cairo maps. It shows clearly the wider variety of elements available in the macro scale.

2) The mean frequency per element was 4.6 for CCC maps and 2.1 for Cairo maps. That clearly indicates the higher degree of agreement of the CCC elements than in Cairo maps.

3) Paths are the dominant elements in CCC maps (53.3%) but in second place in Cairo maps (24.0%). On the other hand, areas are the dominant elements in Cairo maps (33.3%) but are significantly marginal in CCC maps (1.6%). This supports the previous finding showing the dominance of sequential categories in CCC maps and the equivalent role it plays to that of spatial categories in Cairo maps.

4) Edges become more significant elements in Cairo maps as all the three well-known edges, the Nile, its Corniche and El-Mokattam hill were mentioned with a mean frequency of 4.0. They made up 4.9% of total responses in Cairo maps, but only 0.7% in CCC maps.

5) Nodes lost much of their significance in Cairo maps compared to CCC maps. It can be seen clearly from the mean frequency, 2.6 and 8.4 respectively, more than from their percentage 18.7% and 27.7% respectively.

6) The composite map of Cairo includes all the five elements whereas, in CCC composite maps, edges and areas were not represented. The number of frequencies above the 10% threshold in Cairo maps became 1.3, which made it possible for all elements with the frequency of 2 or more to be included. Landmarks and paths had the lowest agreement ratio with 57.4% and 61.0% respectively, which indicates more the insignificance of those two categories in the macro scale.

	Total image				Composite image				
CCC (47)	#	Freq.	Mean freq.	Percg.	#	Freq.	Mean freq.	Percg.	Agreement ratio
Landmarks	47	96	2.0	16.7%	4	33	8.3	8.6%	34.4%
Edges	2	4	2.0	0.7%	-	-	-	-	-
Paths	48	306	6.4	53.3%	16	231	14.4	60.3%	75.5%
Areas	8	9	1.1	1.6%	-	-	-	-	-
Nodes	19	159	8.4	27.7%	7	119	17.0	31.1%	74.8%
Total	124	574	4.6	100.0%	27	383	14.2	100.0%	
Cairo (14)	#	Freq.	Mean freq.	Percg.	#	Freq.	Mean freq.	Percg.	Agreement ratio
Landmarks	30	47	1.6	19.1%	10	27	2.7	15.4%	57.4%
Edges	3	12	4.0	4.9%	3	12	4.0	6.9%	100.0%
Paths	37	59	1.6	24.0%	14	36	2.6	20.6%	61.0%
Areas	29	82	2.8	33.3%	19	66	3.5	37.7%	80.5%
Nodes	18	46	2.6	18.7%	6	34	5.7	19.4%	73.9%
Total	117	246	2.1	100.0%	52	175	3.4	100.0%	

Table 6.8 - Comparison of the distribution of responses on the visual elements' categories on the main five categories in both verbal maps of CCC and Cairo.

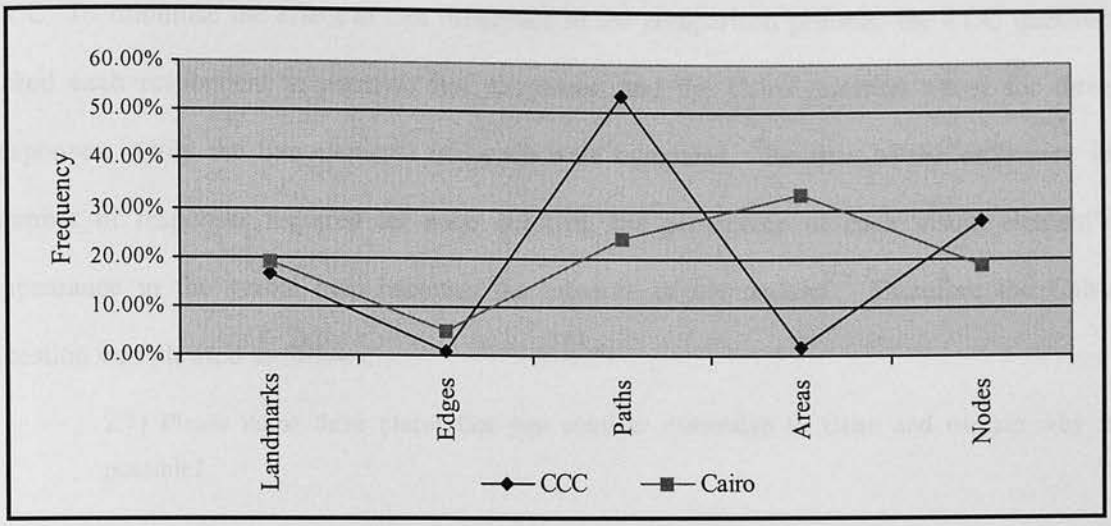


Figure 6.14 – Visual categories at both scales in the sketch map.

6.3.3.a.(ii) Subject by Subject Analysis: The study of the frequency of each visual element mentioned by all respondents is a way to explore observations of the pattern each element follows when used at the two scales by the same individual. There was nothing significant in the pattern individuals mention each one of the five visual element, but there was a significant relationship between the total number of elements mentioned by the same respondent at both scales (figures 6.15).

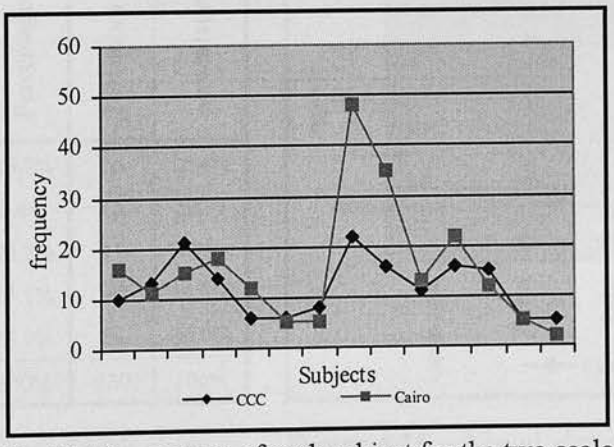


Figure 6.15 – Total responses of each subject for the two scale regions.

6.3.3.b The Verbal Map at Both Scales: The question aimed at finding the verbal map of Cairo was different from the one for CCC. It only asked for 'places' and not for 'general things'. The reason for that was to minimise varieties in responses in order to facilitate the comparison between them, instead of exploring the total image as in the case of the map of

CCC. To minimise the effect of this difference in the comparison process, the CCC question asked each respondent to mention five responses, and the Cairo question asked for three responses. Only the five elements of Lynch were compared. Because of the difference in number of responses required for each question, the percentage of each visual element's appearance in the verbal map becomes the measure of comparison. Therefore the Cairo question was phrased as follows:

> 2.1) Please name three places that you consider distinctive to Cairo and explain why if possible?

Although the number of responses in the verbal maps of Cairo was high (260), only twelve elements were able to be included (>10%) in the composite map. As with CCC it is possible to say that the verbal map has a smaller agreement ratio than the sketch map. On the other hand the gap between those twelve elements and the rest of the elements was sizeable. El-Hossain and El-Azhar had the highest frequency (31), that is equal to 12% of all responses and means that 35.6% of the respondents consider this to be a distinguished place in CCC. Table 6.9 lists the frequency of each category at each scale and is illustrated in figure 6.16.

	CCC		Cairo	
	Frequency	Percentage	Frequency	percentage
Landmarks	31	26.7%	66	25.4%
Edges	3	2.6%	15	5.8%
Paths	24	20.7%	11	4.2%
Areas	18	24.1%	142	54.6%
Nodes	30	25.9%	26	10.0%
Subtotal	116	100%	260	100%

Table 6.9 - the frequency of each visual element on each scale.

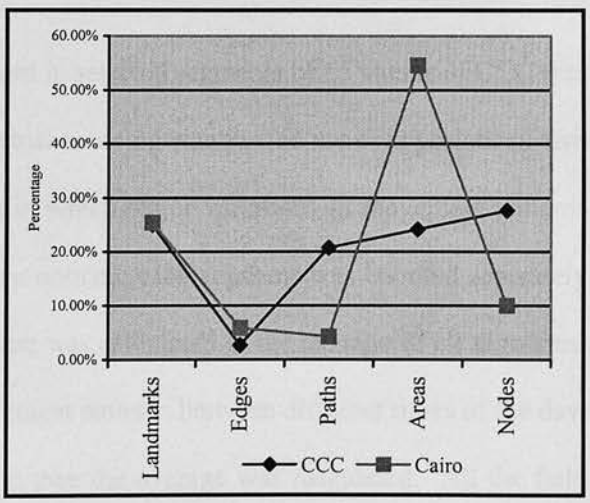


Figure 6.16 – Visual elements at both scales in the verbal map.

From the graph it is noticeable that both landmarks and edges were used almost equally in both scales. Paths and nodes were more extensively used in CCC maps than in Cairo maps. On the

other hand, areas had only moderate importance in CCC maps, but high importance in Cairo maps, accounting for 54.6% percent of all responses.

By comparing figure 6.16 of the verbal image with figure 6.14 of the sketch image, it was found that, CCC and Cairo, maintained almost the same relationship for all elements with respect to which scale gave more importance for which visual element. However, the shape of the graph is affected by the method of inquiry, as the sketch maps gave more importance to paths and the verbal maps gave more importance to areas. The components of imageability at each scale are included in appendix C.

6.3.4 Correlation between Pedestrian Existence in CCC Streets and Path Frequency in the Cognitive and Verbal Map

The aim of this correlation analysis is to explore whether there is any relationship between the mental image as described and real behaviour. Frequencies of paths, as an example and a representative of the visual elements, were compared to the behaviour of walking along them.

A systematic field count of pedestrian movement in selected segments of 15 streets of CCC was conducted during 17th –20th May 1999. The actual counting was carried out over periods of five minutes in each location covered. For streets in which major variations in movement patterns along different segments of the same line were noticed, each segment was counted separately and the movement count value for the whole line was calculated as the average of all segments. Also when there were major variations in movement patterns between different times of the day, the location was counted at different times and then the average was calculated. All the field counts were carried out during weekdays, Monday to Thursday.

It is important to mention that this correlation analysis is only for exploration and a more extensive field survey would be needed to establish a reliable statistical relationship between cognitive mapping and real movement (for a similar study see Kim, 1999).

Using the Statistical Package for Social Science (SPSS), correlation between the frequency of mentioning these 15 streets in the map and pedestrian counts was calculated. The Pearson correlation coefficient was (r = 0.87) with significance of 0.000.

Street name	Day	Night	Average	CCC Map
Omar Makram	72	45	58.5	1
Sabri Abo-Alam	97	78	87.5	1
El-Shaikh Reehan	22	18	20	2
Mohamed Mahmoud	145	160	152.5	2
El-Boustan	150	98	124	3
Kasr El-Ainy	189	140	164.5	5
Shambelion	60	43	51.5	5
El-Tahrir	165	182	173.5	6
El-Alfy	171	244	197.5	11
Abdel-Khalek Tharwat	150	175	162.5	13
Mohamed Fareed	240	161	200.5	17
Kasr El-Nil	188	165	176.5	21
Sherief	272	172	222	23
Talaat Harb	209	242	225.5	27
26th of July	456	425	420.5	34

Table 6.10 - Field observation against frequency in CCC map.

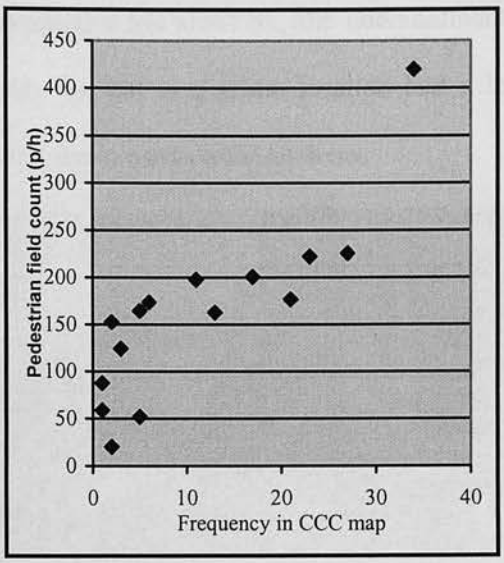


Figure 6.17 – Scattergram of field observation/ frequency in CCC map.

The scattergram graph in figure 6.17 illustrates this relationship. It was found that the highest three streets in pedestrian counts and cognitive mapping are the same. The next five streets, all with a frequency higher than 10% which is 4, have a close pedestrian presence on average although they differ significantly if day and night observations are considered. When it comes to those streets with frequencies lower than 10% in the CCC map the presence of pedestrians is no longer a strong guide.

It was found also that streets like Mohamed Mahmoud Street with prime locations[1], such as access links, but with no significant activities located in them have relatively high pedestrian presence compared to their use in the cognitive map.

The results suggest that people mainly recognise streets which are more usable, with some exceptions. Many streets could be used heavily because of their location but can be considered distinguished only if they have both *complexity of activities* and *prime location*. Remembering

[1] 'Prime location' refers to significant physical relationships and characteristics.

the name of the street and its location is important for the pre-journey planning and for direction description. Some good examples of streets often mentioned in the verbal maps for their prime location but marginally mentioned in the drawn maps are Mahmoud Basiuny Street, Magles El-Sha'ab Street and Sabri Abo-Alam Street. Also streets like Ma'arouf St., the intercontinental passage and Behler passage, with distinctive activity but not in a prime location had a low response rate among all maps of Cairo and CCC and in the written/verbal answers.

Figure 6.18 - Streets with significance in CCC.

Notes: 1) Approach to Talaat Harb Street (to the left) and Tahrir street (to the right) from Tahrir square, **2)** Approach to Kasr El-Nil street from Tahrir square, **3)** Shrief street, **4)** 26th July street with the approach to the High Court of Justice and the Ministry of Foreign Affairs appears in the background, **5)** Intercontinental passage.

6.3.5 Relationship between User Group and The Professional Group Image: This analysis is mainly a reflection of the main research framework, which distinguishes between how users and professionals see the built environment. The comparison is based on respondents with an architectural or planning background (6 respondents) whose results are included in the questionnaire analysis in Chapter Five, and those interviewed separately (7) in the planning for pedestrians in Cairo in Chapter Eight. The 74 users are those from the questionnaire sample after taking out the six professionals. The comparison looks at the sketch and verbal maps.

6.3.5.a The Sketch Map of Both Groups: Because of the limited sample size no comparison was possible between both groups in the aspect of the physical appearance of the sketch map (*individual aggregation* strategy). The accumulated frequencies of the visual elements in both maps were the only criteria available for comparison.

Table 6.11 lists the percentage of times each element was mentioned in each group of maps. It is clear from this table, and even more in figure 6.19, that both groups view CCC similarly with users favouring landmarks, and professionals nodes. Also, professionals did not mention any activity which could be referred to their physical design background.

	Professionals		Ordinary users	
Landmarks	9	10.6%	87	17.5%
Edges	2	2.4%	2	0.4%
Paths	45	52.9%	261	52.5%
Areas	0	0.0%	9	1.8%
Nodes	29	34.1%	130	26.2%
Activities	0	0.0%	8	1.6%
Total	85	100.0%	497	100.0%

Table 6.11 - percentage each visual element was mentioned in users and professionals sketch maps.

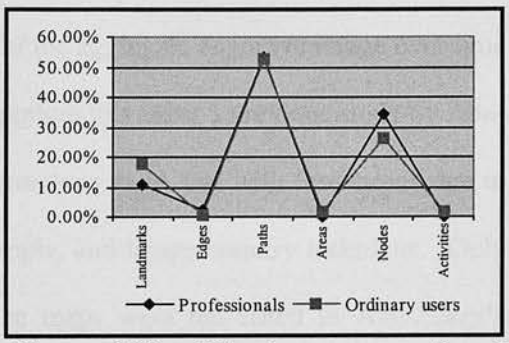


Figure 6.19 – Visual groups mentioned by users and professionals in their sketch maps.

6.3.5.b The Verbal Map of Both Groups: The two groups' responses in the two categories, built environment features and social-grouping attributes, were compared (see table 6.12 and figure 6.20). The professionals were expected to mention aspects of the built environment more than the users, but the test did not show that. On the contrary, the professionals' responses included 74.6% of social-grouping attributes compared to 67.4% of users' responses.

What emerged as being more significant was the huge weight given to the *traffic system* of CCC by professionals compared to users. Seven out of twelve (58.3%) professionals, compared to five out of seventy four (6.8%) users, mentioned the *traffic system* as significant to the city centre.

	Professionals		Ordinary users	
Landmarks	5	8.5%	24	8.6%
Edges	1	1.7%	2	0.7%
Paths	5	8.5%	19	6.8%
Areas	1	1.7%	17	6.1%
Nodes	3	5.1%	29	10.4%
Subtotal	15	25.4%	91	32.6%
Activities	14	23.7%	79	28.3%
Qualities	30	50.8%	109	39.1%
Subtotal	44	74.6%	188	67.4%
Total	59	100.0%	279	100.0%

Table 6.12 - Percentage each visual element was mentioned in users and professionals sketch maps.

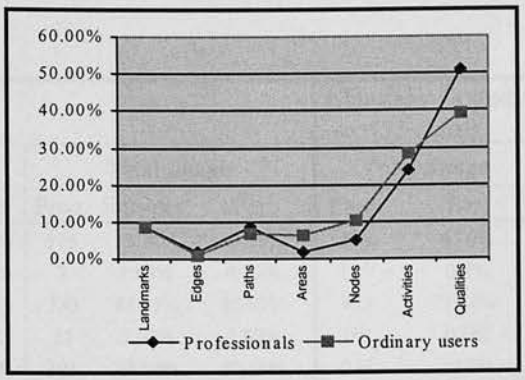


Figure 6.20 – Categories of responses mentioned by users and professionals in their verbal maps.

6.3.6 Evolution and Change of the Image

No study was found that deals with the development of the aggregate cognitive image over time for the same area. The opportunity was available to explore this using a previous study by Abu-Zekry (1983) for city centre of Cairo. The comparison was valid, but with limitations due to differences in sampling strategy, the size of each sample, and image enquiry technique. Only the accumulative frequencies were compared, as the maps were not listed in Abu-Zekry's research. The sample size was 33 in his study compared to 87 in the current study.

Table 6.13 lists the total frequencies of all elements reported by each study. The first surprising difference is the number of elements mentioned by each respondent in each study. The average number of elements per respondent in the sketch map of the current study was 6.7 elements/respondent, whereas it was 39.9 elements/respondent in Abu-Zekry's study! Abu-Zekry did not mention if the results he recorded were an agglomeration of both sketch and verbal image or only of one of them. He showed some examples of the sketch maps he collected and they showed very close similarity, in the aspect of number of elements mentioned in each map, to the sketch maps of the current study. That implies that the list reported was a summation of all frequencies in both sketch and verbal map. What makes it even more reasonable to consider it as a summation is that six elements scored over 90% and two of them scored 100%, i.e. were mentioned by all respondents. Considering the current study, that is only possible if the two images were aggregated.

Study	Current study (87 cases)									Abu-Zekry's study (33 cases)	
Image	Sketch map			Verbal map			Total image			Total image	
Measure	Freq.	Sub-per.	Per.	Freq.	Sub-per.	Per.	Freq.	Sub-per.	Per.	Freq.	Per.
Landmarks	96	16.72%	16.49%	29	27.36%	8.58%	125	18.38%	13.59%	579	43.9%
Edges	4	0.70%	0.69%	3	2.83%	0.89%	7	1.03%	0.76%	11[(1)]	0.8%
Paths	306	53.31%	52.58%	24	22.64%	7.10%	330	48.53%	35.87%	493	37.4%
Areas	9	1.57%	1.55%	18	16.98%	5.33%	27	3.97%	2.93%	0[(2)]	0.0%
Nodes	159	27.70%	27.32%	32	30.19%	9.47%	191	28.09%	20.76%	235	17.9%
Sub-total	574	100.00%	98.63%	106	100.00%	31.36%	680	100.00%	73.91%	1318	100.0%
Activities	8	100.00%	1.37%	93	40.09%	27.51%	101	42.08%	10.98%	0[(3)]	0.0%
Qualities	0	0.00%	0.00%	139	59.91%	41.12%	139	57.92%	15.11%	0[(3)]	0.0%
Subtotal	8	100.00%	1.37%	232	100.00%	68.64%	240	100.00%	26.09%	0.0%	0.0%
Total	582		100.00%	338		100.00%	920		100.00%	1318	100.0%

Table 6.13 – Total frequencies of all elements reported by Abu-Zekry's study and the current study.

Notes: **(1)** The edges extracted from Abu-Zekry's study comply with the definition of edges used in the current study, as being clear barriers of activity between two districts, so streets and nodes included in Abu-Zekry's study as edges were excluded.
(2) Areas were not listed in frequencies, but as a general description of their nature in the city centre, so it was inferred that none was clearly mentioned.
(3) No activities or qualities were mentioned by Abu-Zekry.

Taking both images, sketch and verbal, the ratio of element/respondent went up to 10.6 elements/respondent, which is still far below the ratio of Abu-Zekry's study (42.9 el./res.). Two reasons might explain this disparity. The first is the condition Abu-Zekry used in choosing the sample as being residents in the CCC area, which implies greater knowledge of the area than the current case study sample. The second is the unlimited number of responses required in the questions inquiring into the verbal image in Abu-Zekry's study compared to a limited number of five responses in the current study.

Figure 6.21 shows that four elements recorded close frequencies: edges, paths, areas and nodes. Landmarks were the dominating element in Abu-Zekry's with 43.9% whereas they were in fourth place in the current study with 13.59%. That difference was in favour of the social-grouping attributes obtained by the current study, which were not of Abu-Zekry's interests.

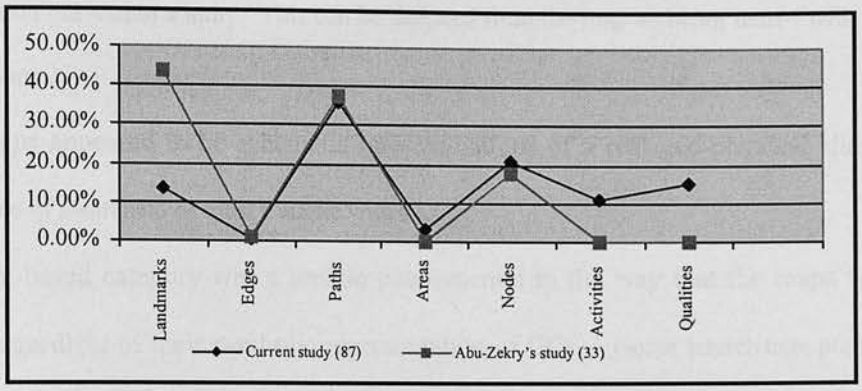


Figure 6.21 – Frequencies of all elements reported by Abu-Zekry's study and the current study.

From these results it is possible to suggest that the distribution of the accumulative image on the different imageability elements is almost consistent over time for the same area, taking in consideration the limited time interval between the two studies which is about 20 years. Also, the method or technique of inquiring the about image affects the result in two ways. First it affects the variety of elements collected among different element groups, for example the significance of the social-grouping attributes in the current study compared to Abu-Zekry's study. Second it affects the number of elements mentioned in each element group and therefore the accumulative image, as it is clear that landmarks dominated Abu-Zekry's study because of the unlimited number of them available in the city centre compared to other element groups like paths and nodes. Thus, it affects the ability to measure the relative importance of each element group against the others.

6.4 SUMMARY OF FINDINGS

The following is a summary of the findings of the cognitive mapping analysis with all interpretations in brackets {}.

1) CCC is more legible on its micro, immediate, sensory level than on its macro, overall, sensory level. {The scale of the area under consideration is relatively small.}

2) The macro scale of CCC is recognised as a composite of its micro scale features. {Although the streets of CCC have a similar architectural treatment, the functions located on each differ a lot and each street has its own visual elements which give it the uniqueness needed for their

identification but within a unity. This can be deduced from the map as being netted with an overall convex shape.}

3) Many maps appeared to be schematic approximations of a real geo-physical shape. {The high degree of awareness of most Cairene with CCC}.

4) The point-based category was a unique phenomenon in the way that the maps were clear images regardless of their symbolic representation of CCC. {some interchange points like El-Tahrir Square and El-Ataba Square are very dominant.}

5) The dominance of paths, nodes, and landmarks on the map clearly shows that CCC is recognised as a network of roads, which start or meet at movement nodes and this network is further articulated by some landmarks. {CCC enjoys a clear road pattern.}

6) Paths and nodes showed a high agreement ratio whereas landmarks had a much lower agreement ratio. {Variety of landmarks is greater than the variety of paths and nodes.}

7) All major streets in CCC were represented in the composite map. {The legibility of the area is significantly high.}

8) Some elements were included as a result of being widely known or greatly enjoyed and others with more frequent use were not included. {Public culture and the media give a bias towards specific elements}.

9) In the verbal map, the distinguished features and the reason for mentioning them were reversible. {The strong bond between built environment and its qualities and other social attributes of the environment means that they are cognitively interchangeable.}

10) Neither *areas* nor *edges* are important in Cairenes' cognition of CCC. {The unity in visual appearance in CCC area makes it difficult to differentiate its composite areas on a visual basis; when they are differentiated on a functional basis, and given the small size of CCC, they tend to be recognised as streets.}

11) *River Nile is* not important in Cairenes cognition of CCC. {The location of many semi-private buildings has minimised the interaction between CCC and the Nile.}

12) A majority of the sample either referred to *activities* or *qualities* (see definition in 6.3.1.b) in CCC. These results highlight the importance of activities and phenomenal qualities in giving a place its identity for users.

13) Operational reasons were dominant for mentioning different features in the verbal map. {There is a direct relationship of operational reasons with all living practices and experiences.}

14) Almost half of all *nodes* in the verbal map of CCC were mentioned because of configuration reasons referring to their association with other features such as important buildings, bus stations or streets. {The major nodes also have important buildings.}

15) The physical description component of imageability was mentioned in association with *landmarks* more than any other element. {A *landmark* should mainly target visual uniqueness more than any other property.}

16) CCC sketch maps were dominated by sequential rather than spatial patterns, slightly the opposite was observed in Cairo sketch maps. {The small scale of CCC makes it recognised as a movement route level; the large scale of Cairo makes it recognised on the abstract level.}

17) As the scale becomes bigger, the ways used to structure and recognise the area become more diverse among the population. This is seen in the dominance of some categories in CCC sketch maps in comparison to the equal distribution among almost all categories in the Cairo sketch maps. {The larger the scale the more complex the spatial structure, therefore each individual is faced with a larger choice resulting in more individual selections.}

18) The diversity of the response as the size of the area increases is apparent in the elements included in the sketch map resulting in a higher agreement of the significant elements on the local scale. {The larger the scale the more the available cues that can be used, and therefore the types of images become more dispersed.}

19) *Paths* are the most important element in the CCC sketch maps but not that important in the Cairo sketch maps. Areas are very marginal in the CCC sketch maps yet, are the most important element in the Cairo sketch maps. Despite *edges* being absent from the CCC sketch maps, all major edges in Cairo are represented in the Cairo sketch maps. {The larger the scale of the settings the larger the scale of the environmental cues.}

20) There is no clear relationship between the individual responses in the two sketch maps of Cairo and CCC apart from the relationship between the total number of elements mentioned in each map by the same respondent. {That might imply that an individual who uses a certain degree of details in environmental cue recollection, tends to use the same degree of detailing if the

limits of the environmental setting change either towards more micro or macro districts. However, this degree of detailing depends on the individual's familiarity with different settings.}

21) Verbal images of Cairo and CCC have less agreement ratio than their respective sketch images. {The respondents find writing easier and more accessible than drawing, thus the verbal image is broader and the sketch image is more restricted to 'drawable' elements.}

22) Sketch maps give more importance to paths and verbal maps give more importance to areas. {This might be a consequence of the method of recording the answer.}

23) With some exceptions people recognise streets which are more usable,. Many streets could be heavily used because of their location but can be considered to be distinguished in the mental image only if they have both the *complexity of activities* and the *prime location*. {The *prime location* makes the street useable as a movement channel; having a *complexity of activities* in it makes it memorable and a link is then established between these activities and the street name and location.}

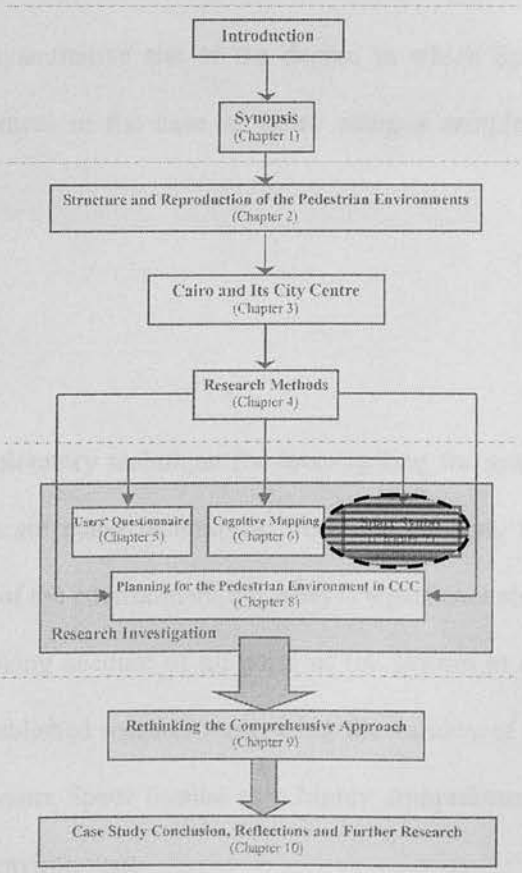
24) The overall comparison of the cognitive maps of Cairo and CCC reveals one important result. Respondents tend to use paths and nodes as guidance in their navigation, but when they are faced with the macro scale of the whole metropolis of Cairo they start to use more macro scale physical elements like areas. {As the pedestrian movement is mainly practised at the micro scale, it should be enhanced by increasing the legibility of its counter visual elements; *landmarks*, *paths* and *nodes*. *Areas* give the whole city its legibility.}

25) In the comparison between professionals and users, no real differences emerged apart from an undue concentration on the traffic system by professionals.

26) The evolution of the image analysis between the current research and Abu-Zekry's study reveals a significant similarity in the use of four elements: *paths*, *areas*, *nodes*, and *edges*. *Landmarks* in Abu-Zekry's study lost importance to socially related *qualities* and *activities* in the current study. {This points to the influence of the research method and technique.}

Chapter Seven

SPACE SYNTAX



INTRODUCTION

In this chapter Space Syntax is applied and analysed. The objectives of using the technique are followed by a detailed description of the methodology used in the application. This includes the sources of raw data, the means of processing it and the different stages of analysis. The main line of analysis is to apply all available models of Space Syntax (CAM/MAM/SIM) (see 4.3.2.d) to Cairo and the city centre. Applying the model at both scales complies with the objectives of the other methods used in this research.

Two main lines of analysis are followed: the analysis of the visual appearance of maps and the analysis of the values accompanying them. The latter line of analysis and its sub-lines are partially specific to the current research, which was selective in using the categories of outcome and the way they are presented to suit the specific objectives of this chapter and the overall methodology.

To contextualise Space Syntax to CCC two tests were run. The first is a subjective qualitative test (see 5.4.3.f). The second is an objective quantitative test of the degree to which Space Syntax values correlate with pedestrian movement in the case of Cairo using a sample of pedestrian counts.

7.1 OBJECTIVES

Space Syntax is used in this research as an exploratory technique for investigating the spatial configuration of the built environment. There are many techniques, like field surveys, that could be used to analyse the physical properties of the environment but what is significant about Space Syntax is its comprehensive nature in taking account of all parts of the system in one interrelated whole or model. The amount of published research supporting the validity of the practical implications of Space Syntax, also favours Space Syntax as a highly comprehensive tool for analysing the physical properties of the environment.

The objectives of using Space Syntax in the current research are to investigate:

1) the spatial configuration of CCC with regard to the accessibility[1] of spaces, and their overall interrelationships;
2) the relationship between the spatial configuration of CCC in comparison to Cairo;
3) to further explore the degree to which spatial configuration, as deduced by Space Syntax, coincides with the actual behaviour and use of the spatial network, represented by pedestrian movement counts.

7.2 METHODOLOGY

In this subsection, an overview of data resources, processing, and handling techniques is described. The main category of data used are the axial maps of Cairo and CCC and the values of different measures represented in the accompanying tables. Secondary data categories are pedestrian counts in some selected locations in CCC. Describing the axial maps and their output values is the main thread of analysis and the secondary categories are used for confirmation of some results.

7.2.1 Raw Data Resources

7.2.1.a Base-map

This was obtained from the 'Underground Project Agency' (figure 7.1). It represents the boundaries of the urban fabric at the beginning of the 1990s extending from Nasr City and Heliopolis in the East to El-Muhandeseen in the West, and from El-Mokattam and El-Haram in the South to El-Ismaeilia Canal in the North.

7.2.1.b Field observation

The field observation used is of two types; participant observation and pedestrian field counts. Participant observations were used to test the values of the spatial analysis as defined by Space Syntax against the actual use of some selected spaces in the spatial system of Cairo and CCC.

The selected spaces were either the highest or lowest in the spatial configuration analysis. The observations were undertaken to control the subjective projections of the analysis. The pedestrian field counts is the same as that used to test cognitive mapping and which is described in subsection 6.3.4.

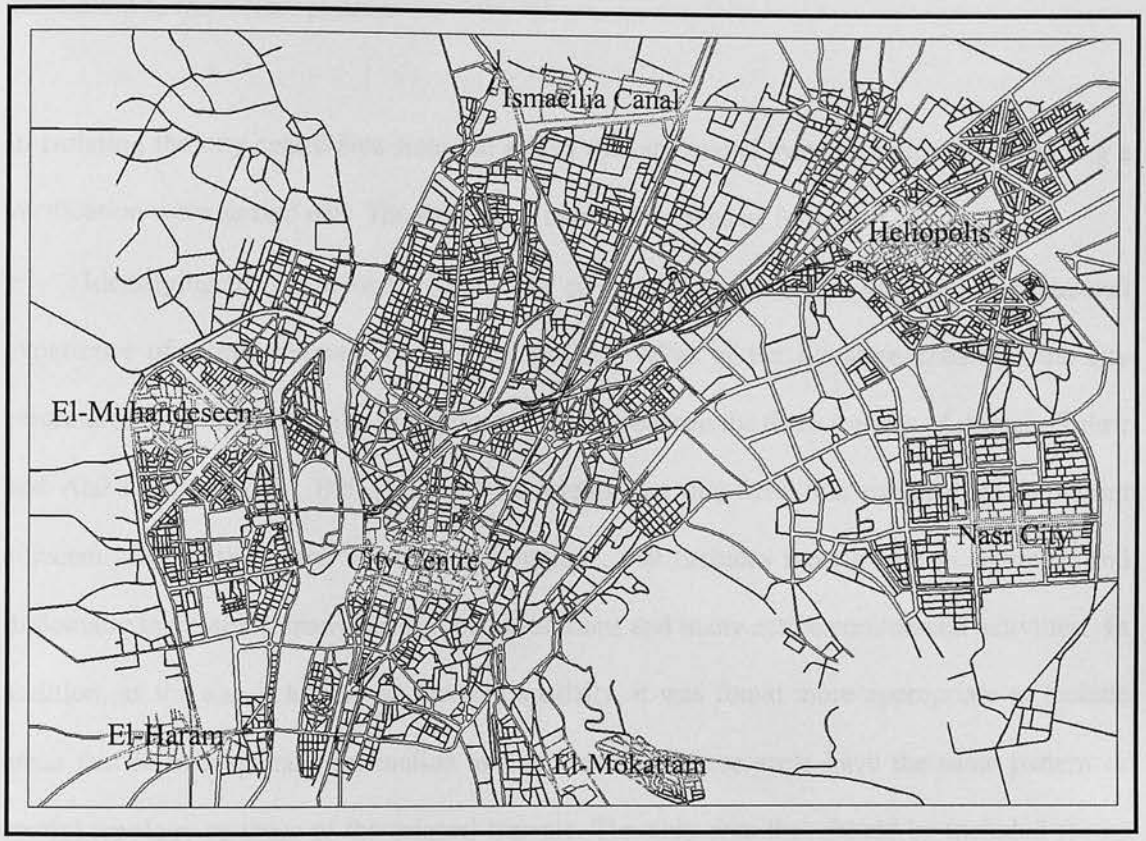


Figure 7.1 – Map of Cairo.
Source: Digital map obtained from the Underground Agency.

7.2.2 Processing the Raw Data

7.2.2.a Drawing the axial maps

Axial lines are defined as the longest and fewest visual and access lines that can be drawn to cover all convex spaces in any movement system. Convex space is defined as a space in which every point can see every other point, or it can be defined also as any space no tangent of which cuts into the space itself.

[1] Accessibility in Space Syntax terms is measured by the variable of Integration, which defines how integrated (accessible) a space is from all other spaces in the system and then ranks the spaces from the most integrated (most accessible) to the most segregated (least accessible).

Only the physical availability of access from one public space to another was taken into consideration while drawing the model, and no traffic management rules, which eliminates factors such as one-way streets from the model. It was mentioned in Penn (Penn *et al.*, 1998: 76) that when traffic management rules were taken into account the model showed less correlation to movement pattern.

In isolating the city centre area from the rest of the city spatial system three steps including a verification were carried out. The three steps can be described as follows:

- Identifying the limits or borders of the city centre according to literature and personal experience of where central functions are located. Most of the literature considers the city centre area to be that known as the 'golden triangle' between the three squares of Ramsis, Tahrir and Ataba (figure 3.6). But a closer look reveals that this definition excludes an important adjacent area, to the South of the golden triangle, that includes most of the government and diplomatic institutions, many educational institutions and many active commercial activities. In addition, as the aim is to analyse the area spatially, it was found more appropriate to include areas that form a spatial continuation to that triangle. These areas have the same pattern or spatial typology as those of the original triangle. The only area that should be included for its spatial continuation, is the same area as that included for functional reasons.

- According to Space Syntax criteria it is essential to include a buffer zone around any area that is to be analysed as if it were isolated from an urban system. The reason for doing so is to minimise the *'edge effect'* that results in misleading configurational values attributed to peripheral segments (spaces) of the total spatial system. This buffer extends to 30 minutes of travel from the current area limits. As this study concerns mainly pedestrian movement and, taking into consideration the average speed of pedestrians in CCC of 71.74 m/min (Abu-Taleb, 1989), this buffer zone is set at about 2150 metres. This includes parts from Fatimid Cairo to the East, Shubra to the North, Zamalek and parts of El-Giza to the West, and parts of El-Manial, El-Saida Zainab and Misr El-Kadeema to the South.

- All pedestrian routes that were not included in the base map were added in the axial map. Only the area of CCC was revised as it proved overcomplex to revise the whole city for such missing segments. The justification for this was that the complete map of Cairo was only to be used in understanding the global relationships between different areas rather than detailed ones in each local area and the local properties of non-central spaces. It was found that the Cairo map, including the major spatial components was satisfactory for the purpose of studying the overall properties of the spatial configuration.

7.2.2.b Processing the axial maps

Processing the axial maps means to run Axman[2] software on the axial maps in order to elicit their configurational values both graphically and in tables.

Three models were used. The two main models used are the Conventional Axial Model (CAM) and the Metric Axial Model (MAM). MAM is considered to be a by-product of CAM with one major difference in that it uses a standardised metric modular system to represent the spatial structure. It was developed by Salheen and Forsyth (2001) and has shown its validity in accounting for local properties of space and in simulating the concept of *Universal Distance* defined as 'the distance from each segment of a spatial system to every other segment in it'. The third model is the Super-Imposed Model (SIM) of both CAM and MAM. The technique that the MAM is developed from the CAM is described in the next sub-section. All the three models are processed using Axman, thereby giving the same set of output configurational values. The basic configurational values include *Integration* (with different radii), *Connectivity* and *Control*. The definitions of these values are as follows.

- The *integration* value of an axial line in the map is described by Hanson (1989: 40) to be "an expression of the extent to which a street or axial line draws all other streets or axial lines to itself and renders them shallow as destinations from that point". Technically, it is defined as the

[2] Axman was developed at the Bartlett School of Architecture UCL.

reciprocal of RRA (Real Relative Asymmetry[3]). *Different radii* means that the measurement of the reciprocal relationships between axial lines is restricted to a number of steps equal to the integration radius. The number of steps or, in another term, the local integration at radius 'x', means calculating the integration values for each line in relation to those lines not further from that line than 'x' number of changes in direction.

- The *connectivity* of an axial line is defined as the "number of axial lines directly intersected with that line" (Hillier and Hanson, 1984).
- The *control* is defined as "the sum of the reciprocal of the connect values of the neighbours of a line" (ibid.).

There were some limitations in applying the MAM in the case study. First, because of a technical problem[4], it was only possible to apply the Metric-Axial Model (MAM) on CCC. Second, because of the same problem, MAM was applied only on the immediate area of CCC without a buffer zone. That solution is partially justified by the findings of Salheen and Forsyth (2001) that MAM is mainly useful locally.

7.2.2.c Developing the Metric-Axial model (MAM)

The Space Syntax review and the results of both exploratory processes (review of transportation planning literature and the questionnaire) highlight the important role that distance, as a dependent factor, and time, as an independent one, play in shaping and constructing pedestrian movement. Consequently there is a need for a model that accounts for metric distance. To do so, the same methodology Hillier used in describing how the urban grid grows gradually using standardised units of space (Hillier, 1999b) was utilised. Hillier also used this to analyse the relationship between metric integration and attraction (Hillier, 1999b: figures 15-18). This method proposes converting the whole axial map of any settlement into standardised segments of equal lengths. This is difficult in practice as most of the CAD packages available do not

[3] Real Relative Asymmetry is defined as the relative asymmetry of a spatial system relative to that of a diamond shaped spatial system of the same size (same number of axial lines). It facilitates comparison of spatial configuration across different systems with different sizes. See Hillier and Hanson (1984) for the complete mathematical definition of Real Relative Asymmetry.
[4] The number of lines the software is able to handle is limited (32, 000) and made it difficult to apply the MAM on the whole map of Cairo as it produced more than 150, 000 lines.

allow such an operation. ACAD, as a highly advanced CAD programme, lacks a simple command to break all the lines or even a single line into standardised length. The nearest alternative was the "measure" command that allows locating external or internal blocks (a block is predefined object or drawing) at equal distances on a drawing object starting from one of its ends until it reaches the final segment which is either equal or less then the distance required.

There were sequential problems in adapting the software to do the task:

1) the 'measure' command can only be run on a single line each time;
2) reaching a block (drawing object) that can represent, when repeated, the standardisation of metric distance;
3) the flexibility of the end segment should account for differences in the remaining distance of each axial line after the multiplication of each line over the standardised distance needed. This flexibility should not increase or decrease the number of original intersections before the modulation procedure takes place; and
4) at the same time the resulting model should fulfil the conditions necessary to work on Axman software[5] as being clearly interconnected at the intersections of each pair of modular lines on the same original line together with keeping the original intersections between different streets.

Although all the technical conditions which must be satisfied to accomplish the operation are extremely complex, the following steps summarise the operation in detail but as simply as possible (Figure 7.2):

1) a block consisting of two inclined and intersected lines is placed at equal distances (2X) on the axial line, where this distance is double the desired metric unit (X). this will account for all of the axial line apart from the end segment which represents the remaining length of the axial line after the subdivision over the equal distance (2X);

[5] this is the software developed at the Bartlett Scholl of Architecture and Planning, University College London (UCL) and used in Space Syntax Analysis

2) a block with another shape is used in a second step. This is placed at the end that was not accounted for in the first operation. This allows for an estimation of the size of the end segment which could vary from just above Zero to just below (2X); and

3) to solve the problem of applying this operation on each axial line individually, a small script file[6] was written to facilitate accomplishing the whole operation on all the axial lines in the map by a single command.

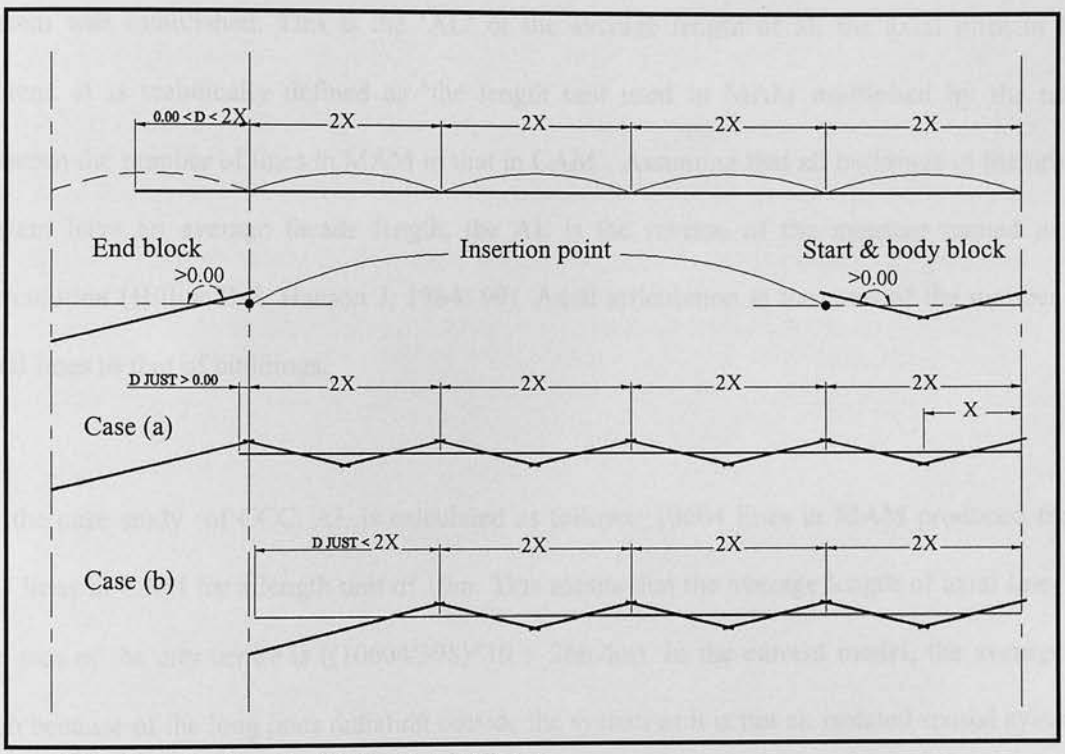


Figure 7.2 – Developing the Metric Axial Model.

Note: The two steps included in the division process of the original axial line (heavy horizontal line) into the standardised segments showing the body block and the ending block. Also the two extreme cases where the end segment of the original axial line is just either more than 2X (Case a) or less than 2X (Case b). It is presumed that 50% of the total number of lines in the system when divided by 2X the remaining will be greater than X and 50% less than X, using the end block as illustrated will not affect the total number of resultant standardised segments if the lines where otherwise divided by X.

Finally, the MAM was produced and it consisted of equally measured *modular segments* as a division of the *original complete segments* of the CAM. A third model was theoretically suggested by Hillier (1996: 136) that is the result of the superimposition of the two models, CAM and MAM. The resulting Superimposed Model (SIM) is analysed and each layer, the MAM layer which is named the '*modular layer*' and the CAM layer which is named the *'strip*

[6] A script file is a simple programme consisted of series of commands in ACAD, written in any word processor; these commands are respectively run one after the other once the script file is run.

layer', can be seen separately. Hillier suggested that the modular layer of the SIM could perform better than the strip layer within the same model. He described it as a "lifelike–localised structure in which greater integration is concentrated at the 'street intersections'" (Hillier, 1996: 138). However, to date, Hillier's hypothetical model has never been applied.

Before going into the analysis of the different axial models a new measure of the urban spatial system was established. This is the 'AL' or the average length of all the axial lines in the system. It is technically defined as 'the length unit used in MAM multiplied by the ratio between the number of lines in MAM to that in CAM'. Assuming that all buildings in the urban system have an average facade length, the AL is the reverse of the measure named *axial articulation* (Hillier B & Hanson J, 1984: 99). Axial articulation is the ratio of the number of axial lines to that of buildings.

In the case study of CCC, AL is calculated as follows: 10604 lines in MAM produced from 398 lines in CAM for a length unit of 10m. This means that the average length of axial lines in the area of the city centre is ((10604/398)*10 = 266.4m). In the current model, the average is high because of the long lines radiating outside the system as it is not an isolated spatial system. It is clear that this measure is likely to differ significantly between different spatial structure systems, and thus could be used as a property of the system typology. The method could be applied to different spatial structure systems to explore the influence of system typology in producing different ALs. For example, how different pure radial or orthogonal grids will be in their AL?

7.2.2.d Usefulness of Universal Distance (MAM): a Link to Sustainability

The study links the analytical results of MAM to the international growing need for sustainable development. One of the main categories of sustainability indictors in cities is transportation (Newman and Kenworthy, 1999). The most important sustainability indicators within transportation is the reduction of car use and minimising travel distances in general. This

reduction could be achieved by offering alternative transit modes and can also be reached by generally minimising travel distances. This also has positive impacts on the social and economic environment in general such as saving travel time for other activities enhancing the social and economic environments.

Newman and Kenworthy have shown that the most recent attitudes towards recentralisation in cities are towards the concentration in the central business district and other inner locations in the form of series of nodes which Willoughby (1994) calls the development of "local millieux". The network of these nodes is similar to what Roberts *et al.* (1999) calls the "integrated metropolis". There is an opposite argument which says that once commuters get into their cars driving for one mile will not be that different from driving for a mile an half. However, the urban planning and design should always target reducing the preliminary expected travel distances to correspond to the generally accepted recommendation of sustainability. In that respect, MAM presents an efficient, rapid and cheap method to identify potential locations for metrically central nodes.

In order to understand the implications of the metric integration a differentiation between young and mature cities is needed. Newman and Kenworthy (1999: 15-16) cite some differences between these two types of cities based on an analogy with an ecosystem. The major differences between the two cities are that the mature city has main five features that are not yet developed in the young city, which are:

1) High energy efficiency and waste materials are recycled.
2) Enhanced form of functions, quantity and quality, with complex established links with users.
3) Compact spatial system with complex spatial relationships.
4) Diverse community constitution, complex and multiple interrelationships.
5) System stand for many forces and is generally stable. Resources are better facilitated and managed.

The MAM is new and will require more work to confirm its usefulness. However, several **practical applications** of this model lies in its simple metric basis and in linking it to the concept of sustainability on cities which always aims at minimising travel distance. Among these applications are:

1) The segment which is the most metrically integrated is reached by the shortest trip distance from all other segments in the system, therefore it is suitable for a destination which is targeted by all parts of the system. However, a compromise should be calculated for various alternatives having the similar targeted destinations, thus seeking the same location, and that should consider the time frequency of being targeted.

2) *S*egments or areas globally segregated should be accommodated by the more private functions such as housing, for them being the target of only their tenants and fewer visitors.

3) Local integration at certain radius, which represent certain metric distance equal to radius multiplied by segment length, could be seen as an indication of the total number of segments that could be reached from each segment in the system with that metric distance. In other words it is a measure of the potentiality of each segment to be a destination at certain distance thresholds.

4) In young cities local Integration at various radii refers to nodes which are reached by more segment at various distance catchment area. Thus locating community services can be done according to accurate walking distances. It can be used to test designed location or the opposite in identifying best locations.

5) In mature cities local integration picks nodes which are suitable for future development as local services centres and in diagnosing problems such as the emergence of unplanned commercial and other types of activities to compensate for under-serviced locations.

7.2.3 Stages of Analysis

The analysis includes two main stages and a secondary stage. The first stage is the description of the maps of all models of Cairo and CCC. This is reported in section 7.3. Secondly, values accompanying the processed maps are analysed following two lines of analysis: the gradual

increase in values within one measure and the intelligibility measure (for the definition of intelligibility see section 7.4). Analysis of values is reported in section 7.4 for all models of Cairo and CCC. The secondary stage of analysis is an association analysis between the models used in CCC and a sample of pedestrian counts in some selected streets of the city centre. It is used to confirm each model's relationship to the actual movement and use of space.

In the descriptive analysis of maps, some syntactic results of spaces deduced from Space Syntax analysis, which suggest how the spaces are used, did not match the observed use of the spaces. Therefore, the findings are presented in the order of matching or mismatching results with the real-life observation which is measured using participant observations. The results of that section are presented in that order to directly suggest recommendations aimed at enhancing the spatial functioning of the urban structure. That might build on the manipulation of space in either the urban structure or in its use to produce functions more correlated to the spatial configuration.

7.3 MAP ANALYSIS

The description of maps in this section highlight only the results as either matching or mismatching the real-life circumstances of the area under investigation. This section is ordered first according to area under investigation (Cairo/CCC) and then according to whether the result matches/mismatches the real-life situation. Each point is preceded by the model used (CAM/MAM/SIM) and integration used (global/local).

7.3.1 The Map of Cairo

After the first entry and processing of the axial lines, the map showed some misleading results (figure 7.3). This was due to some peripheral areas and segments that were connected to the main body of the settlements by deep configurational relations, such as El-Mokattam. El-Mokattam, as a neighbourhood positioned on the hill of El-Mokattam, is connected to the rest of the system through a long ramp. This does not take the form of a straight line but follows an

acute bending path. As a result, the ramp is divided into 12 segments, or axial lines in Space Syntax terms. Such a representation of one single ramp caused this part of the system to attract the segregation, potentially in the whole system, to be far more concentrated in it rather than any other area[7]. The areas causing such a bias were detected from the scattergram between Integration *n* and Integration (3), in this scattergram the areas appeared as a collection of lines having high local integration and very low global integration values. The refined map of Cairo was shaped by the exclusion of these areas.

The refined map was then processed with different local radii. They are radius (3), radius (5), radius (7), radius (9) and radius (8). The matching and mismatching results of the Space Syntax analysis compared to the real observed use of spaces of Cairo maps using participant observation are summarised over the following pages in figures 7.3 - 7.8.

7.3.1.a Cairo matching relationships

- ✓ Ramsis Street is significantly distinguished as the most globally integrated street along its two segments, from El-Tahrir Square to Ramsis Square and from Ramsis Square to Ghamra.
- ✓ It is interesting to see how Ramsis Street starts to loose some of its global integration value where it is divided at Ghamra into two streets, one for each direction.
- ✓ On the global integration map the city centre which is close to the most integrated areas in the city has a moderate integration value.
- ✓ The map of global integration raises the importance of streets like Port-Said Street as a major in-city-highway, and the axis of El-Khalifa El-Ma'moun street and El-Gaish street, as a major services centre and movement link.
- ✓ Heliopolis has a good global integration although it is a peripheral suburb. That may reflect its direct connection to three major streets acting as 'in-city-highways', Gesr El-Sues, Salah Salem and El-Nasr streets.

[7] In an informal discussion with Professor Bill Hillier, on the 28th of April 1999, it was advised that the urban system should be looked at without these 'peripheral' areas, as they represent a separate structure within the more global structure, resulting in biased

- ✓ Central but segregated areas like El-Sharrabia, which is geometrically central but surrounded by the railway to the North, West and South were highlighted by the analysis. It is only properly connected to the rest of the urban system through its Eastern side with Port-Said Street.
- ✓ Integration radius 3 shows Shubra Street to be significantly dominant. After it comes Toman-bai and then Gesr El-Sues Streets. The explanation of this might be that all of them began as major, planned routes to link a new growing residential area that was previously on agricultural land with the rest of the city. Then, the entire secondary street patterns in these areas were laid out following the same lines used to divide the agricultural land basins (*ahwad*). This resulted in an inordinate number of one step links from the main street, raising its local integration up to a maximum level in the urban system. An important reflection of this finding links the radius of integration to origin of movement. Shubra Street is the most locally integrated street with the most movement generated locally, whereas Ramsis Street is the most globally integrated street with the most movement generated globally
- ✓ The orthogonal grid pattern of Nasr City district would have made it a shallow system with high mean integration values but, because of the looping system used in organising the connections to the main collector streets in the district, the mean local integration of the whole district was reduced to a medium value.
- ✓ In the maps with higher radius of local integration than R3, Shubra and Toman-bai streets lose their dominance in favour of the streets of the district of Heliopolis. That may be because of the radial street pattern that Heliopolis enjoys. This pattern has made it very accessible internally with minimum changes in direction needed to go from one place to many others within the district. On the other hand, the districts that contain Shubra and Toman-bai streets are limited from further extension beyond step four[8].

and misleading results. The exclusion of the peripheral areas is conformed in the study of the gradual increase of syntactical values as will be seen later in 7.5.1.a.

[8] Shubra is surrounded by the railway on the East and South and by water features on the West and North. The district contains Toman-bai street was once limited by water features (Ismalia Canal to the West and Gesr El-Sues to the East).

7.3.1.b Cairo mismatching relationships

- ✗ Ramsis Street loses much of its global integration value after it passes El-Demerdash Hospital. This is likely to be because of the acute bend just before El-Abbasiah square.
- ✗ Fatimid Cairo, despite its geometrically central position and being a powerful and lively retail centre, shows little global integration relative to other areas with much less retail activity. That may be due to the nature of the Islamic-planning pattern, which is mainly irregular and with many dead ends. But the strongest explanation is that little effort has been made to integrate Fatimid Cairo with the rest of the city.
- ✗ The most globally integrated convex areas were El-Skakeny and El-Dhaher. This runs contrary to expectations, as these are residential areas.
- ✗ Some streets that were identified as being globally integrated are, in fact, local residential streets. for example El-Skakeny Street was picked as a major streets.
- ✗ Streets with heavy traffic like Salah Salem and its continuation through to El-Haram did not show significant global integration values.
- ✗ Nasr City was given relatively low global integration values compared to its busy retail centres. This is a result of its location at the edge of the system.
- ✗ El-Muhandeseen shows little global integration value, despite the fact that it has one of the two sub-centres of the Greater Cairo Region planned in 1980.
- ✗ By looking at the Radius-Radius integration map some qualities can be expected to appear if this radius really does represent a turning point or even a clear threshold from the radius point of view. But the map on its own shows nothing specific apart from belonging to the gradually rising hierarchy of radiuses. In other words, there were no points that make this map special.

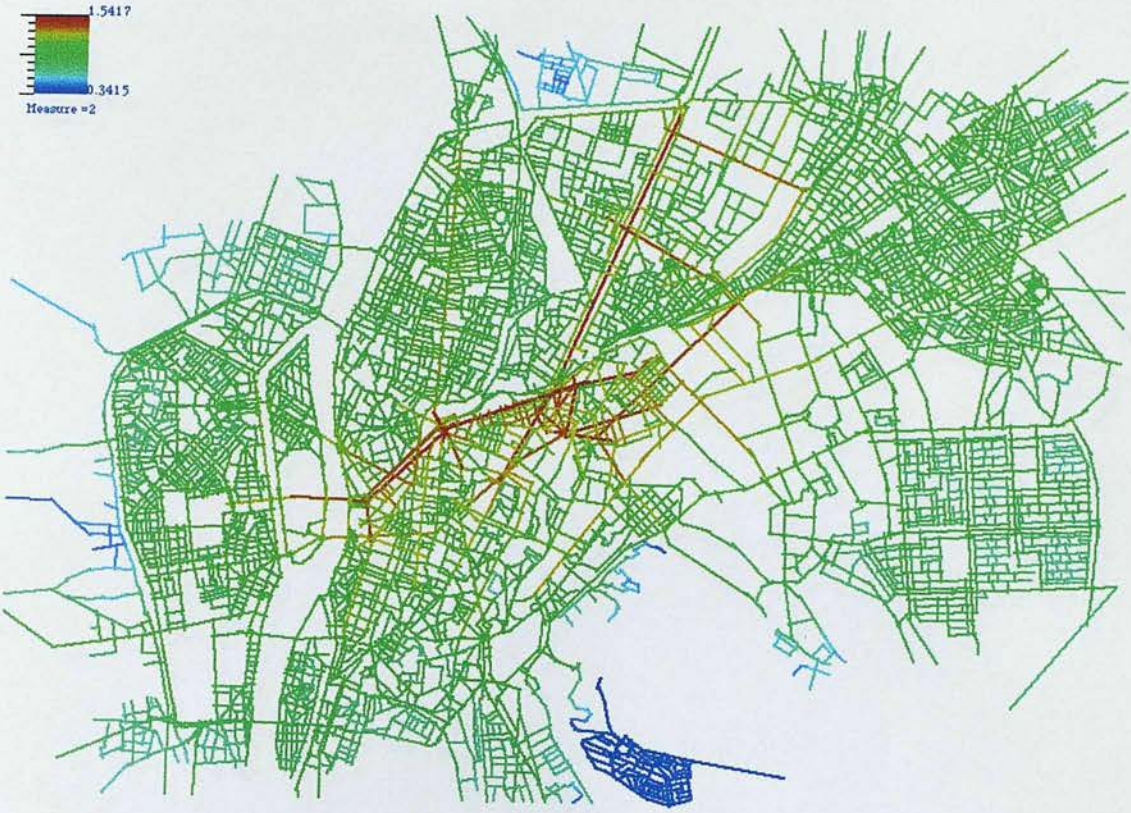


Figure 7.3 – Global integration of Cairo including El-Mokattam hill area.

Figure 7.4 – Global integration of Cairo without El-Mokattam area and other peripheral areas (separated from the main body of the city either by railway or water features).

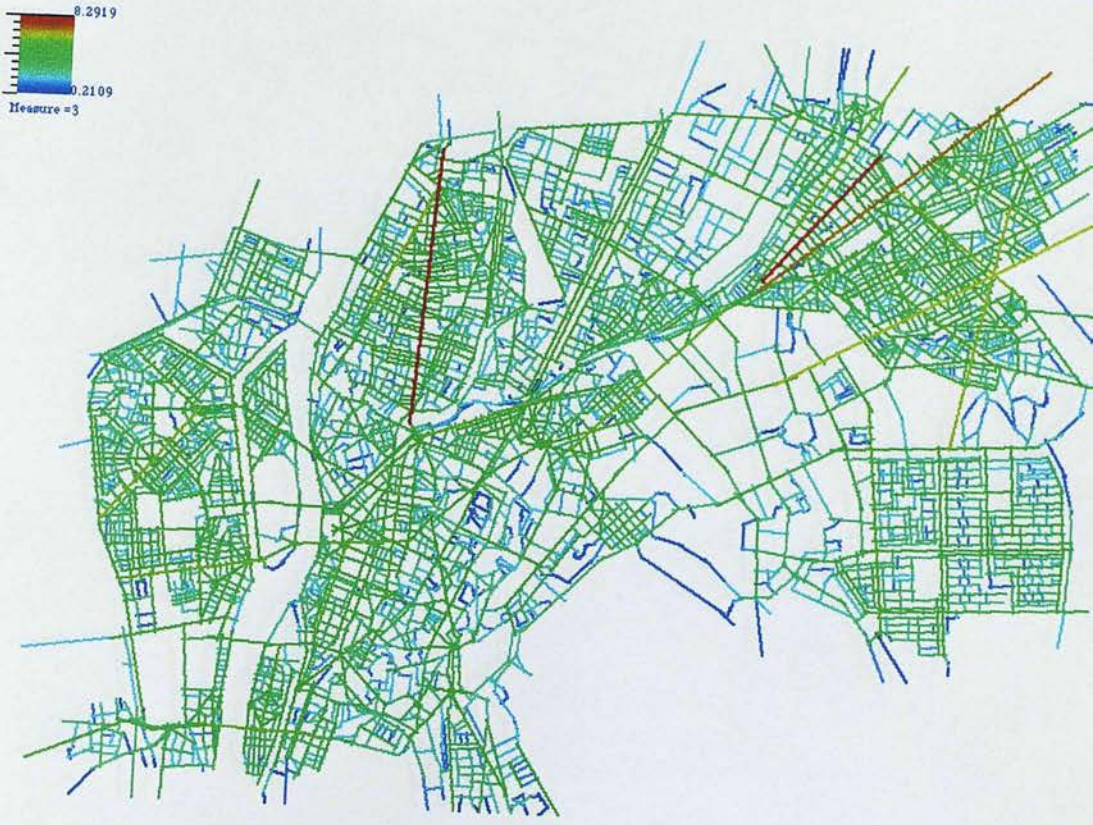


Figure 7.5 – Local integration radius 3

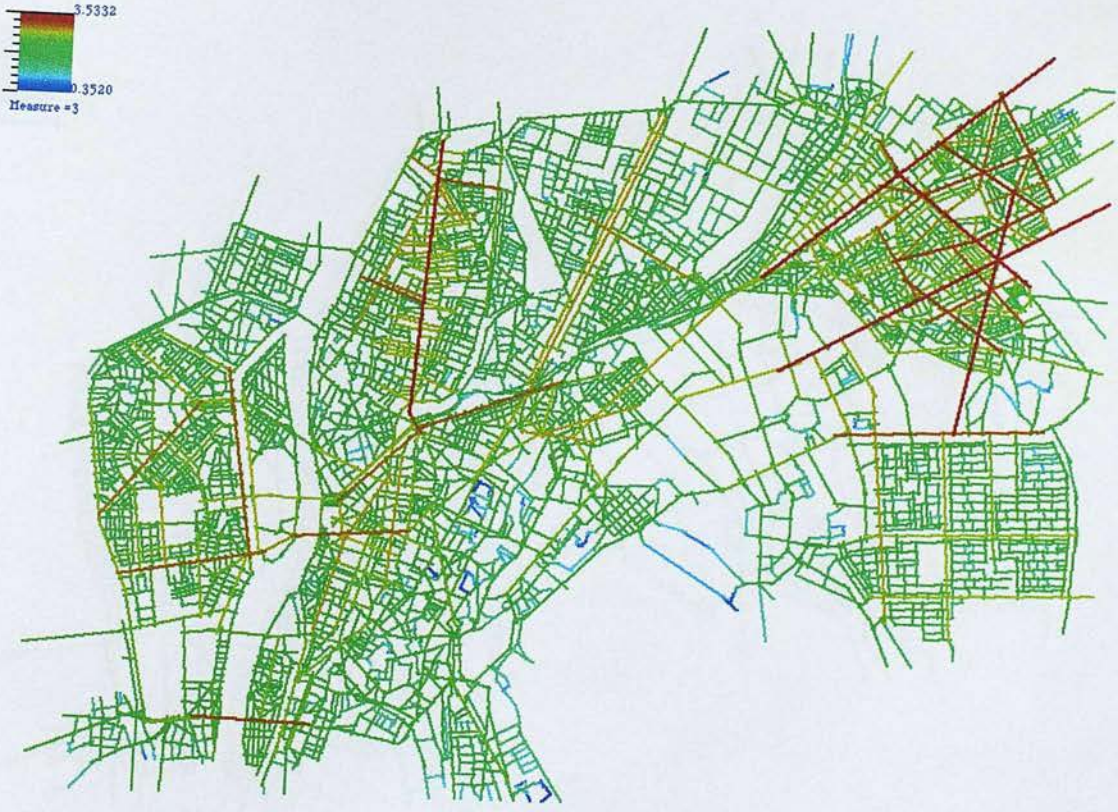


Figure 7.6 – Local integration radius 5

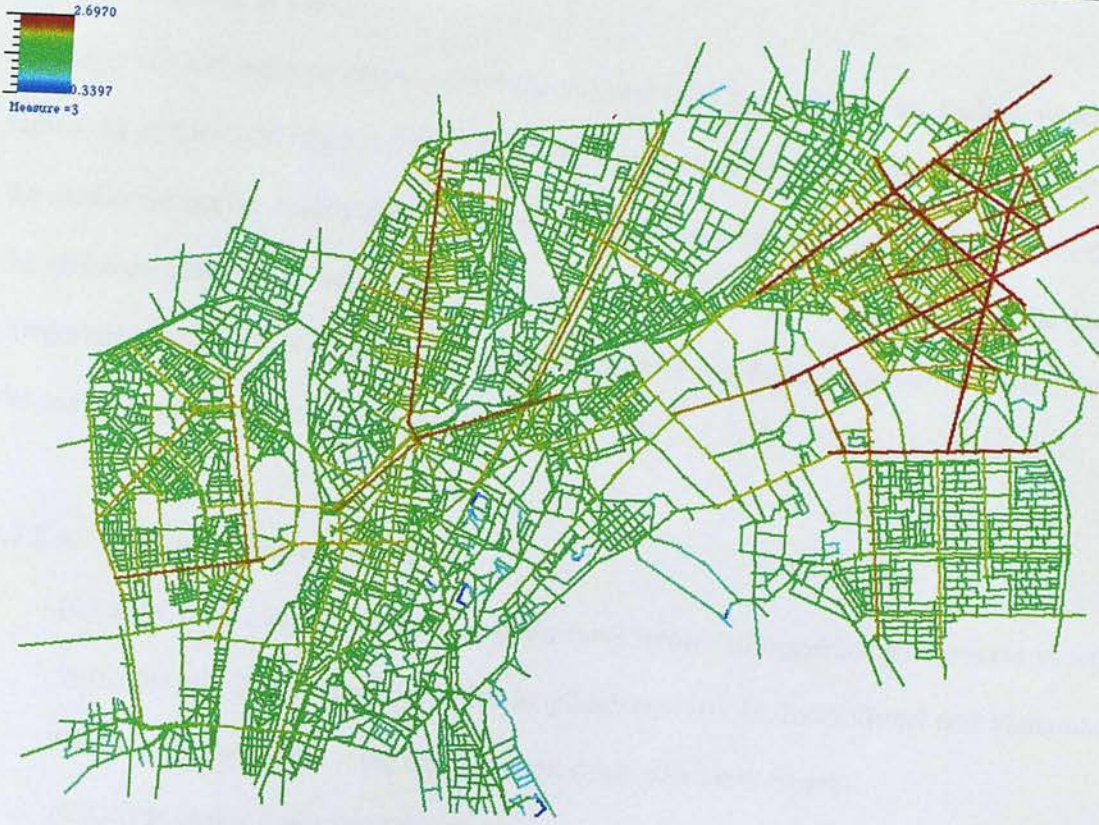


Figure 7.7 – Local integration radius 7

ure 7.8 – Local integration radius 9

7.3.2 The Map of CCC

All maps of CCC were processed with different local radii including Radius-Radius, which is radius (6) in the CAM (figures 7.9 - 7.13). The local integration map of the modular layer of the SIM could not be visually seen because of a technical problem with the displaying order that the software uses, i.e. it was always displayed at the back of the drawing (behind the local integration map of the strip layer). The results from these processed maps were different from the ones produced from the global system analysis.

7.3.2.a CCC matching relationships

- ✓ (CAM) On the global integration map, the most integrated segments are the main streets in the French Centre. They are either long segments like El-Tahrir Street and Mohamed Fareed Street or those having a high control value, like Merit Street.
- ✓ (CAM) In global integration, the effect of the railway appears on the area behind the train station (El-Sharrabiah), making it a poorly integrated area despite its geographical proximity to the city centre.
- ✓ (CAM) The broken grid of Fatimid Cairo has caused the south-eastern part of the area to be segregated from the rest of the system. There was only one direct link between this area and the western part of the area, that is Mohamed Ali Street.[9]
- ✓ (CAM) Garden City area is significantly affected by its organic planning making it less integrated than it should be given its close location to CCC and having central functions and activities. However, it has very few retail activities.
- ✓ (CAM) CCC was found to be more integrated at higher radii of integration. This may indicate that it is more suitable as a global rather than a local centre.
- ✓ (MAM) Global integration shifts the centre of integration towards the dense cluster of axial lines in the northern part of the city centre.
- ✓ (MAM) Bab El-Louque area was found to be a very powerful local service centre. The short block length it enjoys causes most of its local integration.

[9] Mohamed Ali Street was opened by Khedive Ismaiel to link Cairo Castle to the eastern bank of the Nile and later to the new city centre. It brutally cut the original urban fabric and many buildings are still there which are partially demolished.

✓ (MAM) The local integration maps highlighted the important intersections as centres of activity, and picked a local market with its high-density pattern as the most integrated.

✓ (SIM) The modular layer approximated the overall global integration values of all modular segments falling on a complete line to be close to that line's integration value. An advantage of this map is that it is much less affected by the 'edge effect' than is the MAM. Segments far from the metric centre were given high integration values if they were connected to the centre through an original complete segment.

✓ (SIM) The local integration maps of the strip layer shows a normalisation of the integration values of the axial lines by reducing the number of segments in the two extremes of integration and segregation and increasing the number of those in the middle. This provides an image of the area closely related to reality.

7.3.2.b CCC mismatching relationships

✗ (CAM) Mohamed Ali Street which was imposed into the Fatimid Cairo area in the nineteenth century, was more integrated globally than El-Azhar street that had been already embedded into the original structure.

✗ (CAM) Radius-Radius integration (in this case radius 6) does not appear to have minimised the 'edge effect' of the system on the integration values of edge elements. The same was found at the scale of Cairo.

✗ (MAM) In the global integration, the centre of gravity of the modular metric segments (between Mahmoud Basiuny, Kasr El-Nil and Mohamed Fareed streets) was highlighted as a continuous spectrum. Thus, this map failed to pick segregated pockets or segments close to the centre of integration, or isolate the most integrated segments within that area. It has been further affected by the 'edge effect'.

✗ (SIM) In global integration the length of each line has affected the strip layer. This gives longer lines with few intersections a higher integration value more than shorter lines with high local connectivity values. This is the cause of the dominance of Mohamed Fareed Street, whereas streets like Merit Street gained lower integration because of its length, despite gaining relatively high integration values for its centrality.

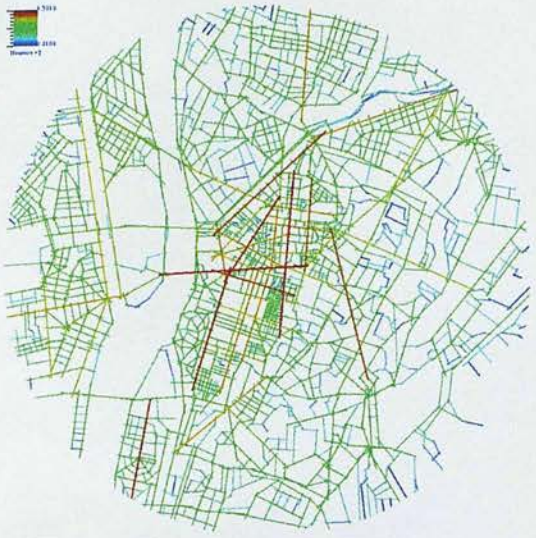


Figure 7.9.a - Integration radius 3

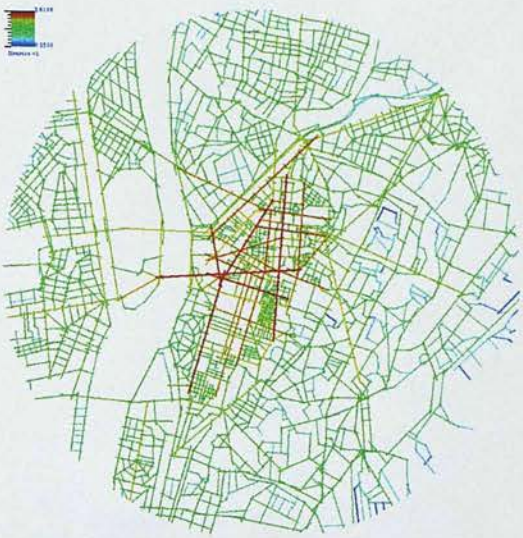


Figure 7.9.b - Integration radius 5

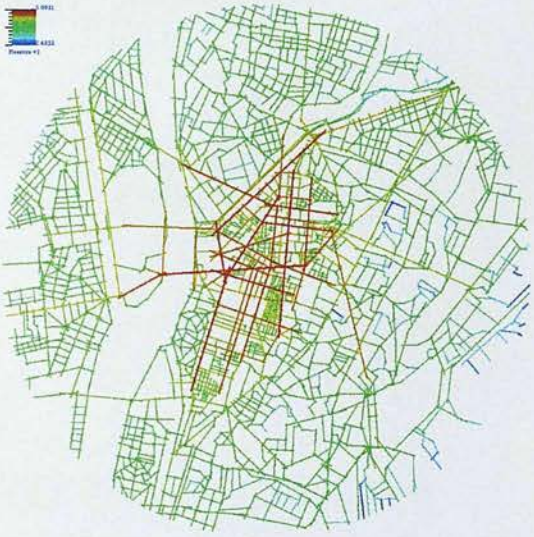


Figure 7.9.c - Integration radius 6

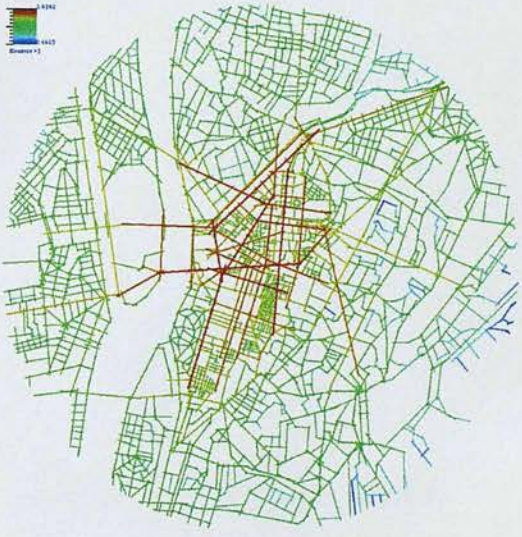


Figure 7.9.d - Integration radius 7

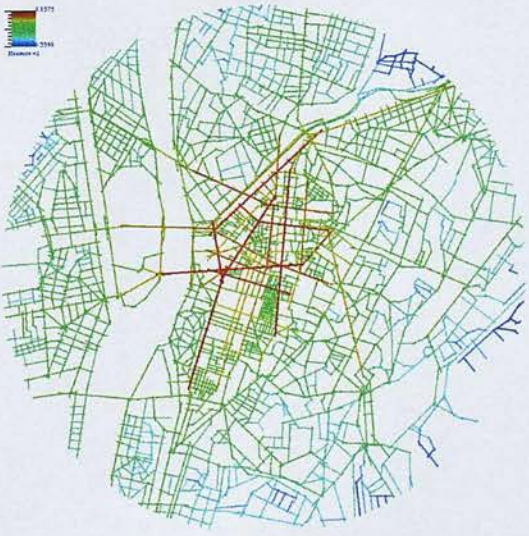


Figure 7.9.e – Global integration.

Figure 7.9 – Spatial analysis of the CAM of CCC with the buffer zone.

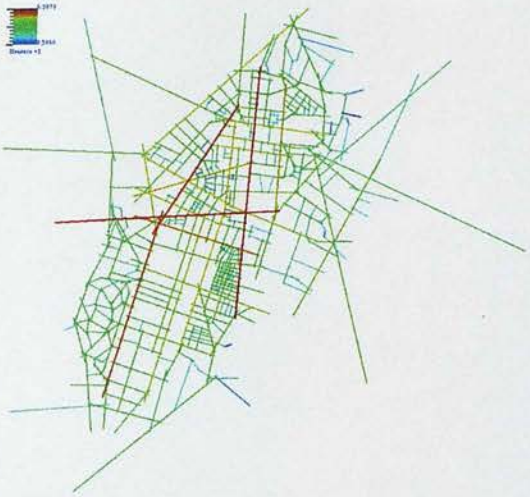


Figure 7.10.a – Integration radius 3

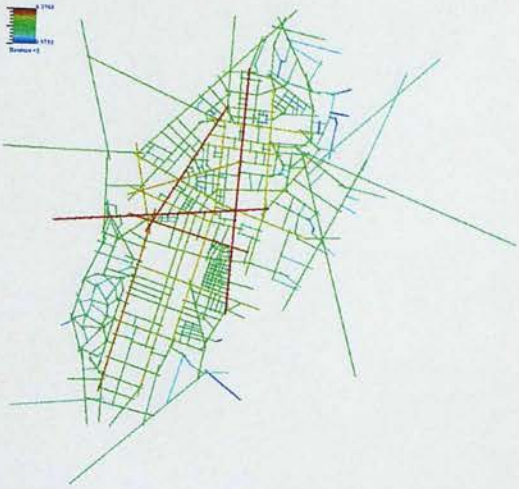


Figure 7.10.b – Integration radius 4.

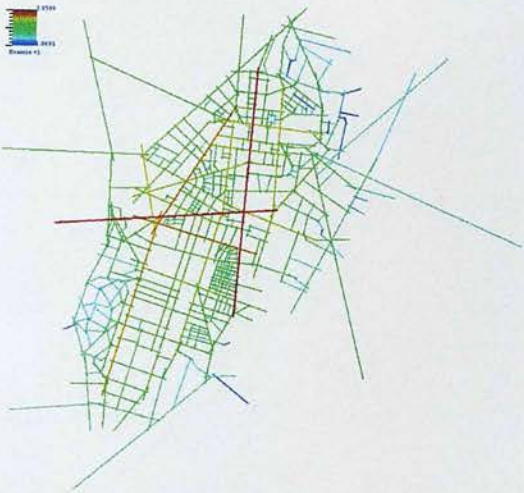


Figure 7.10.c – Integration radius 5.

Figure 7.10.d – Integration radius 7.

Figure 7.10.e – Global integration.

Figure 7.10 – Spatial analysis of the CAM of CCC without the buffer zone.

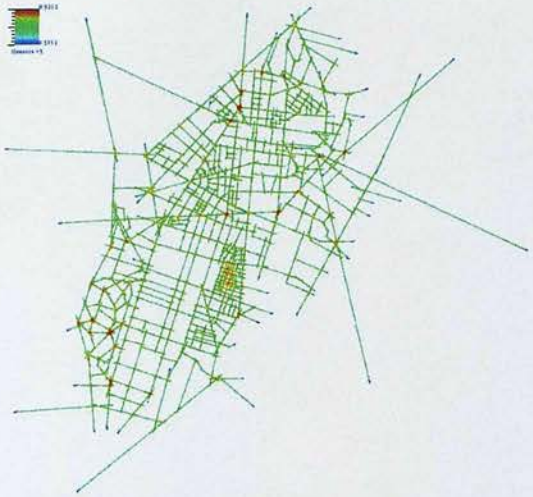


Figure 7.11.a - Integration radius 10

Figure 7.11.b - Integration radius 20

Figure 7.11.c - Integration radius 30

Figure 7.11.d - Integration radius 40

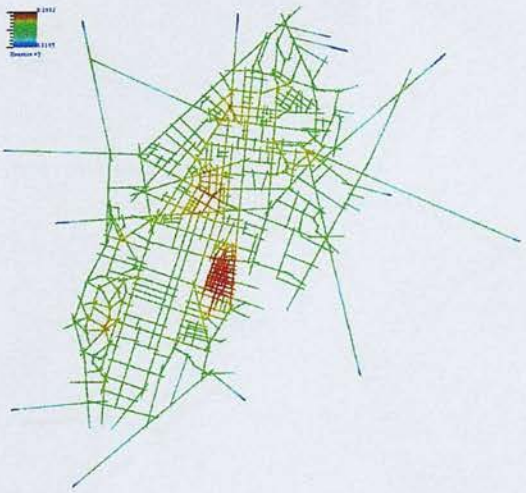


Figure 7.11.e - Integration radius 50

Figure 7.11 – Spatial analysis of the MAM (1) of CCC without the buffer zone.

Figure 7.12.a- – Integration radius 75

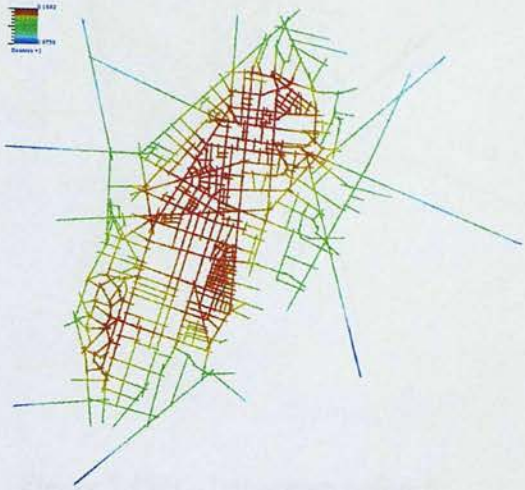


Figure 7.12.b – Integration radius 100

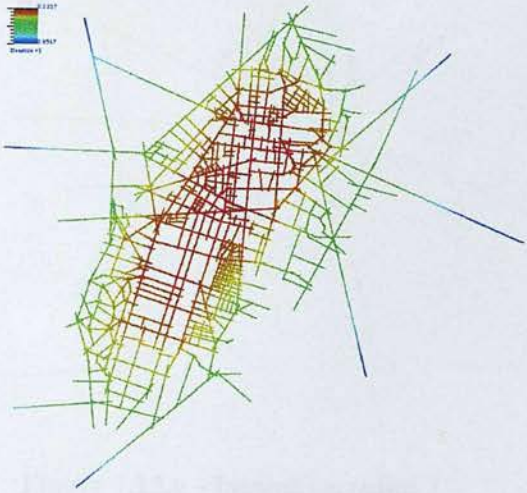


Figure 7.12.c – Integration radius 150

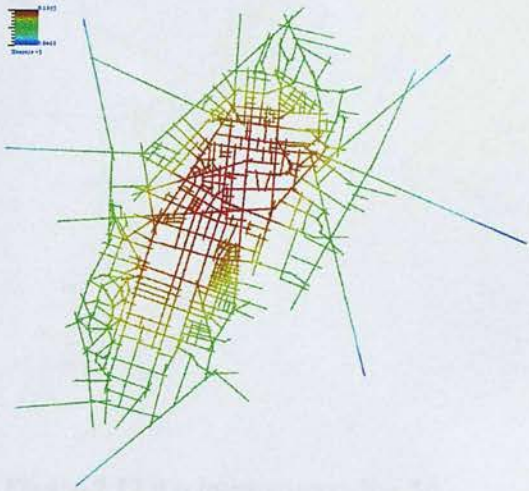


Figure 7.12.d – Integration radius 200

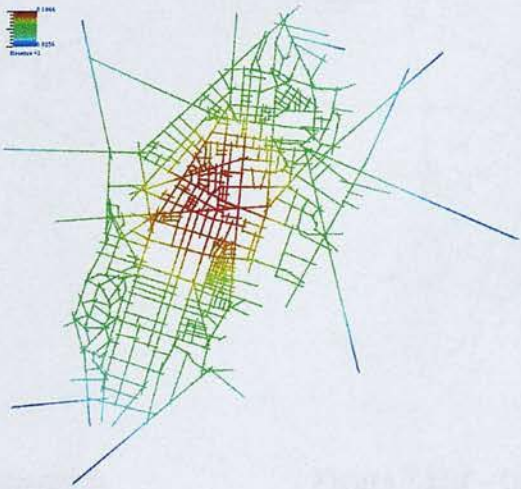


Figure 7.12.e – Global integration

Figure 7.12 – Spatial analysis of the MAM (2) of CCC without the buffer zone.

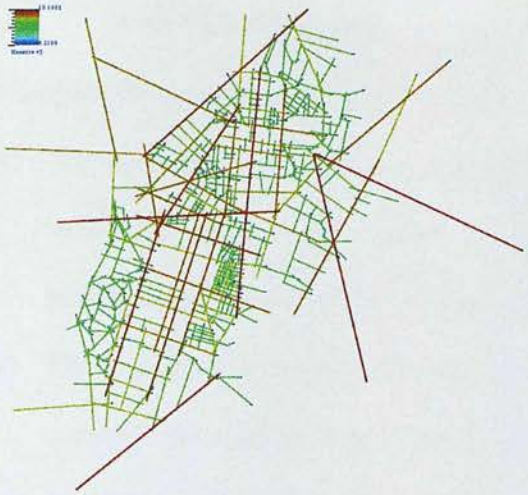


Figure 7.13.a – Integration radius 3

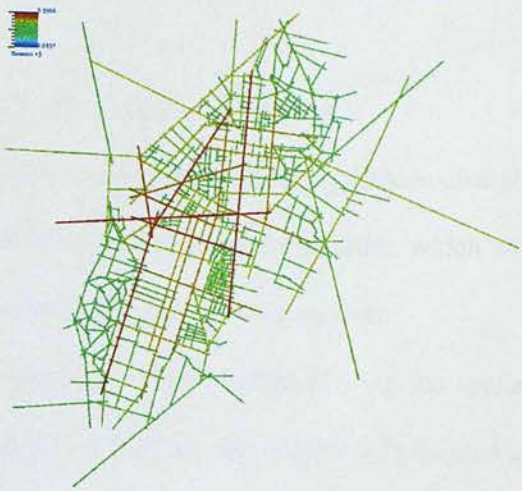


Figure 7.13.b – Integration radius 5

Figure 7.13.c – Integration radius 7

Figure 7.13.d – Integration radius 50

Figure 7.13.e – Global integration

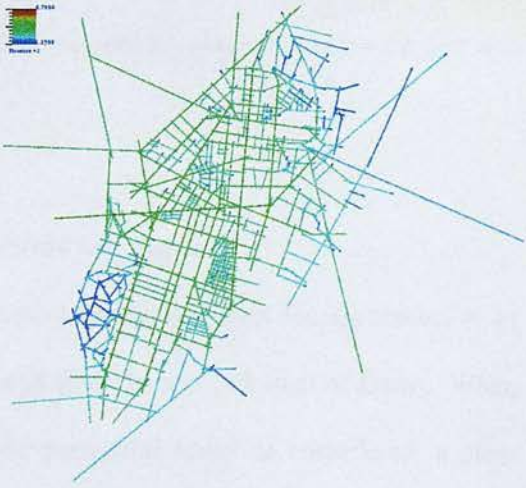


Figure 7.13.f – Global integration

Figure 7.13 – Spatial analysis of the SIM of CCC without the buffer zone.

Note: Figures a, b, c, d and e are all the strip layer, whereas figure f is the modular layer.

7.4 VALUES ANALYSIS

Studying the accompanying values of the processed maps is useful in two ways.

1) The study of the gradual increase in values within one measure allows any sudden changes to be seen. These changes might be in direction or in continuity of the measure, which will have further implications for the logic of the spatial configuration of the system.
2) The degree of correlation between different measures. The *intelligibility* of the spatial system is the most important of these correlations (see 4.3.2.c). *Intelligibility* is defined as the "degree of correlation between the connectivity of lines and their integration value. That is between what can be seen of the line visually and locally, and how this relates to the importance of the line in the system as a whole" (Hillier *et al.*, 1993: 61). It is an important indicator of how clear an urban system is for its users.

The findings are ordered according to the area under investigation (Cairo/CCC), then (when applicable) with regard of the model used (CAM/MAM/SIM).

7.4.1 The Scale of Cairo

Measures involved in this scale are the major three output measures of Axman: *Integration* (at different radii), *Control*, and *Connectivity* (as defined in section 7.3.2.b). Only the CAM model was used in the case of Cairo. Using MAM and SIM required a capacity of software that was not available.

7.4.1.a Study of the gradual increase in values within one measure

The first benefit of this analysis was the confirmation of the previous recommendation of eliminating El-Mokattam hill and other peripheral areas from the analysis map of Cairo. When the 'Global Integration Map' of 'Cairo including the peripheral areas' is considered, a clear change in the increase direction can be found at the lower values end (Figure 7.14). This 'odd bend' consisted of the segments of the peripheral areas. This suggests that it is very weakly related to the spatial system of the city and that it is forming a separate spatial system.

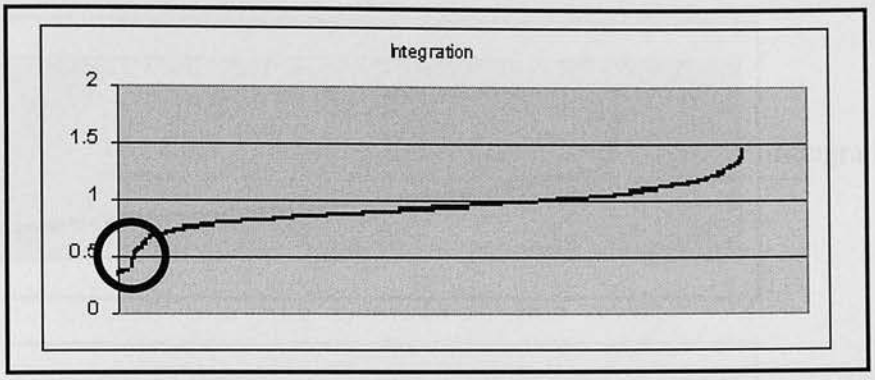


Figure 7.14 – The gradual increase in global integration values of the Cairo map showing the odd bend formed by peripheral areas at the lower end of the graph.

The gradual increase of the output measures of the refined axial map of Cairo was then analysed for any sudden or significant change of their *direction*, and at the two ends of the curve to examine extreme values or the *individual values*. Graphs showing the gradual increase of Space Syntax measures used in the analysis are shown in figure 7.15.

When *direction* is considered, two significant patterns can be observed (see figure 7.15). All the measures of integration of different radii followed the pattern of increase of two-yield point, whereas connectivity and control followed a one-yield pattern. The yield point in the curve is where the inclination angle of the curve changes from 0-45 Degree to 45-90 degree and vice versa.

The one-yield point curves of the control and connectivity values, have only the change to a higher rate of increase in the values at the top of the continuum. That is, they start at a low increase rate for the majority of the segments in the system until they reach the yield point and then change direction to high-rate increase with a high inclination angle.

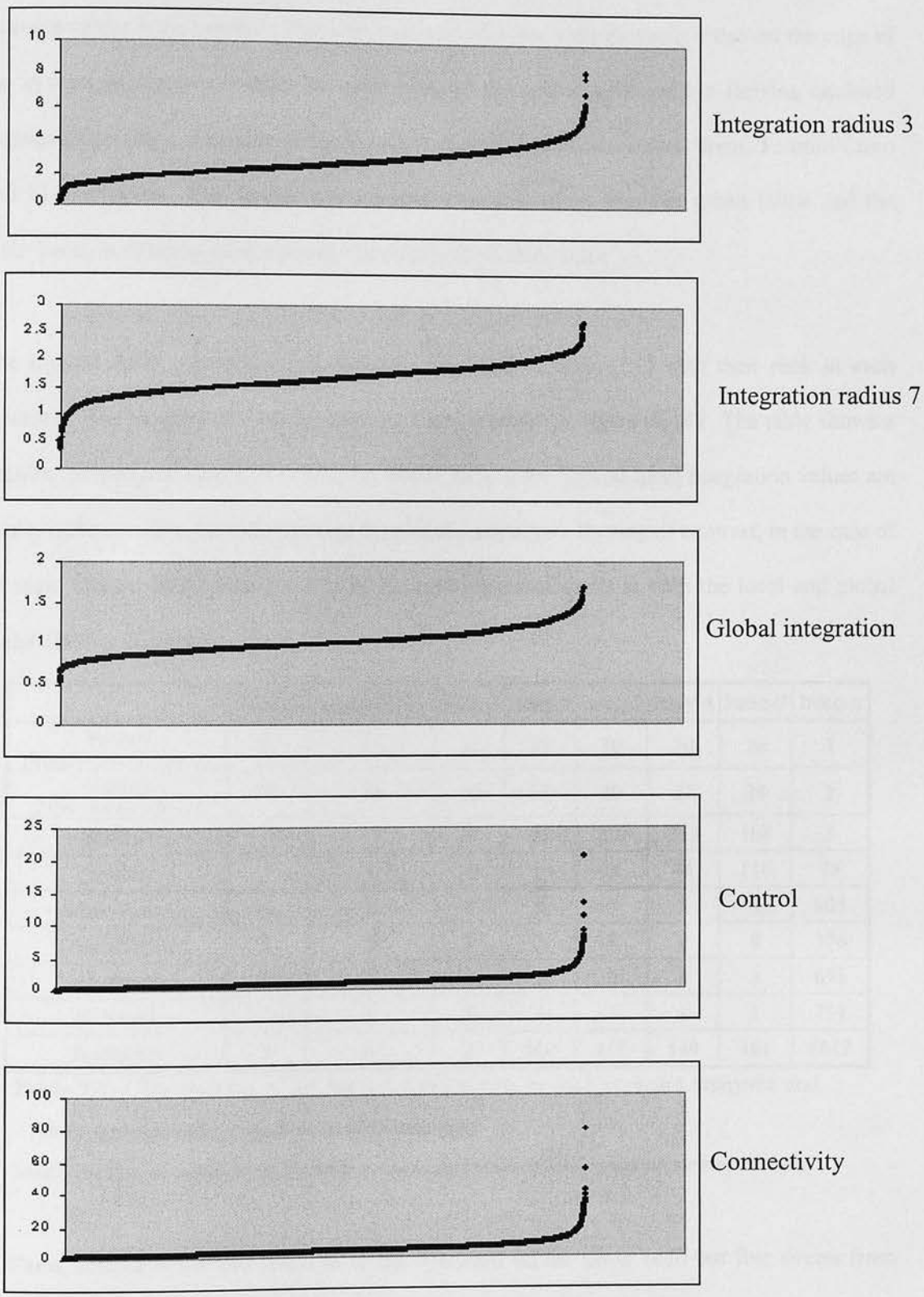


Figure 7.15 – Gradual increase of values in syntactic measures of Cairo axial map.

When *individual values* are considered, the two ends of the curve were looked at and the extreme values were isolated. The least values in all cases were elements either on the edge of the system or segments within the main body of the spatial structure but forming enclosed segregated pockets. Example of these pockets were found in two central areas, Fatimid Cairo and El-Sharrabiah. The former was segregated because of its irregular urban fabric and the latter because of being surrounded by the railway from three sides.

The highest three segments in all measures are listed in table (7.1) with their rank in each measure. The location of these segments in Cairo is shown in figure (7.16). The table shows a peculiar property of spaces in Cairo, that streets having the highest local integration values are totally different from those dominating the global integration. By way of contrast, in the case of London, Oxford Street was found to be the best integrated street at both the local and global scales (Hillier B, 1996).

	Control	Connectivity	Integ-3	Integ-5	Integ-7	Integ-8	Integ-9	Integ-*n*
Ramsis (Ramsis-Ghamra segment)	21	11	13	23	20	20	26	1
Ramsis (Tahrir-Ramsis segment)	70	38	40	28	30	27	24	2
Skakeny	77	17	54	95	219	210	168	3
Shubra	1	1	1	1	14	44	116	75
Salah Salem	4	3	4	5	3	2	2	305
Gesr El-Sues	2	2	3	3	4	7	9	376
Abo-Bakr	86	17	8	2	2	3	3	651
El-Nozha	12	5	5	4	1	1	1	711
Toman-bai	3	4	2	160	113	149	161	1012

Table 7.1 – The ranking of the highest three streets in each measure analysed and their ranks in other measures in the Cairo map.

Note: All figures contained in the table are ranking orders and not syntactic measure values.

In Cairo, Shubra Street was found to be the dominant on the lower radii but five streets from Heliopolis and El-Zaitoon districts take over in most subsequent higher local radii. As explained before (see 7.4.1.a), Shubra Street loses integration at higher radii as a result of the district being surrounded by barriers[10].

[10] The railway to the East and South, the Nile to the West and El-Esmaielia canal to the North. Although it has some links with the adjacent districts, these are by no means the equivalent to a complete interaction along the edges.

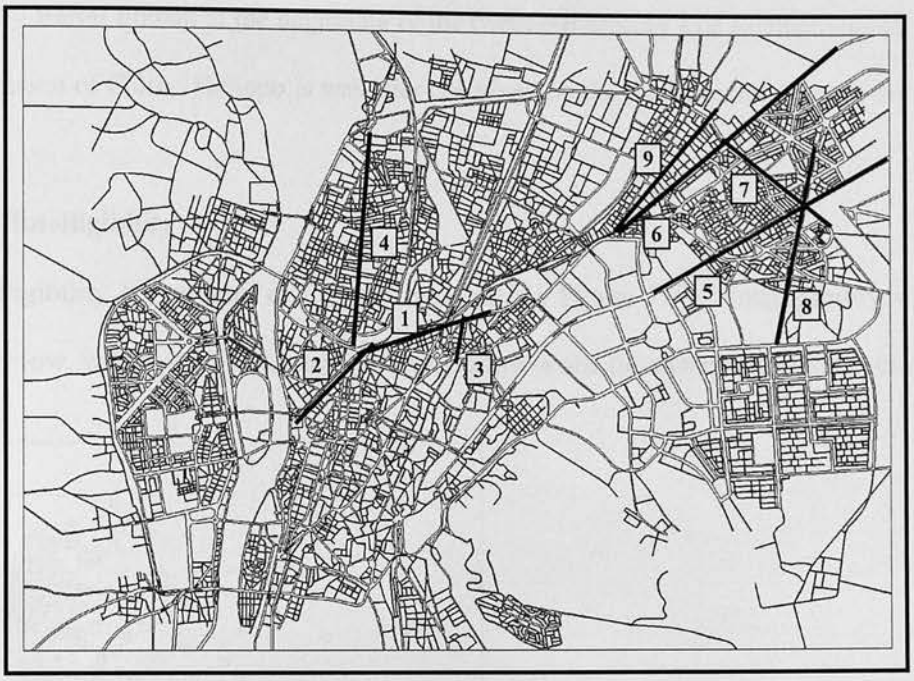


Figure 7.16 – The highest three streets in all measures analysed for Cairo CAM.

Note: Numbers attached to each street does only refer to their sequence in global integration map regardless of intervals between them.

Key: 1) Ramsis (Ramsis-Ghamra segment); **2)** Ramsis (Tahrir-Ramsis segment); **3)** Skakeny; **4)** Shubra; **5)** Salah Salem; **6)** Gesr El-Sues; **7)** Abo-Bakr; **8)** El-Nozha; **9)** Toman-bai.

In the global integration, the two segments of Ramsis Street occupy the first and second ranks. They also have a steady ranking when local integration is considered unlike Skakeny Street ranks which is a residential street and does not have a significant ranking when local integration is considered. It was also surprising to see that CCC produced none of the highest ranked streets either in the global or local integration level of the city as a whole.

Ramsis Street behaves as a rapid movement artery that links isolated islands of individually developed urban systems[11] and it is does not penetrate any unified district. Sakakeny Street is a local residential street. Gesr El-Sues and Salah Salem are in-city highways passing through Heliopolis and El-Zaitoon districts. Toman-bai and Shubra are linear centres of previously agricultural land that have become residential districts. El-Nozha and Abo-Bakr Streets are two major radial streets in the well-integrated and very much active district of Heliopolis, which was

[11] It was found from the axial map that Cairo is divided into these major districts (Shubra, Heliopolis, Nasr City, El-Muhandessen &El-Dokki, El-Manial, El-Zamalek, CCC, Fatimid Cairo, El-Daher & El-Abbasia, El-Hadayek & Ain-Shams, and El-Waily) Between these relatively major districts some enclosed pockets were found (El-Sharrabia, Ain El-Seerah, El-Sabtiiah, Imbabah).

planned by Baron Emban at the beginning of the twentieth century as a satellite suburb to be the new extension of Cairo. Heliopolis was later contained by the further extensions of the city.

7.4.1.b Intelligibility

The intelligibility scattergram of Cairo is presented in Figure 7.17. Intelligibility was found extremely low, with $r^2 = 0.0804$, suggesting that Cairo is one the easiest cities to become lost in.

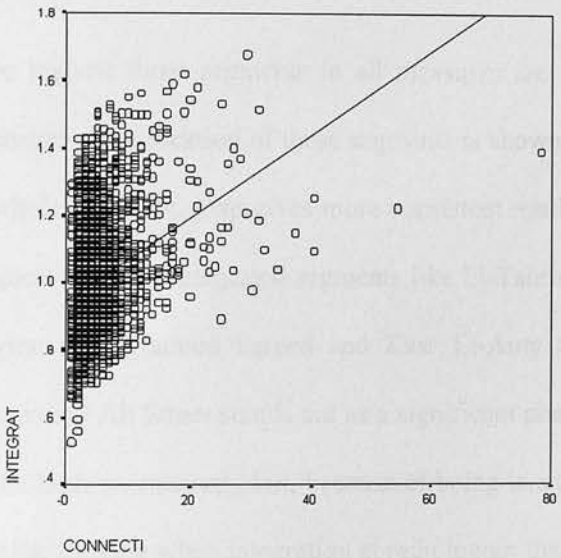


Figure 7.17 – Scattergram of global integration and connectivity of Cairo.

7.4.2 The Scale of CCC

The measures involved in this scale are the three major output measures of Axman: *Integration* (at different radii), *Control*, and *Connectivity*. The CAM was applied to all maps, but MAM and SIM were only applied to the isolated area of CCC.

7.4.2.a Study of the gradual increase in values within one measure

All three models (CAM/MAM/SIM) are used in this analysis.

7.4.2.a.(i) CAM

When *direction* is considered the same two patterns observed in the Cairo axial map can be observed here. All the measures of integration on different radii followed the two-yield point pattern of increase, whereas connectivity and control followed the one-yield pattern (see figure 7.15).

When *individual values* are considered, the two ends of the curve were looked at and the extreme values were isolated. Again, as was observed in the Cairo maps, the least values were elements either on the edge of the system or segments within the main body of the spatial structure but forming enclosed segregated pockets. These were found in Fatimid Cairo and El-Sharrabiah for the same reasons mentioned in sub-section 7.4.1.a (fifth paragraph).

The highest three segments in all measures are listed in table (7.2) with their rank in each measure. The location of these segments is shown in figure (7.18). Unlike the case of Cairo as a whole, the CCC map gives more consistent results between local and global integration. The highest globally integrated segments like El-Tahrir, Talaat Harb, Merit, Ramsis (Tahrir-Ramsis segment), Mohamed Fareed and Kasr El-Ainy Streets were also highly integrated locally. Mohamed Ali Street stands out as a significant phenomenon. It gained a high control value due to its high connectivity but, because of being located in Fatimid Cairo, it did not demonstrate a similar ranking when integration at radii higher than three steps are considered.

	Control	Connectivity	Integ-3	Integ-5	Integ-6	Integ-7	Integ-*n*
El-Tahrir	2	2	2	1	1	1	1
Talaat Harb	10	4	3	3	3	4	2
Merit	37	25	10	6	4	5	3
Ramsis (Tahrir-Ramsis segment)	8	5	4	9	5	2	4
Mohamed Fareed	1	1	1	2	2	3	5
Kasr El-Ainy	6	3	5	5	6	6	6
Mohamed Ali	3	6	8	31	34	31	29

Table 7.2 – The ranking of the highest three streets in each measure analysed in the CAM and their counter ranks in other measures in CCC map.

Note: all figures contained in the table are ranking order and not syntactic measure values.

Space Syntax claims to embed social aspects within the resulting analysis. The findings so far suggest that this is the case. Previous writings of the method's founder suggest that when the observed behaviour does not match the outcome of the Space Syntax analyses, the natural growth has been interrupted by external forces (Hillier, 1999b). The review of the results of Mohamed Ali Street implies the validity of the suggestion.

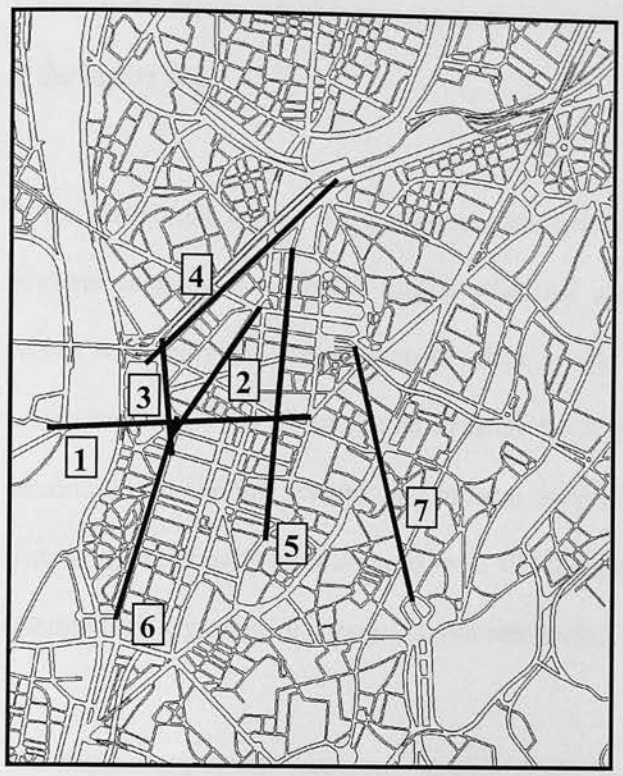


Figure 7.18 – The highest three streets in all analysed measures in CCC CAM.

Note: The number attached to each street only refer to the sequence in the global integration map.

Key: **1)** El-Tahrir; **2)** Talaat Harb; **3)** Merit; **4)** Ramsis (Tahrir-Ramsis segment); **5)** Mohamed Fareed; **6)** Kasr El-Ainy; **7)** Mohamed Ali.

7.4.2.a.(ii) MAM

The gradual increase of MAM is illustrated in figure 7.19. When *direction* is considered, a new pattern of increase can be found in this model. Integration at lower radii follows the same two-yield point pattern observed in CAM in both Cairo and CCC. The first yield point on the curve, however, is not smooth as in the case of CAM. Starting from radius 100 and over, the increase curve loses the second (higher) yield point because of the smoother gradual increase from the most integrated modular segment onward. The curve retains the first (lower) yield point because of long streets radiating from the system which were not trimmed to the selected isolation border of the subsystem of CCC.

Unlike the pattern observed in CAM in Cairo and CCC, *Connectivity* and *Control* followed the two-yield point pattern but with significant differences in the smoothness of the curve. *Connectivity* was affected by the modulation of the system resulting in very few connections per segment; therefore the curve described not more than 8 for the highest segment and huge number of 2-link segments. A clear division emerged between each connectivity value and its neighbours. *Control* also shows approximate similarities to connectivity but, because of the

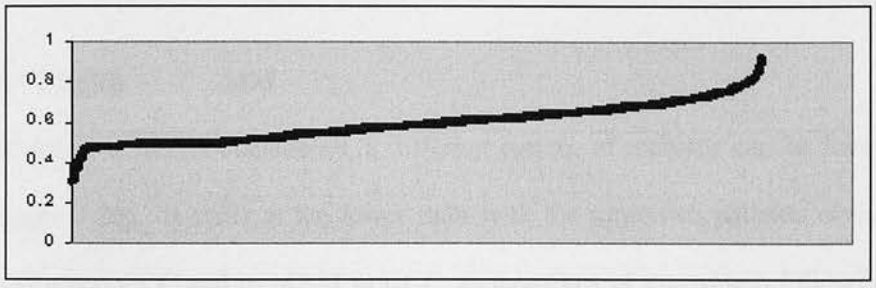
nature of the measure which accepts fractions in values, it was continuous and was only broken at the higher end.

When *individual values* are considered, the two ends of the curve were looked at and the extreme values were isolated. Unlike what was observed in Cairo and CCC CAMs, the least values were only the elements on the edge of the system due to the edge effect. Segments within the main body of the spatial structure but forming enclosed-segregated pockets were not identified in the global integration. In local integration, the metric criteria place the segregated parts at the metrically remoter parts from all other parts of the system. These were found in the intermediate segments of a long, and not intersected, part of a street.

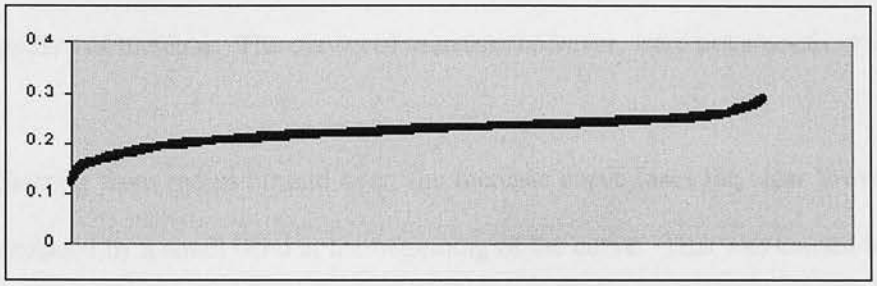
The highest segmental locations[12] in all considered measures were found to be so varied that they cannot be compared across different radii. However, significant observations of the way the ranking of different segmental location was shaped could be drawn.

- Once a segment appears in the list, it is followed by its immediate neighbours and so on until another segment from another part of the spatial system having a higher value appears followed by its neighbours and so on.
- The global integration of the system loses values at a smooth rate from the most integrated location towards the edge of the system without having a clear second grade location.
- Very few meaningful results could be found in the local measures such as *Connectivity*, *Control* and local *Integration* at radii less than radius 10. They seem to be highly affected by their very immediate relationships in a pattern that seems, in most cases, not realistic.
- As radius increases, separate segmental locations appear sequentially in the integration map. These segmental locations behave as pools of integration of different importance. Moving up in radii, the number of these poles decreases and shows a bias towards the location of the global integration pole, where they all finally unite.

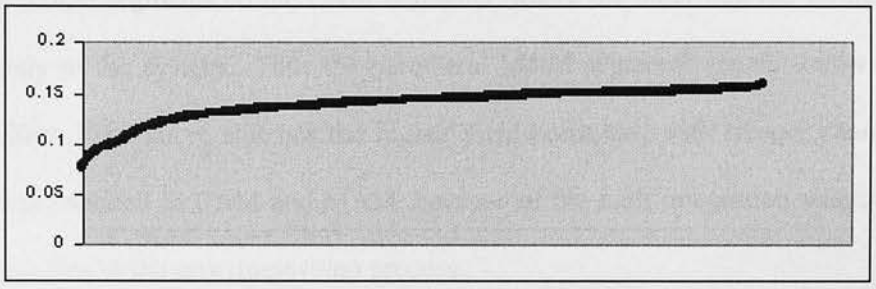
[12] As the segment now is not a street but part of it especially at intersections.



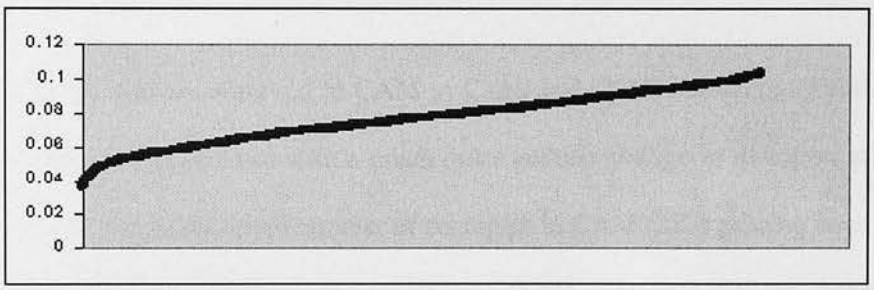
Integration Radius 10



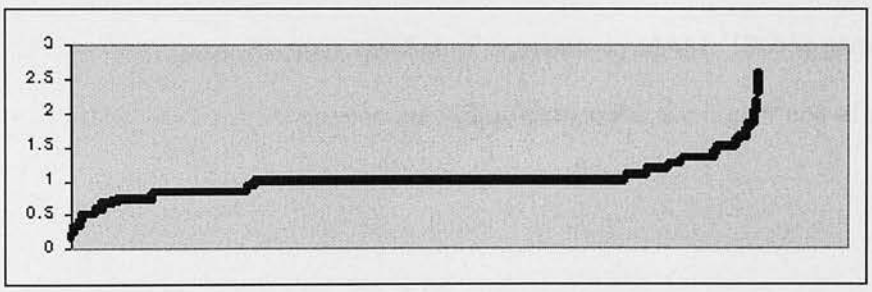
Integration Radius 50



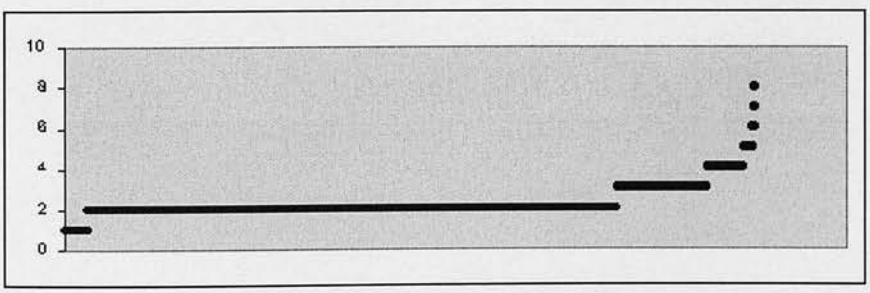
Integration Radius 100



Global integration



Control



Connectivity

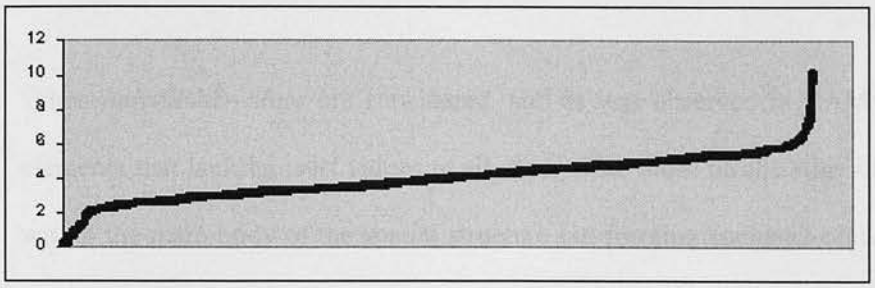
Figure 7. 19 - Gradual increase of values in syntactic measures of CCC MAM.

7.4.2.9.(iii) SIM

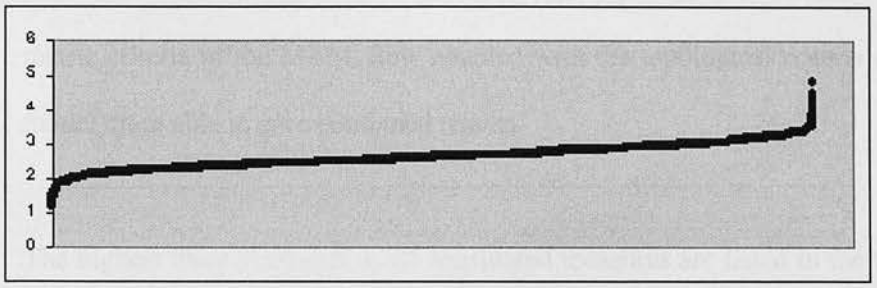
When *direction* is considered, a different pattern of increase can be found in this model (see figure 7.20). It starts at the lower radii with the same two patterns observed in CAM in both Cairo and CCC and in MAM in CCC, as measures of integration following the two-yield-point pattern of increase. The curves of increase, however, were not smooth as in CAM.

Starting from radius 50 and over, the increase curve loses the clear lower yield point which is replaced by a small bend at the beginning of the curve. That was caused by the superimposition of MAM segments on the CAM segments, where the latter link the former directly to the main body of the system. Thus the peripheral MAM segments are no longer affected by the edge effect. The curve still has the higher yield-point but, with steeper changes in direction than those noticed in CAM and MAM, because of the high integration values that CAM segments gain due to the superimposition process.

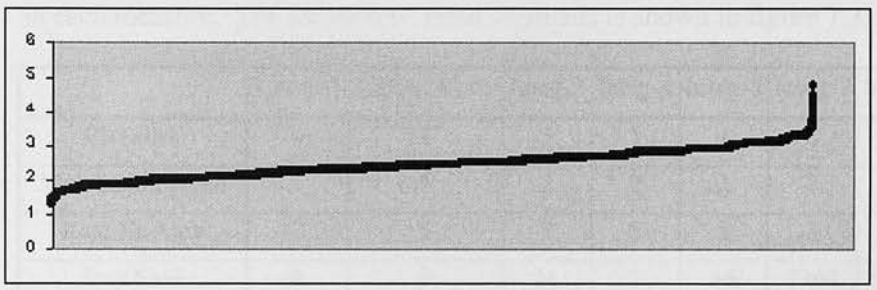
Like the pattern observed in CAM in Cairo and CCC, *Connectivity* and *Control* follow a one-yield-point pattern but with a much more sudden change in direction at this yield-point. This may be due to the small number of segments in CAM (398) gaining *huge* extra value because of their length and therefore the number of MAM segments that are directly connected to them. On the other hand, the huge number of segments in MAM (10606) gain very little value. The two curves were only broken by individual elements at the higher end of each.



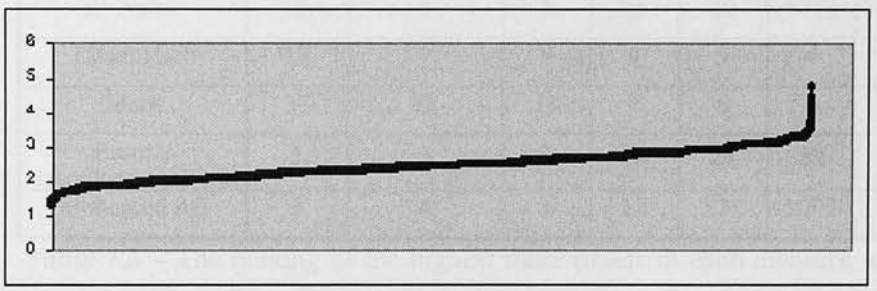
Integration radius 3



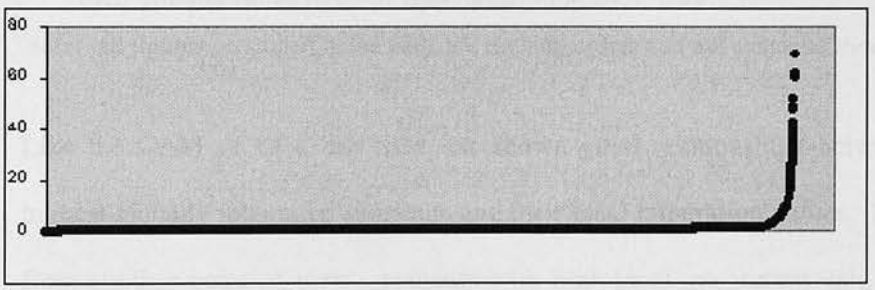
Integration radius 7



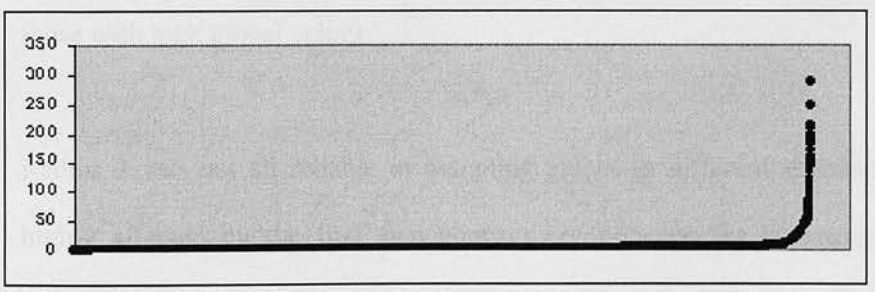
Integration radius 50



Global integration



Control



Connectivity

Figure 7.20 - Gradual increase of values in syntactic measures of CCC SIM.

When *individual values* are considered, and as was observed in CAM in Cairo and CCC, the elements that had the least values in all cases were those on the edge of the system. Segments within the main body of the spatial structure but forming enclosed-segregated pockets could be identified in the global integration but less clearly than in the CAM. In local integration the metric criteria of the MAM, now coupled with the topological criteria of the CAM, makes the model more able to give combined results.

The highest three segments in all considered measures are listed in the table 7.3 with their rank in each measure. The location of these segments is shown in figure 7.21.

	Control	Connectivity	Integ-3	Integ-4	Integ-5	Integ-7	Integ-50	Integ-100	Integ-*n*
El-Tahrir	4	2	5	1	1	1	1	1	1
Mohamed Fareed	1	1	2	2	2	2	2	2	2
Kasr El-Ainy	7	5	7	5	5	3	3	3	3
Port Said	9	9	11	3	36	3364	4184	4184	4184
El-Azhar	2	6	1	25	40	5773	7537	7537	7537
Talaat Harb	11	7	8	4	3	4	4	4	4
Merit	31	28	18	7	6	6	6	6	6
Ramsis (Tahrir-Ramsis segment)	5	3	6	13	24	39	45	45	45
Mohamed Ali	3	4	3	22	127	1002	1202	1202	1202

Table 7.3 – The ranking of the highest three streets in each measure analysed in the SIM and their counter ranks in other measures in the CCC map.

Note: all figures contained in the table are ranking orders and not syntactic measure values.

Like the CAM of CCC the SIM has shown good relationships between the ranking of the highest globally integrated segments and their local integration values. But when it is looked at from another point of view, segments with high local integration values were not necessarily those with high global values.

Radius 3 was not all reliable in assigning values to different segments. It was found to be highly affected by the first step connectivity between the superimposed CAM and MAM segments. This could be seen even more in reviewing differences in integration for the same

segment moving from R3 to R4 and finally Rn. Some segments experienced acute change in ranking order from r3 to higher radii either by sudden increase (like Merit from rank 18 in r3 to rank 7 in r4) or by sudden decrease (like El-Azhar from rank 1 in r3 to rank 25 in r4). Other segments experienced both changes (for example Port Said Street moved from rank 11 in r3 up to rank 3 in r4 and then down again to rank 36 in r5). Starting from radius 7, the top most integrated segments remain the same and at higher radius (radius 10) all integration values remain the same.

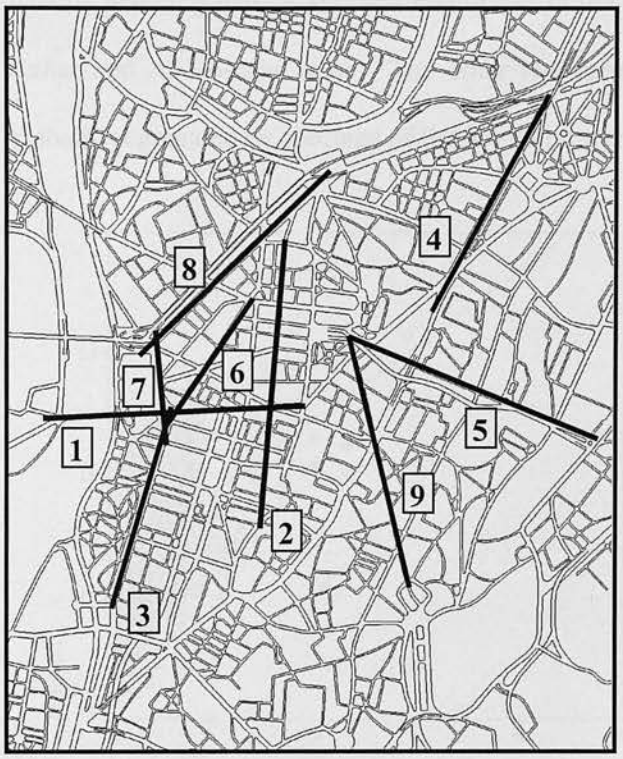


Figure 7.21 – The highest three streets in all analysed measures in CCC SIM.

Note: The number attached to each street only refers to the sequence in the global integration map.

Key: **1)** El-Tahrir; **2)** Mohamed Fareed; **3)** Kasr El-Ainy; **4)** PortSaid; **5)** El-Azhar; **6)** Talaat Harb; **7)** Merit; **8)** Ramsis (Tahrir-Ramsis); **9)** Mohamed Ali.

7.4.2.b Intelligibility

Intelligibility is defined as the relationship between global integration, or integration radius n, and the connectivity measures. It was found to be a good indicator of how easily pedestrians can locate themselves and navigate the urban environment. It was found also to reflect on the legibility (in Lynch's terms, 1960) of the area and the spatial behaviour represented by pedestrian movement (Kim, 1999). The higher the correlation factor the more intelligible the area is.

7.4.2.b.(i) CAM

The model shows a slightly better correlation between global integration and connectivity than that which emerged from the analysis of the whole of Cairo (7.4.1.b). The intelligibility scattergram of CCC with the buffer zone is presented in Figure 7.22. Intelligibility was found moderate with $r^2 = 0.1706$. The only available explanation of that is the inclusion of some highly unintelligible parts like Fatimid Cairo, El-Sharrabiah and El-Sabtiiah areas in the model as a buffer zone to minimise the edge effect. Fatimid Cairo is unintelligible by the nature of its Islamic planning pattern and was mentioned in the questionnaire represented by Al-Moski, Al-Azhar and Al-Hossain areas. The other two areas, El-Sharrabiah and El-Sabtiiah areas are globally segregated by shortage of links with its surroundings.

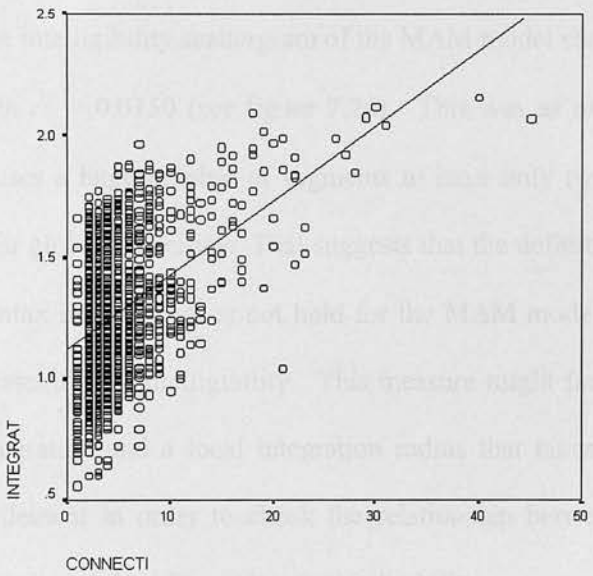


Figure 7.22 – Scattergram of global integration and connectivity of the CAM of CCC with the buffer zone.

The intelligibility of the isolated city centre, i.e. without the buffer zone, was tested and has given better results ($r^2 = 0.3987$) than that of CCC with the buffer zone, but this is still low as an absolute value (see figure 7.23). The inclusion of Garden city, which is a highly unintelligible area according to the questionnaire finding (see figure 5.10), and the significant difference in network density from one place to another contribute to depressing the intelligibility value no matter how many other corrective measures are applied.

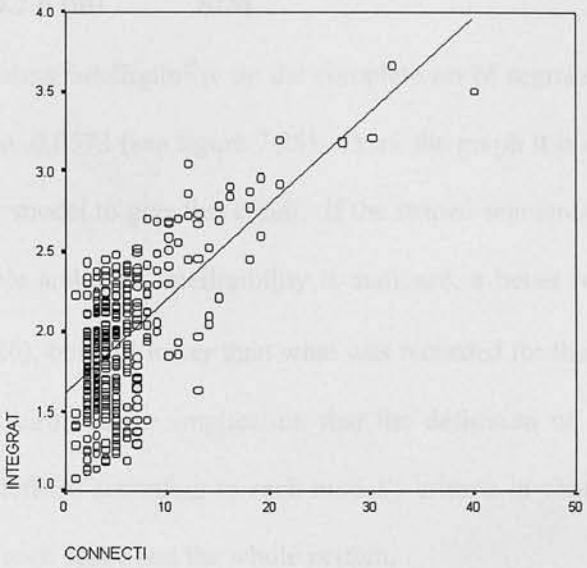


Figure 7.23 – Scattergram of global integration and connectivity of the CAM of CCC without the buffer zone.

7.4.2.b.(ii) MAM

The intelligibility scattergram of the MAM model shows significantly low regression coefficient with $r^2 = 0.0150$ (see figure 7.24). This was as expected, because using the short segments causes a huge number of segments to have only two connections on both ends, regardless of their global properties. That suggests that the definition of intelligibility, as it is given in Space Syntax literature, does not hold for the MAM model. The MAM, then, needs another way of measuring its intelligibility. This measure might facilitate the relationship between the global integration and a local integration radius that takes into account the size (metrically) of the settlement in order to check the relationship between the global and local properties of the system and therefore judge its intelligibility.

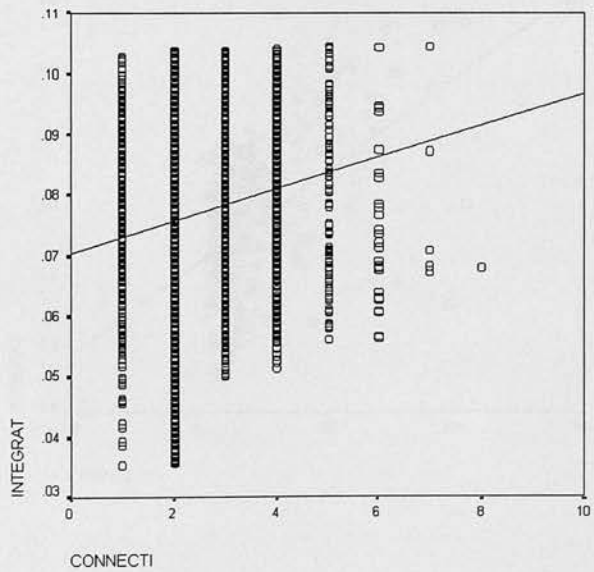


Figure 7.24 – Scattergram of global integration and connectivity of the MAM of CCC.

7.4.2.b.(iii) SIM

Testing intelligibility on the complete set of segments in the SIM gives a very low r^2 value of only 0.0573 (see figure 7.25). From the graph it is clear that the segments of the MAM caused the model to give this result. If the striped segments in the model were isolated from the results table and their intelligibility is analysed, a better result is found with $r^2 = 0.2705$ (see figure 7.26), but still lower than what was recorded for the isolated CAM ($r^2 = 0.3987$). This appears to reinforce the implication that the definition of intelligibility in all three models could be redefined according to each model's criteria in connecting local properties to global properties in each space and the whole system.

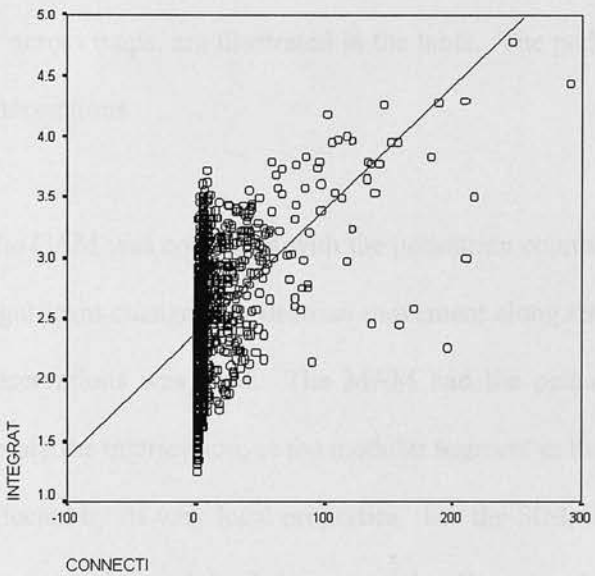


Figure 7.25 – Scattergram of global integration and connectivity of the SIM of CCC.

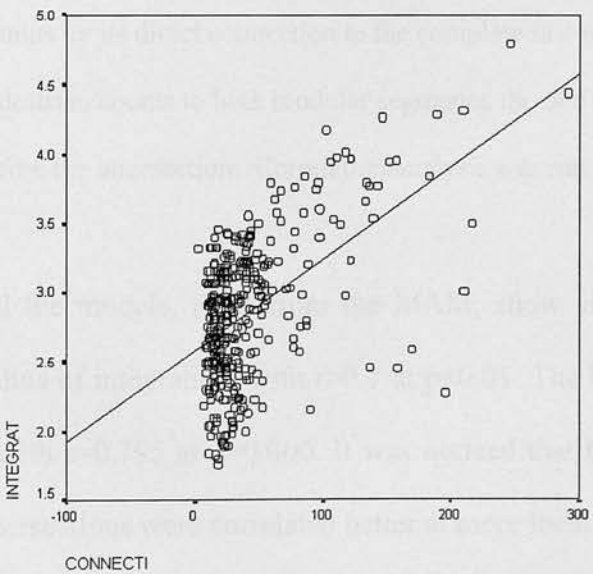


Figure 7.26 – Scattergram of global integration and connectivity of the striped layer of the SIM of CCC.

7.5 CORRELATION WITH PEDESTRIAN OBSERVATION

Correlation is examined only at the scale of CCC, as collecting representative pedestrian counts for the whole city of Cairo was neither possible due to research limitations nor available from any other source of data.

The correlation analysis of all axial models and the pedestrian counts of movement in some streets of the CCC were run on the SPSS (Statistical Package for Social Science) and *Pearson* coefficients were calculated (table 7.4). In order to make it easier to report these results, only correlation coefficients showing significant relationships, whether on the level of the same map or across maps, are illustrated in the table. The pedestrian counts were always located at street intersections.

The CAM was correlated with the pedestrian counts of each street and, when a street showed a significant change in pedestrian movement along its path, an average at these different location observations was used. The MAM had the pedestrian counts assigned to the segment just before the intersection, as the modular segment in the intersection was highly and meaninglessly affected by its very local properties. For the SIM, the correlation analysis was run for the *strip layer* and the *modular layer* separately. Because of the global properties each modular segment obtains by its direct connection to the complete line in the SIM, it was found important to assign pedestrian counts to both modular segments, the one directly on the intersection and the one just before the intersection. Correlation analysis was run for each modular segment separately.

All the models, apart from the MAM, show significant correlation with at least one radius of integration, with $r>0.7$ at $p<0.01$. The highest of them was the CAM at radius 5 with $r=0.795$ at $p=0.000$. It was noticed that CAM, strip layer, and modular layer at intersections were correlated better at more local radii.

		Models used in the correlation analysis				
		CAM	MAM	Superimposed model (MAM & CAM)		
				Strips	Modular	
					Before Intersection	At Intersection
Number of Cases		20	24	20	24	24
Integration (3)	Corr. Coef.	.762(**)	-	.721(**)	.740(**)	.716(**)
	Sig.	.000	-	.000	.000	.000
Integration (4)	Corr. Coef.	.764(**)	-	.683(**)	.720(**)	.665(**)
	Sig.	.000	-	.001	.000	.001
Integration (5)	Corr. Coef.	.795(**)	-	.639(**)	.721(**)	.646(**)
	Sig.	.000	-	.003	.000	.001
Integration (7)	Corr. Coef.	.772(**)	-	.650(**)	.657(**)	.695(**)
	Sig.	.000	-	.003	.001	.000
Integration (10)	Corr. Coef.	-	.402	-	-	-
	Sig.	-	.057	-	-	-
Integration (20)	Corr. Coef.	-	.320	-	-	-
	Sig.	-	.137	-	-	-
Integration (30)	Corr. Coef.	-	.335	-	-	-
	Sig.	-	.118	-	-	-
Integration (40)	Corr. Coef.	-	.412	-	-	-
	Sig.	-	.051	-	-	-
Integration (50)	Corr. Coef.	-	.509	.621(**)	.753(**)	.690(**)
	Sig.	-	.013(*)	.005	.000	.000
Integration (100)	Corr. Coef.	-	.543(**)	.621(**)	.753(**)	.690(**)
	Sig.	-	.007	.005	.000	.000
Integration (150)	Corr. Coef.	-	.619(**)	.621(**)	.753(**)	.690(**)
	Sig.	-	.002	.005	.000	.000
Integration (200)	Corr. Coef.	-	.192	-	-	-
	Sig.	-	.379	-	-	-
Integration (n)	Corr. Coef.	.763(**)	.192	.621(**)	.753(**)	.690(**)
	Sig.	.000	.379	.005	.000	.000
Connectivity	Corr. Coef.	.730(**)	.145	.720(**)	.361	.113
	Sig.	.000	.510	.001	.098	.617
Control	Corr. Coef.	.699(**)	.045	.729(**)	-.066	-.001
	Sig.	.001	.839	.000	.770	.998

* Correlation is significant at the .05 level (2-tailed).

** Correlation is significant at the .01 level (2-tailed).

Table 7.4 – Correlation between pedestrian counts and integration values of all models used in the analysis (*Pearson* coefficient).

The modular layer before intersections was correlated better at more global radii and reached its peak at radius n. On the other hand, MAM describes better correlation with the increase in radius above 7 until it reaches a significant yield point at radius 150 with r=0.619 at p=0.002. After that with higher radii, it continues decreasing till it reaches radius 200 and stayed almost the same until radius n with r=0.192 at p=0.379.

Only CAM and the strip layer have shown significant correlation with other measures of Space Syntax than integration values. Their control and connectivity values were significantly

correlated with pedestrian observations. Control values in the strip layer have higher correlation coefficients than all other integration values.

From the findings so far, CAM is a better predictive tool of the movement of pedestrians than other models. MAM did not perform well when pedestrian projection is considered and requires more field counts and further work on segment length. The superimposed model could be representing a development of the axial models, which also accounts for metric distance. The latter might show better performance when the optimum segment length is found.

7.6 SUMMARY OF FINDINGS

The application of Space Syntax gave rich and varied results. It gave a thorough description of the spatial configuration of Cairo and its city centre. The multiple models and methods of analysis employed added to that variety. Some of these findings reflect on the case study area and others reflect on Space Syntax itself. A summary of the findings of the analysis are summed up in the following points.

1) The spatial configuration of Cairo is characterised by being divided into individual districts which are linked and, at the same time, separated by movement arteries.
2) The strength of borders of each district was clear to have dictated the extent to which this district interacts with its neighbours and the limit of any extension.
3) The difference in the origination circumstances of various districts has led to different spatial configuration patterns, like the organic, radial, orthogonal, concentric and mixed grids.
4) The planning of new districts with little attempt to integrate with the existing urban structure has had a detrimental effect on spatial relationships within the city.
5) CCC, despite not geometrically central, appeared in the analysis of whole of Cairo as the most globally integrated district, especially its Northern borders.
6) Within the map of Cairo, CCC is highlighted as an area within which the parts are closely integrated and which is distinguished from other areas in the system.

7) Overall, the global integration maps tend to show arteries with through movement while local integration maps tend to show local centres.

8) The global spatial configuration of Cairo, as shown by the Space Syntax analysis, represents the vehicular movement (as reported in the JICA study, Dec. 1987) with some exceptions. The local integration represents the pedestrian movement, again with some exceptions. These exceptions are found either where the natural urban growth pattern is disrupted for example the seclusion of Fatimid Cairo and the imposition of Mohamed Ali Street, or due to weakness in the method such as the 'edge effect' and ignoring environmental factors apart from 'changes in direction'.

9) The findings also highlight many disruptions in the natural growth of the urban form.

10) Furthermore, the analysis points to problem areas like the central, segregated areas, and integrated areas that have development potential.

11) The River Nile did not weaken the relationship between its Western and Eastern banks, and that reflects on the location and connectivity of the bridges included in the analysed map.

12) The railway has significantly affected the integration of various parts of the city, by working as a strong barrier between the districts.

13) The most integrated street, in contrast to the findings of previous research, is not contained in the city centre, but adjacent to it.

14) In the spatial analysis of CCC with the buffer zone, all major streets in the area were selected.

15) Within the map of CCC, the analysis picked hardly any areas within the system of CCC, it rather selected single streets with the highest integration values.

16) The use of MAM in the CCC analysis managed to give a picture of busy locations whether as intersections or local centres such as that in Bab El-Louque.

17) MAM highlighted the difference in space use according to its location on a single street, thus solving the 'length problem' in the CAM. Thus a segment of a line which falls on an intersection was shown to be more integrated than the other segments on the same line but in an intermediate location.

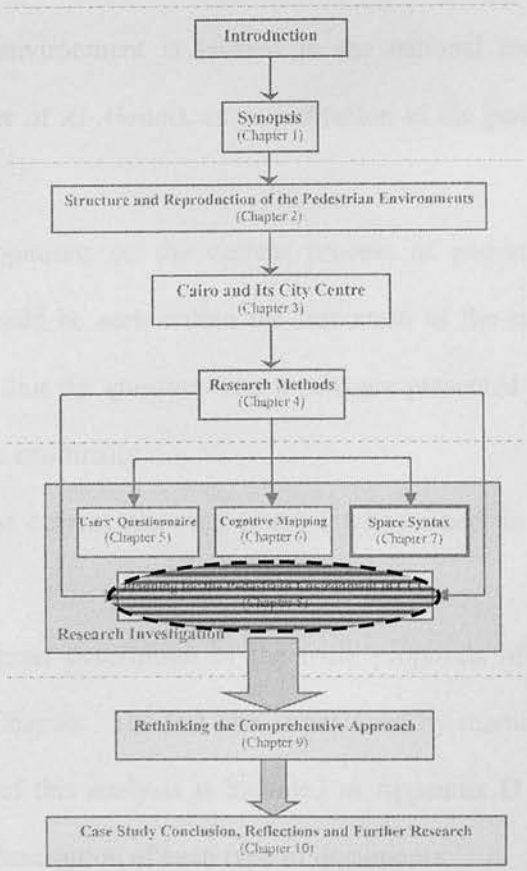
18) In the CAM, CCC has better accessibility on the global scale of Cairo, where Shubra is more accessible on the local scale. Local integration map in MAM identified a local centre as more integrated than the heart of the city centre. These findings raise the question of the origin of movement in each area. In other wards it draws attention to the Space Syntax analysis differentiating between areas where the movement population originates locally and other areas where the movement population originates globally.

19) Given the limited number of pedestrian movement counts, it is still possible to suggest that the findings of the analysis tend to reflect the actual behaviour.

20) The SIM did not show what Hillier (1996) expected from it, which is representation of actual activities.

Chapter Eight

PLANNING FOR THE PEDESTRIAN ENVIRONMENT IN CAIRO CITY CENTRE



INTRODUCTION

The main objective of this chapter is to investigate the professional field that is involved in the process of planning for pedestrians in CCC. This process is defined earlier (see section 2.3) as *the system that currently dictates the reproduction of the urban structure.* The investigation is to understand the current planning process in order to pin down the key features which determine the resulting new structure of the pedestrian environment.

The complexity of the planning system suggest that the analysis must take a varied approach. Thus, various sources of data are used. This means variety in data collection methods and analysis techniques, which are intended to jointly contribute to a wider understanding of the planning process of the pedestrian environment in CCC.

8.1 OBJECTIVES

The objectives of this investigation are:

1) to examine various reports and studies that involve the topic of movement in CCC;
2) to explore how the issue of pedestrian environment is tackled in the national media (represented by the most popular newspaper of *Al-Ahram*), as an indication of the general attitude towards the topic;
3) to obtain an insight into professionals' opinions on the current process of pedestrian environment production (however, this should be seen within the limitation of the small number of subjects accepted in participate, thus the *questionnaire* results are presented in a brief account of the subjects main attitudes); and finally
4) to extract the key features attributed to the current planning process with respect to the pedestrian environment.

The first three objectives are achieved by a brief description of the main proposals of the planning reports and this is presented in this Chapter. The last one is achieved by running a critical analysis of these reports. The details of this analysis is included in Appendix D and brief summary of its main findings follows the description of each type of documents.

8.2 METHODOLOGY

Two groups of data are used in this chapter. The first is the *documents* (reports and studies) and this is the main source of information. The second is the *questionnaire* which is conducted with seven planning-related professionals. *Documents* is subdivided into four categories of reports and studies according to the source from where as they were collected: executive institution; consultant; academic research; and newspaper report. The documents analysed are not a sample but they are all that was found related to the topic of planning for the pedestrian in CCC.

The agenda used to critically analyse the collected documents is outlined by Jupp and Norris (1993) and is based on a discourse analysis approach. This agenda included many questions against which different types of document could be tested. It is impractical to use all of these questions in testing any single document as, for some documents, some questions become central and others are of a less importance. The final (modified) agenda used in the evaluation of the documents is as follows:

Q1. In what kinds of documents and texts do such discourses appear? (representing the typology of the document).
Q2. Who writes or speaks and whom do they represent or purport to represent?
Q3. Who is the intended audience of such writing or speech?
Q4. What discourses are important in terms of the criteria governing the topic?
Q5. What does a critical reading of these documents uncover in terms of:
  (Q5.1) What is the main topic considered by the document?
  (Q5.2) What explanation is offered for tackling the topic considered?
  (Q5.3) What, therefore, is proposed or suggested?
Q6. What does a critical reading of these documents tell us about
  (Q6.1) What is not seen as problematic?
  (Q6.2) Which concepts are rejected or omitted?
  (Q6.3) Which solutions are not preferred?

8.3 Document Analysis

The documents fall into three types: *official documents*, *research reports* and *newspaper reports*. Research reports are sub-divided into funded research sponsored by a government or private institution and purely academic research. All documents found and that concern either pedestrian movement or movement in general with regard to CCC are analysed. Table 8.1 lists

the reports used in the analysis of official and research reports. A code is given to each report in the table which is used to refer to it in the analysis.

Report category		Code	Reference
Official Reports		1.a	The Higher Traffic Committee of Cairo Governorate (HTCCG), (N.D.), The Second Periodical Report.
		1.b	Refky E, Mohamed F, El-Bahr S, and Hossain A, (1996), Preliminary Project Study of Pedestrian Areas in the City Centre, Cairo Governorate – Housing and Utilities Department, General Administration of Urban Planning, Traffic Engineering Office
		1.c	Stock Exchange Committee (SEC), 1999, Stock Exchange Site: City Planning and Traffic Engineering Report
		1.d	General Department of Cairo Traffic (GDCT), (N.D.), City Centre Traffic Report
		1.e	Planning and Technical Research Office (PTRO), Traffic Department, Internal Affairs Ministry, (N.D.), Report on Parking in Cairo
		1.f	General Department of Technical Research (GDTR), Cairo Governorate, (ND), Report Summary: Transportation, Traffic, and Parking Problem Greater Cairo Region
Research Reports	Funded Reports	2.a	General Organization for Physical Planning **(GOPP),** Omnium Technique de l'Urbanisme et de l'Infrastructure **(OTUI),** and Institut d'Aménagement et d'Urbanisme de la Region d'lle de France **(IAURIF),** (1983). Greater Cairo Region: Long Range Urban Development Scheme, February 1983, Ministry of Development, Cairo
		2.b	General Organization for Physical Planning **(GOPP),** and Institut d'Aménagement et d'Urbanisme de la Region d'lle de France **(IAURIF),** Implementation of The Homogenous Sector Concept: Homogenous Sector No. '1', Cairo Centre, final report, November 1988, Ministry of Development
		2.c	General Organization for Physical Planning **(GOPP),** and Institut d'Aménagement et d'Urbanisme de la Region d'lle de France **(IAURIF),** (1991), Greater Cairo Region Master Scheme: Evaluation of Achievements and Updating the Proposals, Ministry of Development
		2.d	Japan International Co-operation Agency, Greater Cairo Region Transportation Master-plan Study, (Inception report, Aug. 1987), (Progress report I, Dec. 1987), (Progress report II, Mar. 1988), and (Interim report, Oct. 1988).
		2.e	Transportation and Traffic Consultancy Unit, Ain Shams University, (1999), Study of Traffic on The Road Network Near Al-Azhar Street and in the City Centre. Ministry of Transportation and Communication, Cairo
	Academic Reports	3.a	Abu-Zekry, T., 1983. Visual Aspect of Down Town Cairo, unpublished MSc dissertation at Department of Architecture, Faculty of Engineering, Cairo University
		3.b	Bahgat, H., 1990, Pedestrian Areas: as an element to develop the city centre, unpublished MSc dissertation at Department of Architecture, Faculty of Engineering, Cairo University
		3.c	Abu-Taleb, A., 1989. Pedestrian movement characteristics in Cairo, unpublished MSc dissertation at Department of public works, Faculty of Engineering, Ain-Shams University

Table 8.1 - References and codes of analysed documents in official and research categories.

8.3.1 Official Reports

In the following paragraphs a brief citation of the significant recommendations or actions proposed in the official reports is presented. This citation helps the reader to have an insight of the qualitative nature of these actions. It is extracted mainly from the answer to Question 5 in the testing agenda (see section 8.2). All of them were tested against the predetermined questions mentioned in section 8.2. The complete citation of the results of this test is reported in Appendix D, however, a brief citation of the main findings of the critical analysis follows the description of the main proposals of these reports.

8.3.1.a Description of the Main Proposals of Official Reports

1.a) HTCCG (N.D.) considers fluidity in the vehicular traffic flow within the streets of Cairo as the main issue. Therefore, having traffic jams or even increasing the time in traffic flow

would suggest the existence of a problem. The offered explanation of the problem is referred to two major reasons. Firstly, the increase in urban development in Cairo within the last fifteen years has resulted in the increase of car ownership and in turn increased traffic volumes, especially on the main axis of the city. Secondly, as a result of being restricted from the East by El-Mokattam Hill and from the West by the Nile River, Cairo has many longitudinal axes but suffers a lack of lateral east-west axes in general and north-east ones especially.

The report takes into consideration the recommendations of the JICA plan in 1989, from which some projects were chosen to be implemented within the next five years in six domains:

1) Developing the main traffic axis: Ahmed Helmy St., Port Said St., El-Fustat & El-Khayyala St., Gesr El-Suez, and Abo-Bakr.
2) Developing new axis: Completion of 6th October bridge, Sekkat El-Waily St.,North Gammaliah St., Al-Azhar tunnels, and Bab El-Wazeer St.
3) Reducing transportation (traffic) demand.
4) Solving parking problems.
5) Integrating surface and underground transportation systems.
6) Studying the expected problems.

Although these domains seem broad for the scale of the main topic of the current study, which is pedestrian movement, it is essential to get hold of the major strategies which the policy makers think of as being of first priority to enhance the movement system in the metropolitan.

1.b) Refky *et al.* (1996) adopts the concept of pedestriansation and consider it the objective for enahancing CCC. The problem, then, is to select appropriate locations to be pedestrianised and to determine what are the needed design guidelines of these pedestrianised areas. Each area should satisfy four criteria: 1) it should not include major traffic routes; 2) there should be a possibility of transferring restricted traffic to other routes; 3) it should be of a commercial, administrational, or entertainment function and character; and 4) the visual elements (buildings) should have a distinguished and homogenous character.

The solution is the creation of a distinguished pedestrian path divided by a unique urban space, that is Orabi Square (see figure 8.1). This path is divided into two parts to the North and South of the square and each ends with a planted area that works as a separation buffer from traffic.

Every part is subdivided to three segments; each segment is about 50 metres in length. The intermediate segment has seats, shade and fountains. The three segments have works of art as in statues and sculptures. There is also a traffic proposal for the regulation of movement and ground signs. The traffic lights and signs should be updated as well as providing suitable and organised parking facilities in front of the High Court.

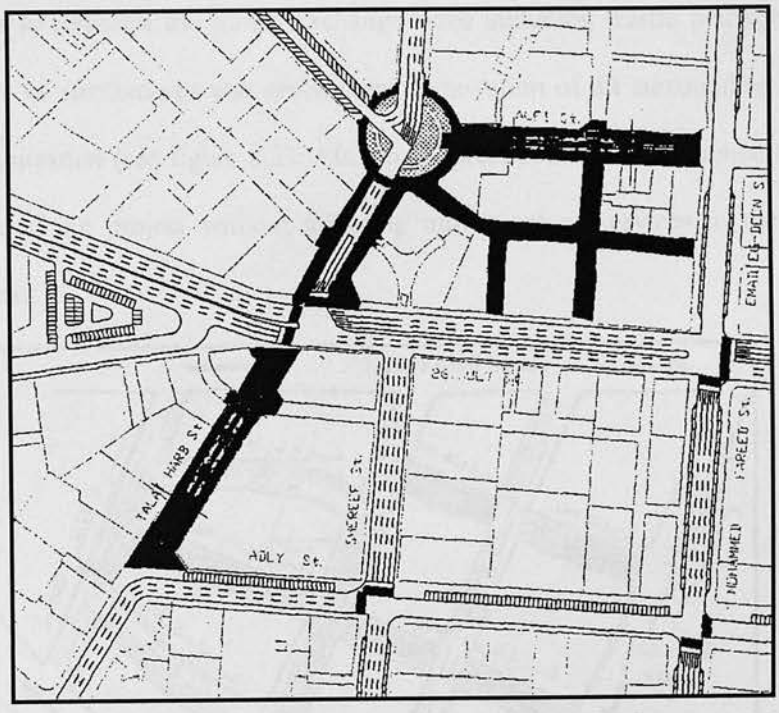


Figure 8.1 – Pedestrianisation proposal for the City Centre (Refki *et al.*, 1996).

Several visual elements are included in the solution: 1) seats with distinguished design; 2) trees and plantation for buffering, decoration etc; 3) different paving patterns homogenous with other architectural elements and characteristics of the area; 4) traffic signs or pedestrian and litter bins with matching design; 5) maintenance works to all the facades overlooking the project; 6) different art styles and types works to be distributed through out the area; and 7) the possibility of using some parts for open-air galleries or as outdoor extensions to some of the coffee shops and restaurants located on the path.

1.c) SEC (1999) is prepared by a non-governmental body and the project it proposes is privately funded. The report considers traffic congestion and illegal parking that hampers movement in the Stock Exchange Area as the main problem. However, this report is only concerned with its local traffic management aspects. The proposal cites several factors that were

considered as constrains on the project. First, the implementation of a project of this magnitude must inevitably have some repercussions on the existing movement and services in the area. Second, the storage spaces necessary to construct the work. Finally, the design criteria were developed from other previous traffic management work carried out in Cairo.

The proposal is to redesign the Stock Exchange Area including traffic management changes; adding elements of streetscapes and green areas; renovation of all surrounding buildings; and partial pedestrianisation (see figure 8.2). Also many precautions are mentioned to facilitate the implementation of the project without affecting movement or services in the site or in the surrounding areas.

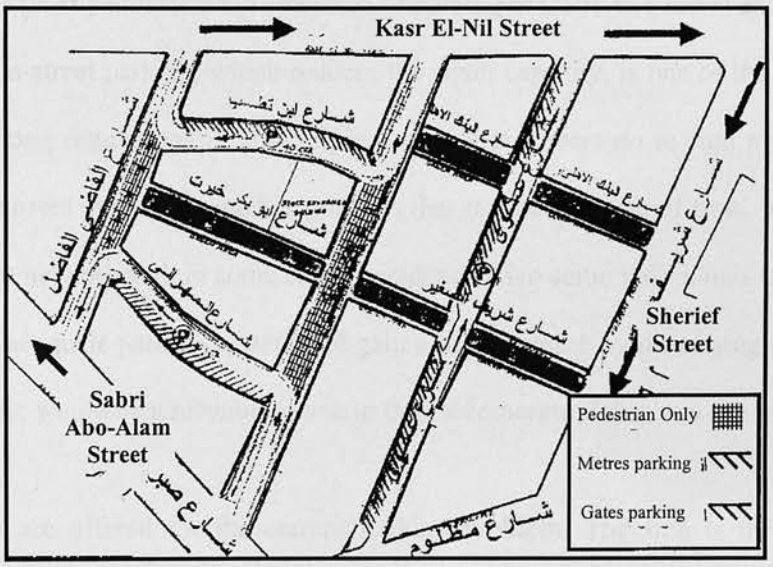


Figure 8.2 – Pedestrianisation proposal for the Stock Exchange Site (SEC, 1999).

1.d) GDCT (ND) considers one criteria of the environment of the CCC, that is the smoothness of the traffic flow, therefore defining the traffic condition as the aspect that needs further enhancement. The report describes the problem as being mainly derived from very complex economic situations with long roots going back in time. The report mentiones many reasons for the current problem in the traffic condition: first, the centralisation of many state and private activities in the small area available in CCC; second, the disorganised building and extension works; third, the cross traffic which passes through the CCC; fourth, the parking problem which reduces the available network capacity; fifth, the rapid increase in population in

GCR which is reflected on the number of vehicular trips per day generated in the city; sixth, deficiency in public transport system and modes forcing the public to use the private modes; and finally seventh, the huge number of buses and cars owned by different institutions and companies, and which exceeds in total the available number of those available for public transport.

After this extensive accounting of the reasons behind traffic flow problems in CCC the report handles each main street individually in the area by brief description of its technical condition followed by a list of materials needed for each street to enhance its functionality.

1.e) PTRO (N.D.) considers the condition of parking in Cairo in general and in service areas specifically. On-street parking, which reduces the street capacity, is one of the negative aspects of current parking regulations. The multiple rounds that drivers do to find a place to park in, according to current system, is another problem that results in waste of time, increase in traffic volumes on the network and, in some cases, accidents. Also some individuals take advantage of the lack of an adequate parking system and gain a huge income by organising them personally, which otherwise would be a revenue source to the Governorate if this was run by the council.

Many reasons are offered for the current parking problem. The first is the state's attitude towards the open-door policies (economic liberation) and the massive construction works achieved since the mid seventies; the second is the absence of parking place standards in public projects. The third is the centralisation and accumulation of services in without considering the consequent demand in parking (for instance there are 28 governmental service institutions in Abbasiah Square). The fourth's the overestimation of parking tariffs in some parking garages which results in their being vacant while the streets around them are highly congested with cars parking on both sides and others looking for a place.

The report suggests that, because of the scale of the problem, a different approach should be used that considers the problem as a general problem affecting all aspects of operation in the

city. Therefore the recommendations the report come up with are: 1) reduce demand on parking in important commercial and service areas; 2) encourage use of public transport by establishing the concept of cancelling unrestricted parking; 3) ensure that the Governorate, instead of other unauthorised groups, benefit from parking income; 4) manage parking time in order to encourage short-term parking; 5) encourage invesment into private sector garages; 6) commit building owners to providing adequate parking places for their own tenants and users; and finally 7) encourage private car owners to park their cars outside the city centre by locating suitable parking places and alternative transport to the heart of CCC.

1.f) GDTR (ND) considers the problems of traffic congestion, transportation saturation and parking in Greater Cairo Region (GCR). As it is a report summary the problems are clearly stated without explanations. Fifty-three recommendations are given to solve the problems in hand under the categories of technical policies, economical policies, social policies, functional policies, regulations, regional and urban planning aspects, behavioural aspects, safety aspects and traffic regulation awareness aspects.

8.3.1.b Findings of the critical analysis of official documents (see Appendix D):

1) It is not clear whether any official document is aimed at co-operating with other institutions. Two thirds of them are not dated, which prevents or discourages further development of the report findings or proposals, and makes it difficult for future referencing.
2) All the reports lack clear citation of the discourses governing the topic.
3) The reports lack clear explanations of the topics considered.
4) The reports lack clear reasoning for their proposals or suggestions.
5) Pedestrian environment and movement receive very little attention in the reports (only two of the six on movement in CCC consider pedestrian movement).
6) None of the reports reject any concepts. However some of them overlook various non-physical aspects such as social, economic and administrative issues.
7) No reports offer any alternative solutions to the only one they are offering.

8.3.2 Research Reports

Research reports are defined here as the documents which are not automatically considered as material for policy documents, instead they tend to work as design guidelines. These guidelines are not obligatory to executive bodies until responsible government authorities adopt them.

There are two types of research documents. The first is contract research or consultancy which is sponsored by the government in order to give guidance on future problems or plans. The second is purely academic research which could be carried out to obtain an academic degree or submitted in academic arenas such as conferences. The distinction between funded research and academic research is usually its relation to policy makers. The following two subsections give a brief description of the two types of research document and a summary of the results of critically testing all of them is included in Appendix D.

8.3.2.a Funded research

Because this kind of document usually includes many volumes and updates, three major groups of documents were found to be relevant to movement in CCC. Two of these groups are the Greater Cairo Region Scheme (GCRS) and the transportation master-plan study done by the Japan International Co-operation Agency (JICA). The third was prepared by the Transportation and Traffic Department of Ain-Shams University. It is a single document which studies the influence of El-Azhar Tunnels on the traffic in the city centre and proposes a new movement plan for the area.

The GCRS group includes three documents: the Master Scheme, 1983, the Homogenous Sector # 1 (which includes CCC), 1988, and the Evaluation of the Scheme and Updating the Proposals, 1991. The JICA group report includes many volumes which are all treated as one document as they represent consecutive research stages. In the following paragraphs a brief citation of the significant recommendations or actions proposed in these reports.

2.a) GOPP *et al.* (1983) considers the huge size of GCR and its recent growth due to the economic changes in the seventies as the major problem. Thereafter, it addresses how to organise the urban agglomeration into a manageable, feasible and workable physical system. As far as CCC is considered four problems are found:

1) Worsening of traffic conditions on all approaches to the Cairo CBD;
2) Destruction, disorganisation and progressive deterioration of the historical centre and of the Nile Banks;
3) Need for new bridges over the Nile. It should indeed be noted that the administrative functions (ministries in particular) are on the right bank and that private offices have developed on the left bank;
4) Expansion of the agglomeration on agricultural areas around Dokki-Mohandessine (Markaz Embaba).

The explanation given for the condition of the Greater Cairo Region is the rapid increase in urbanisation since the second half of the seventies which was followed by more centralisation of services into the city centre. The centralised activities in the CCC were found to be one of four categories: central administration, business and service centres, specialised commercial retailing and finally information, culture and entertainment facilities.

The solution for the GCR was found to be arranged around five urban land-use concepts. However they are out of the main focus of this research, thus they can be breifly cited as: 1) Homogenous Sectors; 2) New settlements; 3) Development corridors; The Urban Region; and 5) Agricultural Areas. On the other hand the solution for the city centre problem had two counterparts. The first was to propose new centres and the second was the deconcentration of the activities located in the current city centre. The new proposed centres were two main centres one in the East and the other to the West of the main agglomeration of the region, then two secondary centres in Helwan and Maadi (see figure 8.3), and finally local centres of each homogenous sector.

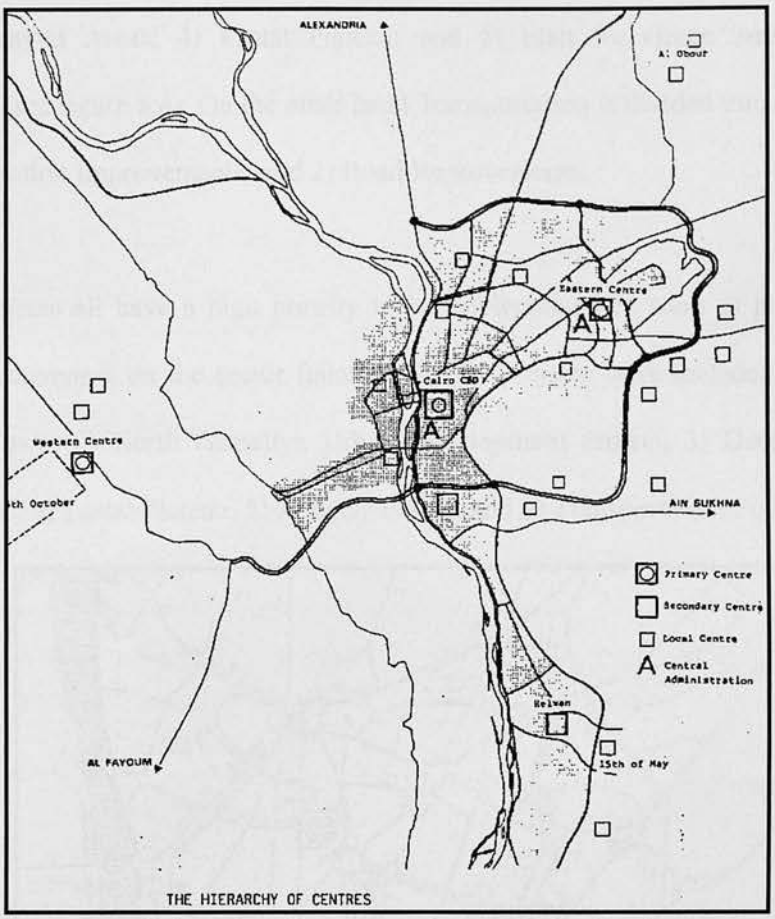


Figure 8.3 – Proposed hierarchy of centres in Greater Cairo Region.
Source: GOPP, 1983: 4-19.

2.b) GOPP (1988) considers the detailed studies and proposals of the Homogenous Sector 'Number 1' which includes CCC and some of its surrounding areas. The Master Scheme gave recommendations for the development of this sector to change it to self-sufficient sector. This study aims at putting these into implementation with various action plans. So the report does not start with a problem, but rather with a proposal. It then moves onto analyse the current situation of the sector to achieve self-sufficiency. The explanation for the proposal is the same as that proposed by the Master Scheme of 1983, which is to reduce trips between different sectors which in taken to result in the reduction of the total trips on the scale of the whole region.

A rehabilitation strategy plan and several action projects are proposed. The rehabilitation includes two major fields of proposal: Urban Planning, and Transportation. Urban Planing is further subdivided into five sections: 1) Structure Plan and Development guidelines for the Old

Islamic Town; 2) North Gamaliya Urban Development; 3) Planning Guidelines for Transition Zone and Decayed Areas; 4) Fustat Plateau; and 5) Plan for Green Areas and Square Developments (see figure 8.4). On the other hand Transportation is divided into two sections: 1) Mass Transportation Improvements; and 2) Road Improvements.

The action projects all have a high priority to be implemented as soon as possible for their significant effectiveness on the sector functioning. Six projects were included in this part: 1) Old Islamic Town; 2) North Gamaliya Urban Development Project; 3) Decayed Areas and Transition Zone; 4) Fustat Plateau; 5) Activity Policy; and 6) Transportation Policy.

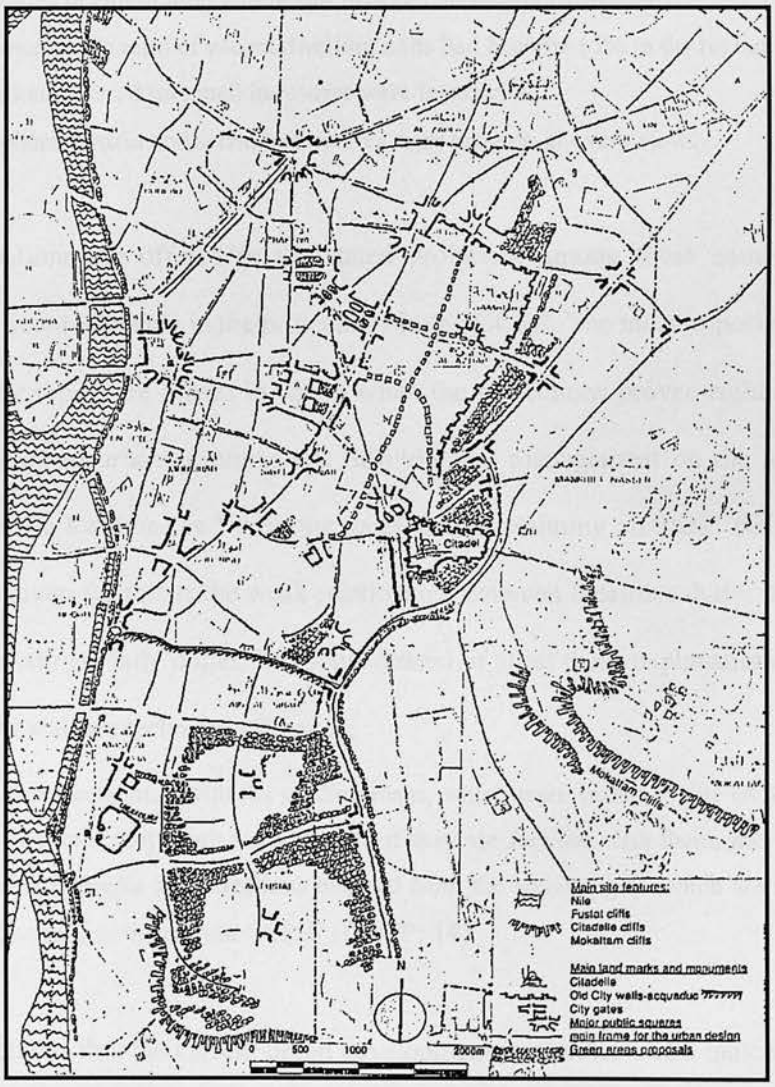


Figure 8.4 – Proposed green areas and squares in homogenous sector number one.

Source: GOPP, 1988: 34.

2.c) GOPP (1991) critically, but briefly, evaluates the achievements that had so far been undertaken in the Greater Cairo Region, and looks at emerging changes in the region to update the planning schemes. The report cites the following problems regarding the misfits of the GCRS or emerging changes in the region causing new problems:

1) The decentralisation strategy of the population, although it had succeeded to a reasonable extent, had worryingly affected the rural areas surrounding the region and caused an unexpected increase in the population on the western bank of the Nile.
2) The homogenous sectors strategy had not yet started, although it was one of the first priorities of the GCRS.
3) The sewage system would become inadequate in the long term.
4) The strategy of local roads network was not progressing as planned, causing difficulties in commuting within and between homogenous sectors.
5) The increase in ratio of vacant dwelling units had become 15% in the region.
6) Locations offered for small industries were insufficient.
7) The planned main and secondary centres were progressing very slowly.

Various explanations are offered to the stated problems, among these being them funding difficulties and misjudgements in the projections in the GCRS. The most important explanations mentioned by the report are acases in which when the projections proved right and plans were suitable are related to urban planning and development management on the local level. The report describes the localities as "suffering weakness in planning abilities" (GOPP 1998: 13). Another reason given for this is the weak relationship between localities duties proposed by the GCRS and their current daily duties. The most crucial of all of these explanations is cited by the report about the localities technical offices as:

> "Most are not acquainted with the guiding plans, which were issued by the GOPP, of the homogenous sector they work for and, even if they are familiar with them, they continue implementing concepts and directions inspired from the sixties plans which are no longer suitable according to the current GCRS" (GOPP: 14).

The report concludes that the current urban development in Greater Cairo matches the strategic recommendations of the GCRS of 1983. The only additional recommendations to the previous one of the GCRS are related to the co-ordination between different organisations and departments involved in development policy making and implementation, and the extra work to

raise the technical qualifications and awareness of the localities to allow planing staff to handle and deal with the new requirements of the scheme.

2.d) JICA (1987-1988) says that one of the main problems in Cairo is traffic congestion. The study considers improvement of transportation facility as its objectives and therefore the following factors in determining this improvement are found problematic:

1) A policy for conversion from individual modes to public transportation.
2) Clarifying the roles of various public transportation modes with a view to transport capacity and economy.
3) A review of what advance investment in infrastructure improvement will be required in order to promote the urban development scheme.
4) A policy for reducing traffic resistance at intermodal points.
5) A policy for large-scale traffic regulations (introduction of area licensing, traffic cells etc.) within CBD.

(JICA, Aug. 1987: p 4)

The problem of traffic congestion is partially referred to network capacity but the main cause is the lack of well-developed traffic management facilities. The study suggests the adaptation of a road-oriented plan. In this plan as many roads as possible are to be developed throughout the whole region. When the city centre area is considered (referred to as 'CORBS' in the study), the report gives guidelines of how to cope with the issues of selected areas as examples for more comprehensive study.

In the short term plan (figure 8.4) the only proposal that considers pedestrian movement is the proposal of a pedestrian bridge, although the reason for this proposal was to prevent pedestrians crossing the street and therefore slowing down the traffic. The more comprehensive long term plan (figure 8.5) gives more care to pedestrian movement. The basis on which the plan was proposed is also adequately presented.

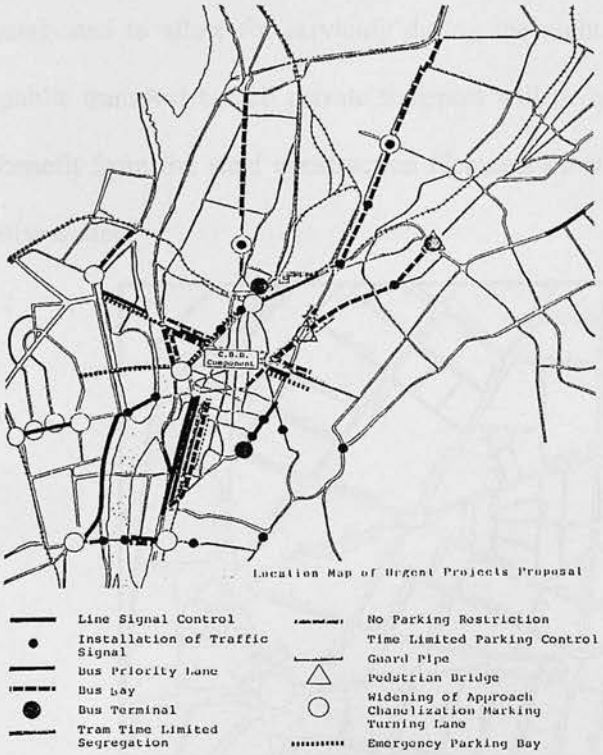


Figure 8.5 – Short-term transportation plan for the CORBS.
Source: JICA, Oct. 1988: 7-9.

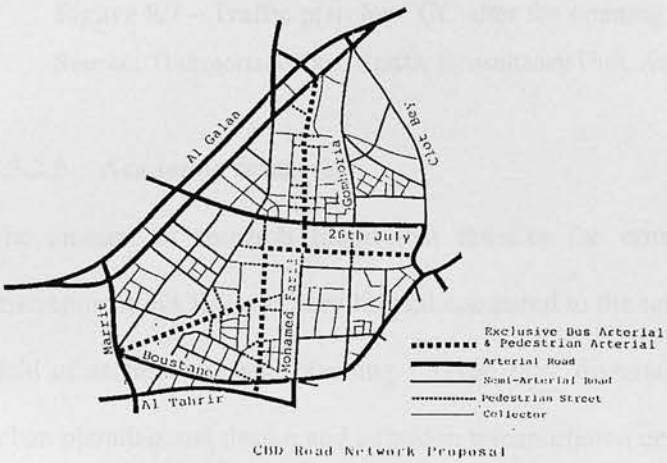


Figure 8.6 – Long-term transportation plan for the city centre area.
Source: JICA, Oct. 1988: 7-42.

2.e) TTCU (1999) aims at minimising the problems which might result from the construction of Al-Azhar tunnels and the partial pedestrianisation of Al-Azhar Street. These problems include a greater traffic flow in the city centre and the reduction of the services available to shops in Al-Azhar Street and its surroundings. The explanation offered is the absence of the traffic lights which used to reduce the traffic coming along the Al-Azhar axis. The problem of servicing for the shops is magnified by the fact that they are wholesale shops.

The report offers various changes in the traffic plan in the city centre area to allow for fast absorption of the expected traffic coming from the tunnels (see figure 8.6). Al-Azhar Street is

suggested to allow for servicing during the night. During the day the street will be open to public transport but all private transport will be restricted. The study extends the proposal to benefit from the steel construction elements of which Al-Azhar Bridge is made. after this is dismantled.

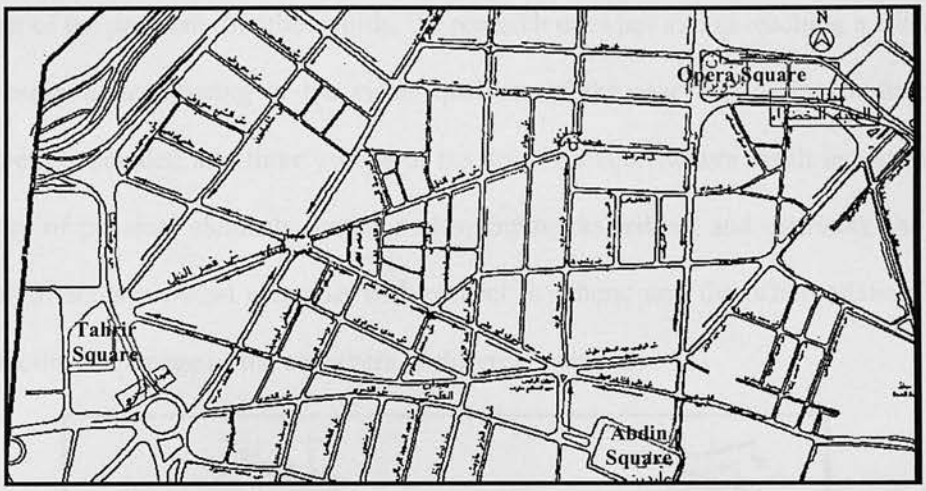


Figure 8.7 – Traffic plan for CCC after the opening of Al-Azhar Tunnels.
Source: Transportation and Traffic Consultancy Unit, Ain Shams University, 1999: 13-27.

8.3.2.b Academic research

The amount of research found that satisfies the criteria of being focused on pedestrian environment in CCC was very limited compared to the total amount of academic research in the field of architecture and planning. Three MSc dissertations were found, two in the field of urban planning and design and a third in transportation engineering. In the following paragraphs a brief citation of their theoretical premises and main recommendations is given.

3.a) Abu-Zekry (1983) defines the problem as the 'negligence' of recent Egyptian researches of visual aspects in favour of the functional ones. However, and because of his adoption of the cognitive mapping technique in exploring into the visual aspects, *imageability* is then considered the most important measure in this research. It is defined according to Lynch as "that quality in a physical object which gives it a high probability of evoking a strong image in any given observer" (Lynch, 1960). The explanation offered by the study for that negligence of the visual aspects is that planners in Egypt consider the visual aspects less important than the functional ones.

The stated objective of carrying out the research is to explore into the visual qualities of the down town of Cairo in the minds of its local residents (see figure 8.7). Thus, Abu-Zekry considers the findings of the exploration as the aim of the study and at the same time as part of the solution of the problem. In other words, the research does not aim at reaching a *solution*, but rather at *better understanding* of the visual qualities of the case study. The findings of the research were concluded into three groups of results: the major factors result in increasing the imageability of physical elements (paths, nodes, landmarks, edges, and districts); the relative importance of some physical elements with respect to others; and the differentiation between factors affecting the image of the observers of different cultures.

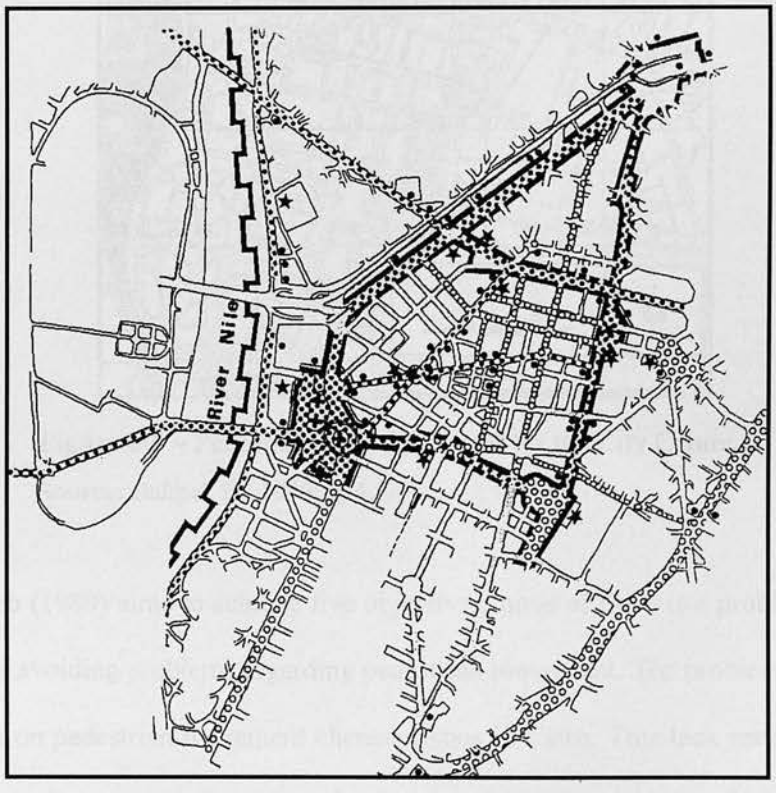


Figure 8.8 – Cognitive image of CCC by a sample of its local residents.
Source: Abu-Zekry, T., 1983: 72.

3.b) Bahgat (1990) adopts the concept of pedestrianisation of city centres which promotes reducing, and sometimes prohibiting, use of vehicles in these areas. Therefore, the problem is defined as finding a pedestrianisation solution for the case study, which is the city centre of Cairo. The explanation for the need to have pedestrian areas is mainly evoked by many reasons

under four main categories: traffic management, economic revitalisation, environmental improvements, and social benefits. The study ends by proposing a pedestrianisation plan of CCC (see figure 8.8). However, the proposal is not supported by enough analysis.

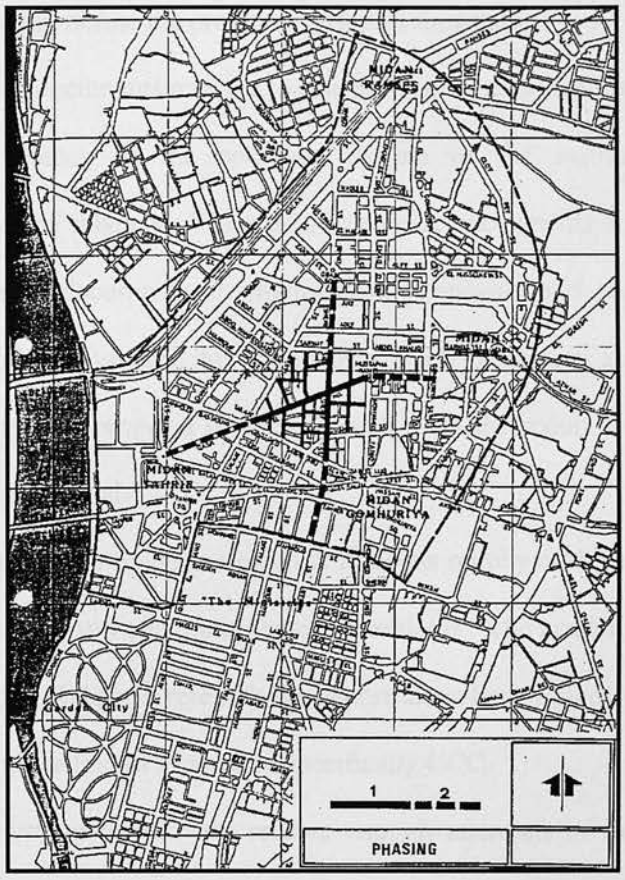


Figure 8.9 – Pedestrianisation proposal for the City Centre.
Source: Bahgat, H., 1990: 254.

3.c) Abu-Taleb (1989) aims to achieve five objectives, none of them is a problem in itself, but rather a way of avoiding problems regarding pedestrian movement. The problem then is the lack of information on pedestrian movement characteristics in Cairo. This lack results in increasing conflicts between pedestrian and vehicular movement, which cause traffic congestion and accidents. Abu-Taleb develops a mathematical model to express pedestrian movement characteristics on pavements with any width and with different land uses along side the roads in Cairo. The identification of pedestrian movement characteristics can enhance the facilities offered to pedestrians

8.3.2.c Findings of the Critical Analysis of Research Reports (see Appendix D):

1) Both funded and academic reports present the important discourses clearly in terms of the criteria governing the topic.
2) Both categories clearly define the problems or topics they tackle.
3) The funded research documents manage to deal with some non-physical explanations. They highlight the deficiency in the operation system of the institutions in charge of implementing planning schemes. The academic research documents do not do this.
4) The funded research documents are focused on *proposals* and *plans* for the physical environment. Academic research documents only reach the state of a *better understanding*. Even when an empirical proposal is offered (such as in the report on pedestrianisation of CCC) the result is not tested.
5) The main drawback of the funded research is its focus on physical problems and proposals at the expense of social and other non-physical problems. The academic research considers social aspects but in Bahgat's research on pedestrianisation, failed to re-contextualise its theory into the local context of Egypt and specifically CCC.
6) The pedestrian environment did not receive enough attention in funded research. The inclusion of the pedestrian environment in all three academic research documents comes as a result of their being directly related to CCC as an area.
7) Among both types of research documents, only the JICA report presents any alternatives to what they are offering as the solution.

8.3.3 Newspaper Reports

In this sub-section all the newspaper reports which consider either the pedestrian environment or the city centre of Cairo are reviewed. All reports have been published since 25/6/98, the data that this research methodology was established, and which were accessible in Edinburgh where the researcher is based, are included in the analysis.

There are three types: 1) reports demonstrating public opinion on a topic selected and managed by the policies of the media; 2) reports demonstrating professional (architectural and planning

related) attitudes towards a public issue or carrying news of new achievements or proposals; 3) reports which include both public and professional points of view. Where the second type is clearly related to the present chapter topic, the first and third are considered from the perspective that the national media adopts government policies and supports them. The support could be either by selecting the subject under investigation or by the way it is presented.

The analysis does not follow the same agenda used in analysing the other three types of documents mentioned earlier in this chapter. It concentrates on four points in each report: the *type* of the document, the *subject* under discussion, an *explanation* of the reason for discussing it and the *message* the reports manage to convey to the reader. The detailed findings of the analysis are listed in Appendix D.

Findings of the Critical Analysis of Newspaper Reports:

1) The distribution of publishing dates of the reports was not affected by seasons, as nine of them were published in winter and ten in summer. But when the reports that directly tackle the pedestrian problem are considered, five were published in summer and two in winter. Even in those two, one tackles the problem of pedestrian crossings for students (which must be in winter) and the other reports the opinion of planning consultants that some previously proposed plans in CCC need further action.
2) When type of report is considered, 3 represent public opinion, 11 represent professional and administrative opinions, and 5 are mixed.
3) The reports reveal some negative observations about the current planning process. One of these observations is the discontinuity of strategic plans prepared by previous management. For instance, it was found that out of the 16 reports involving professionals, 11 were to announce new policies or decisions and only 4 considered previous plans. Even in those four, two contain the requests of private planning consultants for the state to carry out previously planned schemes which, in their opinion, would help to solve a problem.
4) Another observation is the conflict in responsibilities between different organisations, as in the case of the modernisation of CCC squares. One report considered it the responsibility of

the Ministry of Cultural Affairs and another considers it that of the Ministry of Transportation.

5) The behaviour of pedestrians is mentioned as the reason for the problems in five reports. Pedestrian behaviour is described in many reports as 'not capable of following a system'.

8.4 PROFESSIONALS' QUESTIONNAIRE

Three-months were put aside to carry out this questionnaire, including a field trip to Egypt. Surprisingly, during these three months, very few professionals showed an interest in taking part in the questionnaire and only seven finally accepted to do so. Even among the sample many problems occurred[1] making it difficult to objectively analyse the responses. Therefore, the questionnaire findings are considered as a speculative study that give indications of the attitudes and directions of professional's thinking instead of giving a clear statistically valid set of results. The following are the main findings of the subjects' attitudes and opinions.

Findings of the professionals' questionnaire:

1) In way-finding professionals gave equal weight to macro scale designs and micro scale details. Also abstract spatial properties like 'scale' and details like 'building façades' were considered equally important.

2) The criteria considered in the selection of streets to be pedestrianised included two important aspects: low original traffic flow and quantity and quality of commercial activities. The main aim of pedestrianisation was considered to be the provision of safety and freedom for pedestrians.

3) It was clear that professionals consider that non-physical design aspects like 'safety' and 'smooth movement' receive a lot of attention in comparison to physical aspects like the 'condition of pavements'.

4) When factors affecting pedestrian movement in general are considered, the ratio between

1 Within the sample three refused to make it in the form of interview, referring this to the greater flexibility they would have in managing time available to complete written questions. Others divided the interview into many sessions which they could not complete because of lack of time.

physical to non-physical factors is 2:1 with higher ratio for the physical.

5) Despite the importance assigned to non-physical factors and aspects in the case study, professionals say that they will make more physical than non-physical changes if they have the choice.

6) Professionals describe users' opinions as 'important' in all stages of the planning process.

7) Professionals thought that users' opinions are represented to a high degree in their responses.

8.5 SUMMARY OF FINDINGS

Reviewing the planning reports and other research documents has shown that they cover a wide range of proposals and consider many aspects of the built environment. Among these, traffic is the most important aspect that is considered in CCC. Social and human aspects are generally marginalised in official reports and funded research reports. The pedestrian environment is dealt with in many cases as a by-product of other movement and urban functions. Even when they are considered not enough effort is paid to investigate the users needs and the proposals are usually rushed out.

Findings from various parts of the document analysis confirm some serious concerns with the planning system for the pedestrian environment in CCC. For instance, lack of co-ordination between various institutions and conflict of responsibilities between these institutions. The analysis stage in official reports was found to be in most cases insufficient. Newspaper reports are more focused on the physical than the behavioural environment. The media gives more attention to government achievements than the problems of the pedestrian.

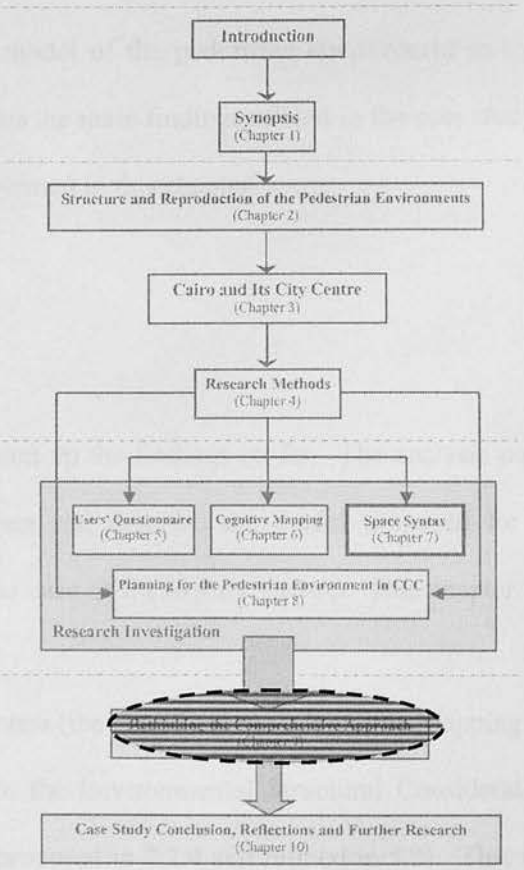
Professionals tended to support more physical changes in the environment. Professionals think that user participation in various stages of decision making is important, however they believe that the professionals' opinions coincide with the opinions of the users to a great extent.

Part Four

CONCLUSION

Chapter Nine

RETHINKING THE COMPREHENSIVE APPROACH



INTRODUCTION

This chapter is the keystone of the analysis stage. It is the first of the two closing chapters which narrow down the discussion in order to reach the final stage of this research. Up to this point, there are three parts, The first part widened the scope from the initial problem statement up to the research methodology. The second part narrowed the discussion down by focusing on the case study background from the pedestrian environment in general, through to Cairo and its city centre. Finally there was a review of the literature on selected research methods. The third part expanded the scope again with the empirical work, which was divided into four chapters each of them investigating one the four modes of interaction defined in the first part of the thesis. Each one of these chapters considers its main specialisation and those of the other chapters. The third part generated results reflecting on many different aspects and areas of interest.

At this point in the research, the match or mismatch of findings has not been discussed. A process, which brings these findings together into one comprehensive whole, is necessary to test the research hypothesis and to reconstruct the model of the pedestrian environment in Cairo City Centre. This process also prepares to discuss the main findings related to the case study in more details in Chapter Ten. This process is presented in this chapter.

9.1 METHODOLOGY

Association analysis is used in this chapter to sum up the findings so far. The analysis points out the contradictions and prepares to construct and describe the model proposed for the pedestrian environment in 1.2.3 according to the case of Cairo City Centre. This chapter will achieve that in three stages:

1) The findings of the first three empirical chapters (the Questionnaire, Cognitive Mapping and Space Syntax) are reorganised according to the Environmental Structural Considerations (ESC) of the pedestrian environment (first proposed in 2.2.4 and refined in 5.3). This is to

establish the major considerations in the structure of the pedestrian environment in CCC according to the findings of the current research.

2) The types of actions associated with the major considerations in point 1 are then compared with the Environmental Reproduction Actions (ERA) (first proposed in 2.4 and refined in 5.3) which are taken from the fourth empirical chapter (Planning for Pedestrians in the City Centre of Cairo). Comparing the ERA against the ESC tests the research hypothesis.

3) An account of the relationships of the various components of the pedestrian environment model in CCC is developed, by combining the findings from points 1 and 2, together with reflections from Part Two of the thesis.

9.2 ENVIRONMENTAL STRUCTURAL CONSIDERATIONS (ESC) OF THE PEDESTRIAN ENVIRONMENT IN CCC

The three areas of investigation involved in this section are: the relationships within the *social grouping*, tested by the users' questionnaire; the relationships within the *built environment*, tested by Space Syntax; and the relationships between the *social grouping and the built environment*, tested by cognitive mapping. In order for the relationships to be integrated, they should be laid down on the same scale or reference. This is the categorisation of environmental resources (detailed in table 5.1). Categories that have been raised more frequently in the findings are discussed more extensively.

9.2.1 Built Environment Considerations

In users' questionnaire, functional aspects (way-finding tasks, design aspects and desired changes) were dominated by built environment considerations. Other aspects, which are partially functional and partially operational (such as difficulties facing pedestrians and factors affecting pedestrian movement in CCC), were evenly distributed between the built environment and social-grouping considerations.

Space Syntax objectively revealed most of the abstract built environment considerations. It also revealed a few other operational considerations, which are subject to interpretation. However, the investigation did not manage to gain any insight into considerations related to association with the environment.

Cognitive mapping showed the built environment considerations as secondary determinants of the verbal image at the scale of CCC. At the scale of Cairo a balance was demonstrated between built environment and non-physical considerations, with the incidence of built environment aspects only slightly higher than non-physical ones.

9.2.1.a Configuration Considerations

Space Syntax is the main method that investigated these considerations. That was supported subjectively by Cognitive Mapping and the Questionnaire especially on the detailed level.

9.2.1.a .1 Geographical Location

Very little of significance was found in Cognitive mapping which is related Geographical location. It was also hardly mentioned in the users' questionnaire apart from one incident when the subjects where asked about their desired changes in CCC, 10% of the responses were mostly about relocating governmental and central government institutions outside CCC.

In Space Syntax, the geographical location was the most important consideration of all. Most of the findings related to the spatial relationships. The analysis paid specific attention to the location of CCC within Cairo. It was found that CCC is well located and accessible from all over the city. Cairo was found to be divided into several spatially defined districts. Ramsis Street was identified by the analysis not only as the main street in the city but also the only direct lateral route. On the scale of CCC, the analysis selected all the important streets in the area.

9.2.1.a 2 Spatial Relationships

It was addressed by the subjective testing of Space Syntax in the users' questionnaire. The responses suggested some subjective reasons for the correlation between the method and the real behaviour. The most important reasons are *timesaving, ease* and *safety*. It further suggested an association between certain social groups and certain environmental decisions, such as the tendency of males, young people, architects and people familiar with the setting to select short routes with many changes in direction over longer routes with fewer changes in direction.

The spatial relationships were the main aspect around which all findings pivoted in Space Syntax. Some findings, such as the existence of enclosed pockets near the centre, reflect directly on spatial relationships either because of manmade features like Al-Sharrabia area or because of natural features like Al-Mokattam hill. Also the spatial configuration of Cairo was found to be divided into individual districts, which are linked and, at the same time, separated by movement arteries. The MAM of CCC raised the importance of dense and short length blocks by being more locally integrated. Also the analysis suggested an extension of CCC to the North East as this is where the global integration extends.

Respondents recognise CCC as found in cognitive mapping as being composed of interrelated elements, and their cognition is enhanced by the fact that CCC accommodates most of the central services and institutions, which forces most of the population to visit it frequently.

9.2.1.a .3 Scope

There were no issues of significance. It is quite surprising for investigations into a city which accommodates the River Nile not to show any sign of its magnificent views.

9.2.1.a.4 Associated features

Associated features were raised twice as an important factor in the users' questionnaire, once as the second reason behind place preference (after functional reasons) and once with regard to

pedestrianisation experiences. The success of pedestrianisation plans was found to be highly dependent on the association of features like retail and food courts than on any other factor.

Space Syntax confirmed, to a certain extent, the association of retail and service centres with the most integrated streets. It further established the relationship between segregated areas and the edge of the system or with movement barriers whether natural or manmade.

The nodes in the respondents cognitive maps were found to be significant becasue of being associated with movement interchange points like Tahrir, Ramsis and Ataba squares.

9.2.1.a .5 Signs and Markers

This was only raised as an important aspect in the users' questionnaire. Respondents referred to the absence of signs and markers as an important reason for losing their way. Enhancing the signage and marking system of the area was mentioned as one of the most important changes, which are needed in CCC.

9.2.1.b Description Considerations

Description considerations were examined primarily through Cognitive Mapping. However, users' questionnaire gave an insight into some detailed aspects, especially when the reasoning for the response was analysed. Space Syntax was more speculative than objective in this category because it relied on previously established associations between the spatial configuration and social phenomena.

9.2.1.b .1 Size

All three areas of investigation demonstrated the importance of environmental scale. So in users' questionnaire, the narrowness of streets was mentioned as a reason for becoming lost in urban settings. Respondents mentioned the width of the pavement and the street as one of the main design aspects that they wanted the urban designer to take in consideration when planning for pedestrians.

The consideration of size was raised many times in relation to several concepts in Space Syntax. The size or length of streets coincided with significantly high integration in the system. Using short block lengths is important in planning service centres, like the case of Bab El-Louque area. The size of the area under consideration significantly affected the type of results. In large-scale environments, such as Cairo, global integration selected the most integrated streets while local integration identified sub-centres. At the scale of CCC, global integration identified the most integrated streets, but local integration did not reveal new information.

The role that the size plays in environmental cognition was revealed by some observations in the cognitive mapping analysis. For instance, whereas a large-scale environment such as Cairo was recognised as a collection of spatially structured abstract elements such as *areas* and *edges*, a small-scale environment such as CCC was recognised as a composition of sequentially structured detailed elements such as *paths*, *nodes* and *landmarks*. The increase in the size of the environment means an increase in the available amount of elements to be perceived and then recognised, which results in two differences between the small-scale and large-scale environments. First, the agreement ratio of recognised elements is higher in small-scale environments, and second, the variance in the structuring methods used to reconstruct the image tends to be more varied in large-scale environments.

9.2.1.b .2 Design and Character

They are hardly mentioned in the responses of the users in their questionnaire. They were referred to when views were expressed about the conservation of the old character of CCC. Space Syntax, and because of the two-dimensional, abstract level of Space Syntax, aspects relating to design and character were scarcely mentioned. Also in cognitive mapping design and character were found to have little significance.

9.2.1.b .3 Shape, Pattern and Form

This was mentioned occasionally in the *difficulties* facing pedestrians and *desired changes* in CCC according to the users' questionnaire. The significance becomes clear when considering the reasons behind way-finding problems, as it was the major reason and accounted for a third of the reasons for people losing their way.

The properties that different urban patterns impose on spatial relationships were clearly represented in Space Syntax analysis. A main street dominating the urban pattern with many junctions, such as Shubra Street and Toman Bai Street, becomes a strong local integrator, or service and retail centre. Where the natural geometry of an urban grid is artificially interrupted, there are discrepancies in the way the analysis represents the spatial structure, the acute bend of Ramsis Street just before El-Abbasiah Square. An organic and irregular urban pattern, which is not integrated globally with the rest of the city, creates an isolated island which eventually becomes a deep subsystems even if it is geometrically central, as happens in Fatimid Cairo. Despite Nasr City was planned on an orthogonal grid bases, but the design of the internal streets which does not respect the accessibility of the grid resulted in low integration values. Garden City being the most problematic area in way-finding because of is complex urban pattern, as found from the investigation of the relationships into the non-physical environment, was also confirmed in this area of investigation. Finally, concentric and radial patterns are the most successful in producing globally and locally accessible urban patterns, such as the cases of Heliopolis and CCC. Overall, despite the integration of individual urban districts in Cairo being found to be adequate, the spatial system of Cairo as a whole suffered from weak interrelationships between its composite districts.

In cognitive mapping, *shape, pattern and form* was found to be a key group of reasons for CCC maintaining its significance on the global scale of Cairo. The clear road pattern, which offers varieties in shapes of spaces with an overall attractive design unity, allows most Cairens to perceive and navigate the area easily. The high agreement ratio of the selected elements and the

degree of detail used in describing the area support the notion of CCC being easy to perceive and cognise in a uniform and consistent way.

9.2.1.b .4 Construction Materials

The aspect of *construction materials* was raised in the users' questionnaire only once. It came after *size,* in design aspects to be taken in consideration when designing for pedestrians and it refers to aspects of durability and suitability. Neither Space Syntax nor cognitive mapping has raised any aspects related to *construction materials*.

9.2.1.b .5 Condition and Upkeep

This was not raised as an important aspect in the users' questionnaire and was only mentioned once in relation to factors affecting pedestrian movement. It came in fourth place after *management system tools, congestion* and *atmosphere*. Nothing significant was found in either Space Syntax or cognitive mapping which is related to condition and upkeep.

9.2.1.b .6 General Visual Appearance

Considerations of *general visual appearance* were not raised in the users' questionnaire. That might be due to the respondents' ability to specify the exact significant visual feature like the design and character or the respondents being more ready to discuss the micro rather than the macro properties of the environment. Again, because of the focus of Space Syntax being on the spatial configuration the considerations of general visual appearance was not raised.

Many considerations related to *general visual appearance* were highlighted by cognitive mapping. It pointed to CCC being more legible on its micro, immediate, sensory level than on its macro, overall, sensory level. It also drew attention to the importance of the clear road pattern that CCC enjoys and which causes the area to be recognised as a network of roads, starting or meeting at movement nodes and further articulated by some landmarks. However, it also associated *general visual appearance* more with landmarks than any other physical element. People's difficulties in discussing the macro properties of the environment was further

confirmed in this investigation by the dominance of the sequential structuring patterns of sketch maps over the spatial structuring patterns.

9.2.1.b .7 Management System Tools

The users' questionnaire was the reason for introducing the category of *Management System Tools* which was not part of the original list (see 2.2.4) and was added in the refined list (table 5.1). It was the most significant category in the responses to the question on factors affecting pedestrian movement.

The decrease of the integration value of Ramsis street at Ghamra, according to Space Syntax analysis, where it is divided from one two-way path into two one-way paths, shows how spatial configuration is related to physical considerations of management. The investigation raised the need for specific management rules in problem areas which are having centralisation problems, such as Ramsis Street and Al-Azhar Street. It also points to some internal routes in the urban fabric of districts which might be used as strong alternatives to existing overloaded streets, such as El-Skakeny street. The analysis of the MAM highlighted the active intersections of the spatial system.

Cognitive mapping raised the transport interchange points as being the most important nodes in the area. These points were represented in some cases as a base point for all the spatial representation. Changing the management system could eventually affect the mental image and increase the way-finding problem until new mental maps are established. It was found that individuals with backgrounds in planning or architecture had more awareness of the aspects related to management systems in this area of investigation.

9.2.2 Social-grouping Considerations

In the users' questionnaire, aspects of preference, either of Cairo or of places in CCC, and aspects of attitudes (like the respondents' opinions of the pedestrianisation experiments) were all dominated by considerations of operation and association, i.e. those related to social-

grouping. On the other hand, questions that addressed aspects that are both functional and operational were shared between social-grouping and built environment considerations.

Space Syntax managed to reflect on many social-grouping considerations, however these should be seen as proposals and not definite relationships.

Cognitive mapping revealed the social-grouping considerations as the major determinant of the relationships at the scale of CCC. At the scale of Cairo a balance was demonstrated between the social-grouping and built environment considerations, with the latter slightly more frequent.

9.2.2.a Operation Considerations

Operation Considerations are mainly investigated in the users' questionnaire. Space Symtax was more associative, according to links established between the operational observations from previous research and their objective findings. Finally, *operation considerations* was the dominant category in cognitive mapping at the scale of CCC. This last observation might indicate the importance of the operational and functional aspects above visual aspects although cognitive mapping was criticised as being very objective and orientated towards the physical environment (Gulick, 1963). At the scale of Cairo *operation considerations* were equal with *configuration considerations in significance.*

9.2.2.a.1 Economic

These were raised in response to two questions in the users' questionnaire. First, people tend to shop in CCC because of the price of goods and the cost of travel. Second, shop-owners were against more pedestrianisation projects because of their concerns about financial loss as a result of the change. The Cognitive map did not raise any aspects that are related to *economic* factors.

Space Syntax raised *economic* aspects as a result of the method's association between well integrated areas and their potential value due to their suitability for retail facilities. It pointed to some areas which should have high land values (because of being highly integrated), but the

field observations indicate otherwise. It also raised the problem of central areas which should be integrated with the rest of the urban form to raise their value like El-Sharrabia.

9.2.2.a.2 Political and Social

From the users' questionnaire, social class was found to be associated with certain attitudes and opinions. The higher the social class the more representatives tend to develop a negative opinion about Cairo and CCC; tend to shop much less in CCC; tend to reject pedestrianisation projects. Political aspects were very rarely mentioned.

Space Syntax managed to reveal many *social and political* aspects. These aspects include the influence of political forces on the urban form such as the case of Mohamed Ali Street and the segregation of Fatimid Cairo from the rest of the city. Differences in the origin of various districts in the city were significant in their different spatial configurations. Various integration radii revealed whether social aggregation is locally or globally generated.

The influence of the media and a common culture raised elements in the cognitive map which are widely known more than others which are more frequently used. Social background was found to be important in the way people see the environment, for example, the difference between the image of respondents with architecture and planning backgrounds to that of respondents from other backgrounds.

9.2.2.a.3 Religious and ethnic

Aspects related to *religious and ethnic* factors of the environment revealed little of significance in all areas of the investigation.

9.2.2.a.4 Historical

Only Space Syntax showed the *historical* aspects of the environment as having any significance. It showed how a historical sequence of scattered developments results in a whole that is not efficiently interrelated or actively interacting. Thus, it raises the importance of historical links

between past, present and future urban structures and that might suggest increasing the integration of various parts of the city to produce a more comprehensively interrelated whole.

9.2.2.a.5 Functional

Aspects related to *functional* properties of the environment were significantly raised in many instances in the users' questionnaire. It dominated the reasons for place preference. Also it dominated respondents reasoning for route choice in Space Syntax subjective testing, by reasons *of timesaving*. Respondents also referred to functional aspects as the main reason for the success of El-Alfy pedestrian area. Many responses mentioned the need to remove central government functions from CCC as a high priority for change.

In Space Syntax analysis, the functional aspects of many spaces in the city were examined against their spatial configuration. The spatial appropriateness of the location and nature of some existing functions were confirmed and others were not. The analysis also describes the gap in integration of urban areas that is caused by the military areas that were once located on the outskirts of Cairo, and are now in the heart of it.

Functional aspects played an important role in giving CCC its image, according to cognitive mapping analysis, over any visual aspect but with a different degree for each one of the elements of the image. Functional aspects in streets are complex and occur on many levels. The function of the street itself, as a movement channel, enhances the imageability of the street if it has a *prime location* and has the *complexity of functions* that the street accommodates. The location of semi-public and semi-private functions between CCC and the River Nile appears to have weakened the relationship between the two areas, which might explain why the River Nile was included in very few mental images of CCC despite its geographical closeness.

9.2.2.a.6 Convenience and Welfare

Convenience and welfare was one of the most frequently raised aspects in the users' questionnaire. From the subjective test of Space Syntax, aspects related to *ease* and *safety* were

major factors in route choice. In the evaluation of factors from the literature, safety, security and protection were most significant. It was also a main factor in the success of pedestrianisation, especially in El-Shawarby area. Respondents also recommended many design aspects to be taken in consideration, which are related to the convenience and welfare of the user.

Some issues related to *convenience and welfare* could be taken as a second order results of the spatial analysis of Space Syntax. For example, the segregated areas like El-Mokattam Hill and El-Sharrabia, require a certain security policy to maintain safety and protection. Pedestrian safety is also raised with regard to crossing city-highways and integrated streets in general, especially those with considerable distance between traffic signals such as Salah Salem Street.

Convenience and welfare issues were found to be one of the main imageability components of *activities* and *aspects* mentioned as part of the verbal cognitive image of CCC.

9.2.2.a.7 General significance

The *general significance* of Cairo was a major reason for the respondents living in it in preference to other places as they mentioned in their questionnaire. The *general significance* of many new shopping centres in the peripheral areas has negatively affected the role of CCC as a major shopping area.

In Space Syntax terms, the concepts of *attractors* and *multiplier effect* suggested by Hillier *et al.* (1993) represent, to a certain extent, aspects of *general significance* as defined in this research. Therefore these aspects could be deduced from the analysis of Space Syntax as a second order finding. For instance, Space Syntax analysis identifies a location as being of high potential for a certain function, consequently this function will work as an attractor to similar and integrating functions. The location will then start to gain more importance because of the located functions far beyond its spatial configuration values. Thus, it is possible to suggest that the investigation

using all models available (CAM/MAM/SIM) identified places in Cairo and CCC with general significance which could be used in directing future plans.

Cognitive mapping raised the significance of movement interchange points as major reference points in the mental structure that people have for the environment. It was found also that the general significance of some elements over others is dependent on the total amount of elements available (difference between Cairo and CCC); the method that is used to recall these elements (difference between verbal and sketch maps); and the size of the generally significant elements is relative to the total size of the environment (between Cairo and CCC). A comparison between the current research and Abu-Zekry's study (1983) suggests that the general significance of functional elements is more consistent than that of the purely visual elements.

9.2.2.a.8 Congestion

Congestion was not included in the original list of resources of the environment (see 2.2.4) and was added in the refined list (see 5.3). It was strongly and consistently found in the findings to the extent that including it within any other category would have omitted its significance.

Congestion was raised many times as a major concern in the users' questionnaire. It was first mentioned as the major reason for people wanting to live outside Cairo and one of the reasons why some of the respondents shop less in CCC than before. It was the second major factor affecting pedestrian movement, after *management system tools*. Congestion appears to increase the way-finding problem. Responses about the difficulties, which pedestrians are currently facing in CCC, raised congestion as the most important, more than 33% of the total.

On the other hand, non of the other two research methods, Space Syntax and cognitive mapping, has revealed significant reflection on aspects of congestion.

9.2.2.b Association Considerations

In the users' questionnaire, it was the dominant aspect related to preference for living in Cairo.

Space Syntax did not raise any aspects related to *association* because the objective nature of this area of investigation made it impossible to reflect on subjective aspects of the environment such as association. Association aspects also were the last of those raised by cognitive mapping.

9.2.2.b .1 Atmosphere

Aspects related to atmosphere were not found to have significant importance in the users' questionnaire or Space Syntax analysis.

On the other hand, cognitive mapping revealed aspects related to *atmosphere* of the environment as a secondary component of imageability (fourth place after *functional, associated features,* and *political and social*). However, the majority of the elements which were mentioned were either *activities* or *aspects*, in other words they were mainly linked to non-physical elements.

9.2.2.b .2 Familiarity

It was clear from the users' questionnaire that aspects related to *familiarity* were one of the two main reasons why Cairens do not want to live elsewhere, and the other was *affinity*. *Familiarity* plays a key role in wayfinding tasks as subjects who are familiar with the area said that they would chose shorter routes even if they have many changes in direction. As subjects' familiarity with CCC increases, the reasons for place preferences tend to be more subjective and related to non-physical reasons. On the other hand, they tend suggest more detailed physical aspects in response to what should be considered in design.

The familiarity with CCC produced near to geo-physical cognitive maps. It also showed that users do not become familiar with all physical elements to the same extent. They become familiar with functional elements more than purely visual ones, which was reflected on the agreement ratio of each element. The influence of the media and public culture on the extent to which people are familiar with various elements was apparent.

9.2.2.b .3 Affinity

In users' questionnaire, *affinity* was the main reason for respondents' positive feeling for Cairo, accounting for about half the reasons mentioned. It was raised also as an important reason for place preference in CCC, respondents preferred places that they have an emotional bond with, yet it was in the third place after *functional* and *associated features*. Some differences appeared in the association analysis, which could only be associated with affinity aspects like the tendency of females to go for the safer option more than males do, such as choosing the longer route with few changes in direction and supporting pedestrianisation projects. The tendency of younger age group to explore the urban environment rather than selecting the more direct routes.

The cognitive mapping emphasised the role of *affinity* as being a personal factor rather than shared among the population. This was deduced from the finding that although *affinity* played a marginal role in the cognitive map of CCC, it played a major role in the cognitive map of Cairo as respondents started to select scattered elements close to their place of residence or work. The agreement ratio was significantly low.

9.3 DOES THE ERA RESPOND TO THE ESC?

The Environmental Reproduction Actions (ERA) of the planning system was found to cover a wide range of actions and to reflect on many Environmental Structure Considerations (ESC). However, a comparison reveals some discrepancies. This section highlights points where the ERA fails to meet the ESC and where they are significantly compatible.

In general, the pedestrian environment was found to have received little attention in the ERA compared to that for other modes of transportation. In some cases it was even considered as a by-product of the vehicular environment. The priority was to solve vehicular movement problems and then, if some budget and will remained, pedestrians would receive some attention. Planning reports were found to be recommending various types of reproduction actions. This

section discusses these actions and their relative importance in the current reproduction system. They are also discussed against the ESC.

9.3.1 Physical Actions

9.3.1.a Planning

The planning actions ranged from specified actions, such as developing a new movement axis, to general complex actions, such as reducing traffic. The more general actions were found in the funded research reports and the more specific actions were found in the state official reports. Academic reports did not include many planning actions; when they did, these were not justified. The professionals' questionnaire generated few planning actions.

When the results of the ESC are compared with the planning actions recommended in the reproduction analysis (ERA), the following associations were made:

1) Increasing the integration of areas like Fatimid Cairo and El-Sharrabia with the rest of the city, especially CCC, was not directly considered in the planning process. However some planning actions aiming at other objectives might help in solving the problem of Fatimid Cairo.
2) Extending the city centre towards the Northeast, which was recommended by the spatial analysis of Cairo, was not proposed in any planning report.
3) The spatial analysis established the need to increase the interaction between different parts of the city. This contradicts the recommendation of the 1983 Master Scheme of Greater Cairo Region (GOPP *et al.*, 1983) to increase the independence of each sector. However, interaction was found to be important in later planning reports.
4) The location of centres was discussed functionally in the planning reports but was not analysed syntactically or metrically. For example, the importance of block length in the planning of urban centres was highlighted in the ESC (centres tend to be made up of the shortest block lengths in the area), while it was a notional aspect in the ERA.
5) Both the ESC and ERA raised the need for the relocation of government services away from CCC. It was raised in ERA in the professionals' questionnaire and not in the

planning reports, which might indicate some political or financial reasons.

6) The relationship between urban pattern and spatial behaviour (like way-finding) was raised in the ESC. Planning was the most important category affecting way-finding. Actions attempting to solve the problem of way finding in urban patterns, such as Garden City, were not included in any planning report.

7) Successful urban patterns, revealed in the ESC, like CCC and Heliopolis, were not replicated in new extensions. The orthogonal grid pattern with the internal looping system, like Nasr City, which was not preferred in the ESC, is the favoured pattern for future plans.

8) The ESC and ERA pointed to the need for more East-West routes to support the very few routes currently available (Ramsis Street and El-Azhar Street).

9) The ESC produced some routes like El-Skakeny Street, which hold the potential to help with the pressure on the current road network in central Cairo, not considered in the ERA.

10) The relationship between the higher social class groups and the desire to live on the outskirts of the city was raised in the ESC and was met in the ERA with the construction of new suburbs that provide the desired standard.

11) The spatial continuity of urban patterns was raised as an important aspect in the ESC, but it was not considered in the ERA.

12) The ESC established a relationship between *prime location* and *complexity of functions*. This relationship is crucial for planning central areas. The ERA on the other hand, tended to adopt a zoning policy which dedicates zones to each function for easier management.

13) The ESC recommended the use of functional cues rather than visual cues for way-finding support, in contradiction to the ERA's recommendations.

14) Congestion in CCC and in Cairo, was found to be a major problem in both the ESC and ERA. It was seen in the ESC as the illness, unlike the ERA that saw it as a symptom.

15) The *atmosphere* of the environment was dealt with in the ERA from the designer's point of view; the user was not consulted.

16) The study of the users' *familiarity* with the environment in the ESC confirms an important notion of planners and designers. It suggests that users, when faced with a new

environment, tend to establish links with the physical aspects until they become familiar with them, after which they tend to establish links with the non-physical aspects, like uses and social meanings. This argument differentiates between distinguished aspects by the local population and those distinguished by the visitors or strangers.

17) *Affinity* was found in the ESC as the most difficult consideration that designers and planners have to deal with in Cairo. It was the most important reason for the Cairens' preference not to move outside Cairo, which is clearly not in the hands of the designer and planner, and which can explain many of the vacant new towns. It is even more complex because of its individual nature, individuals tend to have different personal things that they have affinity for. Nevertheless, the investigation into the role *affinity* plays highlighted the variance in the considerations of different social groups according to their social class, gender and age. The current ERA does not seem to take that into account in many of its actions.

9.3.2.b Urban design

This was the most frequently mentioned category of the ERA. Almost all the research reports include some kind of urban design actions. They range from huge new constructions, like the underground garage and commercial mall in El-Tahrir Square, to small interventions like road painting and litter bins. The large scale actions were proposed by the funded research reports, whereas the state official reports included the small scale and supplementary actions. Academic reports gave more attention to urban design than they gave to planning actions. Professionals' questionnaires raised more urban design actions than planning actions.

When the results of the ESC are compared to the urban design actions recommended in the reproduction analysis (ERA), the following associations were made:

1) The need to use clear and consistent signage was raised in the ESC as important in helping way-finding. Although it was raised in some reports in the ERA, it was found to be lacking consistency (using various signage systems) and in some cases the information included was not helpful.

2) The considerations related to size highlight the need for many urban design actions. For instance, the adequate width of streets was found important not only to meet movement demand, but also to increase the legibility of the overall environment, thus easing the way-finding task. In the ERA, the planned width of streets is proportionate to movement flow, and even so when the use of street is mixed, the demand for vehicular movement was the main concern. The neglect of consideration for pedestrian movement in urban design in CCC was confirmed by the dominance of the 'width of the pavement' over all other design aspects that the respondents thought of as important.

3) The size of environmental cues was found in the ESC to be proportional to the size of the environment. For instance architectural details are important on the scale of individual buildings, whereas architectural character is important on the scale of different areas. Considerations of size were found important in helping with way-finding through the gradual distinction of facades from individual buildings – individual streets – individual areas etc. This was not considered as an issue in the ERA.

4) Aspects of design and character were not of significant importance in the ESC. On the other hand, it was a major concern of the ERA mainly with respect to conserving the old architectural character of CCC, which was only mentioned peripherally in the ESC.

5) Construction materials were raised in the ESC as important for pedestrian movement. Respondents complained about the construction materials of the pavements as being sometimes unsuitable or for the diversity of the materials used, which interrupts the visual unity of an area. The ERA gave little consideration to construction materials.

6) The ESC found that increasing the number of significant elements might distract the user and fragment the image of the urban area.

7) Movement interchange points, such as bus terminals and railway stations, were important reference points in the ESC. The ERA also paid a lot of attention to these points and many actions were taken there, such as the replanning of El-Tahrir, Ataba, Opera and Ramsis Squares.

8) Pedestrianising more streets in CCC has been rejected because of shop-owners being anxious about financial losses. There are many systems for dealing with this problem

which should be considered by future pedestrianisation schemes.

9) The ESC raised the fact that certain social groups have different attitudes towards aspects of design and landscape. Higher social classes tend to reject pedestrianisation projects, while lower classes see pedestrianised areas as gathering places. The ESC should take into consideration the targeted social class in planning public areas as well as the local Egyptian culture. The ERA tends to blame the users for not using properly what is offered in these areas.

10) The spatial analysis in the ESC has identified catchment areas for urban centres. The target groups would be the inhabitants and users of these areas. In the current ERA this kind of result is speculative. It is based on previous experience rather than on comprehensive analysis, which takes into account the interrelationship of various parts of the city. If such an investigation had taken place, it is unlikely that a regional centre would have been located in an area with local catchment influence such as El-Ma'adi.

11) Functional considerations dominated almost all other considerations in the ESC.

12) The ESC recommends that some urban design actions should be considered to compensate for the segregation between the CCC and the River Nile. The current ERA seems to be considering each area as separate from the other and does not suggest any integration.

13) The ESC recommends the mixed use approach for central areas but, this is not considered in the current ERA in CCC or in Egypt in general.

14) The influence of congestion on the operation of CCC and Cairo as a whole, suggests that the main objective of design on any level should be to solve the factors causing congestion. The ERA handles the aspect of congestion on a macro scale represented in movement flows in different streets and areas. Detailed urban design and landscape do not consider easing and smoothing the movement of pedestrian. The main consideration for detail design is visual not functional.

15) The difficulties facing pedestrians in CCC are related to traffic signs and pedestrian crossing facilities. These also appeared as the respondents' most desired changes in CCC. The ERA showed some attention to these considerations but the main concern of

their actions was to smooth the flow of vehicular traffic, which does not always result in the best solution for pedestrians.

16) The historical atmosphere of CCC is the most important visual aspect found in the ESC and that is met with similar consideration in the ERA.

17) In the ESC, aspects of place association, which include preference and attitudes, were not found to be directly related to the physical environment.

18) Statues located in CCC did not receive much attention in the ESC.

9.3.3.c Maintenance

Despite its importance in the urban environment, maintenance was seldom raised in the ESC analysis. It appeared once in relation to factors affecting pedestrian movement, however, it was fourth after *management system tools, congestion* and *atmosphere*. It was raised again under difficulties facing the pedestrian in CCC referring to the bad condition of sidewalks.

The ERA paid a lot of attention to maintenance work, in some cases it appears excessive. Certain areas received maintenance when they did not need it and other areas, in desperate need for such work, did not receive any. The former are mainly the major roads in CCC which are constantly redesigned, therefore repeatedly maintained and reshaped. The latter are the inner areas of CCC which in order to receive adequate maintenance work have to raise funding from non-governmental sources, such as the project of pedestrianising El-Borsa (stock market) area.

9.3.2 Co-ordination

Co-ordination actions are the actions that require the involvement of many interest groups and are achieved by a composition of the other six categories of action (Planning, Urban design, Maintenance, Legislation, Administration and Encouragement & Education).

In the investigation into the ERA the proposals did not clearly define the interest groups involved in each planning action. Although one report (GOPP *et al.*, 1991) mentioned the need for a more efficient system of co-ordination among the institutions involved in the planning

departments in the localities and other governmental bodies, none of the reports put forward a comprehensive co-ordination plan. The professionals' questionnaire amplified this problem. The responses to a question about actor groups involved in the planning or controlling of the pedestrian environment in the city centre were extremely scattered. Among the eight institutions mentioned in each aspect, only three institutions were mentioned by 50% or more of the sample.

However, the ESC has raised many considerations which can only be achieved by employing comprehensive co-ordination action among various groups. Some of these considerations are also mentioned in the ERA and others are not mentioned at all. Among these considerations is the need for the decentralisation of many services which are currently located in CCC. This need has been repeatedly raised since the 1960s. The need to do that was so strong that a custom-made city (El-Sadat) was built to accommodate some governmental bodies and ministries, and a suburb (Nasr City) was planned to absorb some others. Despite many institutions having moved to Nasr City, El-Sadat City still has not received any of the institutions that were to move to it. Many of the political and social aspects which have played a role in this situation are not in the remit of this research.

Two aspects in the ESC raised the benefit of good co-ordination which the pedestrian environment in CCC. It shared the first place with administrative aspects in actions related to factors affecting pedestrian movement. It was in first place with reference to difficulties pedestrians are currently facing in CCC. Just having a better system of co-ordination will not solve these difficulties completely, but it is a key aspect in improving the situation by bringing the participants together within a systematic framework.

Although co-ordination was raised as a key element in solving most of the difficulties that are faced in CCC, respondents mentioned few aspects which need a lot of co-ordination when asked to suggest changes.

9.3.3 Social-grouping Actions

In the ESC, considerations related to non-physical actions were only raised by the questionnaire. They were mentioned only very briefly in the ERA.

9.3.3.a Legislation

In the ESC, about 9% of all desired changes in CCC were actions related to legislation. This seems surprising, as almost no other aspects in the investigation significantly raised any difficulties with the current legislation. It is even more surprising when the desired legislation is investigated, as most of it already exists. This might suggest that the next category of actions, which is *administration,* is the reason for such a surprising finding.

On the other hand the ERA raised the need for some additional legislation and to tighten up the existing. However, the ERA referred in many instances to the lack of enforcement. This reflects on the point raised in the previous paragraph.

9.3.3.b Administration

Managing the urban environment is not an easy task, especially for complex urban conditions as in Cairo and CCC. This is compounded by the lack of experience and skills that the local authorities and government are suffering from. The complexity of the urban conditions is clearly demonstrated throughout this research and the lack of experience and skills is raised in many previous publications (e.g. Serageldin, 1984b; GOPP *et al.*, 1991) and even in media reports (see 8.3.3).

The importance of the actions related to administrative aspects was clearly shown in the ESC especially in the investigation into the most important factors affecting pedestrian movement in CCC. It was the most important action together with co-ordination aspects, each accounting for about a quarter of all actions involved. The importance of administration was demonstrated even more by the difficulties that the respondents are facing in CCC as it was in the third place

after co-ordination and urban design actions. Furthermore, it scored almost the same as actions of planning and urban design in the desired changes for CCC.

The ERA did not propose a complementary administrative structure to their planning and design actions nor were there efforts to reform the existing administration system of urban areas. Some consultants suggested an active role for Non-Governmental Organisations (NGOs) and perhaps the private sector, which might help with the skill shortages of the local authorities and might help with funding shortages. However, the future role of NGOs is not confirmed because of localities, and the political and social role they play in the society.

9.3.3.c Encouragement & Education

In the original list, adopted from Wallace *et al.* (1997), encouragement and education were separate categories but because of the lack of both in the ERA and the ESC, they were combined into one category. Even so, their response rate was minimal throughout the investigation. It was only raised in the ESC twice, once as an important action in relation to factors affecting pedestrian movement in CCC, and the other as a reason for people losing their way in some parts of Cairo. The very low response rates this kind of action received in comparison to difficulties facing the pedestrian in CCC and the desired changes suggests that the respondents might not be aware that such actions could help in providing a better environment in CCC. This might also be a result of the shortage of the education they are currently receiving with respect to environmental considerations.

Reviewing the ERA shows that very little attention is given to educating people about their environment, and that the use of enforcement is preferred to encouragement. Enforcement is not always the best way of reaching the planned objectives, especially given the condition of the enforcement bodies with their serious shortages in manpower and funding. It might be better to adopt a mechanism which deals with the real desires and needs of the users and make it flexible to allow periodic adjustment of policies. For example, the ESC reveals that convenience and welfare are key elements in the respondents' attitude and motivations to do and prefer certain

things. This element, which is universal rather than local, could be used in education and encouragement programmes, to help people to acknowledge the disadvantages of the current situation and the advantages of what is proposed. This may begin to rebuild trust in public policy.

9.4 THE MODEL OF THE PEDESTRIAN ENVIRONMENT IN CCC

This section sets out the relationships of the various components of the pedestrian environment model in CCC. They were deduced from Giddens's (1984) theory of *structuration*. The aim of this is to assist understanding of the current structure of the pedestrian environment in CCC and its reproduction system.

The relationships include *considerations* and *actions* which were significant in one area of investigation or which were repeatedly raised in other areas of investigation. The measure of significance differs from one research method to another. For example, in space syntax it is integration and segregation and how the spatial analysis is correlated with the actual situation; in cognitive mapping the first measure is the threshold and the second the ranking of each feature and its component of imageability.

It was intended to draw conclusions from throughout the thesis and to arrange them according to the two resources of the environment, either physical or non-physical. However, when this was attempted, not a single relationship was found to discretely fit in only one of the two modes of interaction as expected in subsection 1.2.2. All relationships include components of both, albeit with different weightings. This suggests that the two components are not so readily, if at all, separable in the field of urban planning and design. The relationships are organised according to the areas of investigation that raised them as detailed in subsection 1.2.3.

These concluding relationships are not by nature right or wrong, but they all contribute to the resulting pedestrian environment. They are presented here as the fundamental results of this

research. Although they are deduced from a case study of Cairo and its centre, they could be applicable in other contexts with modifications. They therefore deserve to be further tested and developed in other contexts. Each relationship is categorised as being local or general. Those in the general category might be applicable elsewhere.

The total collection of relationships is also categorised according to their relevance to the current body of knowledge. The first two categories confirm concepts in a specific context and the third proposes new ideas which need further testing in other contexts. The first category is those relationships which are referred to in the literature but have not been confirmed in the specific case study, this is referred to as '**Lit.**' and a reference for it is cited. The second category is those relationships which are 'common sense' but, to the knowledge of the author, have not been clearly cited in literature, this is referred to as '**C.S.**'. Finally, there is a category of relationships which are additions to the body of knowledge, either specific to the case study or of a more general nature, and this is referred to as '**A.K.**'.

9.4.1. Conclusions from Studying the Environmental Structure

These are the relationships deduced from the investigation using the Questionnaire, Cognitive Mapping and Space Syntax. Table 9.1 lists these relationships.

From the table it can be seen that all three areas of investigation reflect on both the local and the general contexts to different degrees. The investigation into the non-physical environment result in more local relationships whereas the investigation into the physical environment gave more general relationships. Overall, there were more general than local relationships.

Some of the conclusions in table 9.1 confirm what can be found in the literature and others are introduced to the field of knowledge by this study. Almost all the local relationships mentioned offer new knowledge to the discourse about the pedestrian environment in CCC. The only exception is the commonly accepted dislike of congestion in Cairo, especially in the city centre.

Some general relationships might be considered as 'common sense'; but the contribution use in their contextualisation in Cairo.

To the author's knowledge, a number of the general relationships could be argued as original contributions of this study. These are:

1) The significance of functional aspects over any other aspects in pedestrian environment.

2) The relationship between width of streets and way-finding.

3) The relationship between familiarity and people's reference to physical and non-physical aspects of the environment.

4) The relationship between the size of the environment and the way it is recognised and structured.

5) There is a high agreement ratio of functional features compared to visual features in environmental recognition.

6) The function of a space gives it its distinguished atmosphere.

7) The better integration performances the concentric and the radial than the linear.

8) The relationship between local service centres and metric integration.

Context	ESC - Conclusions from investigating the non-physical environment	Relevance
General	• People tend to make environmental decisions based on functional more than any other considerations. Included in these environmental decisions are place preference and route choice.	N.K.
	• Narrow streets affect isovest regions of urban spaces and cause problems in way-finding.	N.K.
	• As the subjects' familiarity with the area increases, they tend to become more attached to non-physical considerations of the environment, but with greater knowledge of its physical considerations.	N.K.
	• Economic reasons lie behind many of the environmental decisions, starting from shopping in areas with lower prices through to cost of travel and cost of alternatives.	Lit. (Hillier, 1996)
	• Different social groups have different environmental considerations e.g.: safety is more important for females than males; youngsters are more adventurous than other age groups etc; each social class has its own prerequisites in the environment according to its taste and economic abilities.	Lit. (Moore, 1979)
	• The appropriate mix of interrelated functions is a major criterion in the design of pedestrian areas.	Lit. (Gehl, 1984)
	• In modern, complex, large urban environments, signs and markers are of great importance in way-finding, not only to tourists but also to citizens.	Lit. (Passini, 1992)
	• Complicated urban patterns and forms with spatial segregation play a significant role in making the task of way-finding more difficult.	Lit (DeJomge, 1962)
	• Adequate pavement width is one of the most important design aspects to be considered when designing for pedestrians.	Lit. (Kwon *et al.*, 1998)
	• Condition and upkeep of the environment significantly affects pedestrian movement.	Lit. (DETR, 2000)
Local	• The main reasons for Cairenes strong bond with Cairo are *familiarity* and *affinity*.	N.K.
	• Higher social class subjects tend to develop a negative opinion about Cairo and CCC; tend to shop much less in CCC; tend to reject pedestrianisation projects.	N.K.
	• Convenience and welfare considerations come second after functional considerations in directing environmental decisions in CCC.	N.K.
	• The management system is the most important factor affecting pedestrian movement in CCC.	N.K.
	• Conserving the design and character of CCC is important.	Lit. (Myntti, 1999)
	• Suitable construction material is an important aspect in pedestrian environments, but it is not properly considered in CCC.	Lit. (DETR, 2000)
	• Congestion is a nightmare to Cairens in all categories of environmental considerations.	C.S.
	• The heart of CCC should be occupied with flexible functions are able to respond as the relationship between supply and demand changes.	C.S.

Table 9.1 – Conclusions from investigating the structure of the Pedestrian Environment in CCC

Context	ESC – Conclusions from investigating the area between the physical and non-physical environments	Relevance
General	• Large-scale environments are recognised as a collection of spatially structured abstract elements such as areas and edges, whereas small-scale environments are recognised as a composition of sequentially structured detailed elements such as paths, nodes and landmarks.	N.K.
	• Large scale environments gain lower agreement ratios with respect to distinguished environmental features and more varied restructuring methods than small-scale environments do.	N.K.
	• Functional elements have a higher public agreement ratio and are more consistent over time than visual elements.	N.K.
	• Landmarks are more visually associated, while paths, nodes and areas are more functionally associated. An edge is more functional if it is man-made and more visual if it is natural.	Lit. (Lynch, 1960)
	• Transport interchange nodes are of high importance in environmental cognition.	Lit. (Marchand, 1974)
	• Complexity of function is an important prerequisite for environmental recognition of paths (streets).	Lit. (Abu-Zekry, 1983)
	• The atmosphere of the environment results from the activities and the other non-physical properties of the space rather than the physical elements.	Lit. (Gulick, 1963)
	• The commonly shared culture and public media have a significant influence on environmental recognition, especially at the macro and abstract levels of the mental image.	Lit. (Moore, 1977)
	• Personal and social history influences the environmental recognition of individuals on the micro and detailed levels of the mental image more than it does on the macro and abstract levels.	Lit. (Downs and Stea, 1973)
	• The type of functions categorised according to their accessibility plays a role in environmental recognition. E.g. private uses act as barriers or edges (but which are not directly noticed by the user) and result in the discontinuation of public functions.	C.S.
	• Changing the management system of the urban environment might result in significant changes in the mental image of the users.	C.S.
	• The role affinity plays in environmental cognition is more personal than communal among the same social group.	C.S.
Local	• The clarity and legibility of shape and form in CCC help to maintain its dominance and significance.	N.K.
	• In terms of the five elements of Lynch, CCC is perceived as a network of *paths*, which start or meet at movement *nodes* and this network is further articulated by some *landmarks*.	N.K.
	• The significance of areas as an element of the mental image exists mainly in large-scale environments and in the case of Cairo is more related to administrative regions.	N.K.
	• Convenience and welfare are the most important imageability components for activities and qualities in the urban environment of Cairo and CCC.	N.K.
	• The mental image of CCC is likely to be held as a composition of interrelated elements, and the accuracy of this composition is enhanced by the subject's familiarity with the area.	Lit. (Abu-Zekry, 1983)

Table 9.1 – (continued) Conclusions from investigating the structure of the Pedestrian Environment in CCC

Context	ESC – Conclusions from investigating the physical environment	Relevance
General	• Certain urban grids perform better in increasing local and global integration, such as the concentric and radial grids. Others produce more localised integration such as in the linear grid.	N.K.
	• Increasing the value of local integration does not lead to global importance. However, it might lead to excessive locally-generated activities, which in turn will result in more global isolation, such as in Shubra.	N.K.
	• Built environment should maintain the compatibility between the physical properties and its functions.	Lit. (Hillier,1996)
	• Natural geometry of the urban form should be maintained since actions that alter this geometry might result in spatial conflicts.	Lit. (Hillier, 1999b)
	• Management systems, such as traffic systems, should consider spatial configuration and natural geometry of the urban environment as major determinants of potential and constraints.	Lit. (Hillier, 1999b)
	• The rule of the multiplier effect exists on consecutive levels starting from a single shop to a whole city and from a single shopping centre to a whole retail area.	Lit. (Hillier, 1993)
	• Local service centres tend to exist at locations with short block length and with the highest local accessibility values.	Lit. (Hillier, 1999a)
	• The basic urban grid does not automatically produce intelligibility, if the inherent permeability is not maintained.	C.S.
	• The city centre has to be spatially accessible, and not necessarily geometrically central.	C.S.
	• The length of a street should be proportional to its global importance and the number of connections it has should be proportional to its local importance.	C.S.
	• Areas with prime geographical location and spatial configuration tend to be of the highest economic value in the urban system.	C.S.
Local	• The spatial isolation and lack of spatial continuity between different districts in Cairo contributes to a poor interaction between them and causes the main integration lines to be on the tangents rather than passing through the core of districts.	N.K.
	• Where natural and man-made barriers are not properly considered in the urban plan, area-segregation might be the result, such as the cases of El-Mokattam and El-Sharrabia.	N.K.
	• Major movement arteries in Cairo work as linkages and barriers between different districts.	N.K.

Table 9.1 – (continued) Conclusions from investigating the structure of the Pedestrian Environment in CCC

9.4.2 Conclusions from Studying the Reproduction System

The relationships drawn from the investigation using document analysis and the professionals' questionnaire are shown in Table 9.2.

Context	ERA – Relationships of the reproduction system of the pedestrian environment structure
Local	• Co-ordination between the various institutions involved in the reproduction process is either absent or ineffective.
	• Lack of co-ordination between various institutions has resulted in another problem, which is the overlapping and conflict between their responsibilities.
	• The problem of *the discontinuity of strategic plans* prepared by previous authorities is evident, especially in the official state and government institutions.
	• Social considerations were poorly considered in most studies.
	• The pedestrian environment is marginal, a secondary consideration in most cases.
	• The analysis procedure in all cases is more focused on the physical considerations of the environment than the non-physical considerations.
	• Reports collected from state official bodies tend to suffer from various problems: poor problem definition, absence of or insufficient analysis, lack of alternatives and reasoning behind decisions. In other words they contain only decisions and proposals.
	• Consultants tend to be more thorough and accurate than local authorities.
	• Academic research tends to reach a better understanding but does not usually propose practical solutions.
	• The media reports tend to present the official, governmental point of view more than that of the users'.
	• Users are unfairly blamed for some of the problems that exist in the pedestrian environment in CCC.
	• The professionals in their subjective responses gave balanced views on various environmental considerations.
	• The professionals think that user participation in the various stages of decision making is important, however they consider themselves as representing the user.

Table 9.2 – Conclusions from investigating the Reproduction System of the Pedestrian Environment in CCC

It is apparent from the type of results listed in table 9.2 that they are only applicable to the local context of Cairo and especially the city centre. However, unlike the local relationships mentioned in table 9.1 not all local relationships in table 9.2 are new. Some of them confirm what has been suggested in the literature such as the problem of a lack of a skilled technical workforce in official organisations (Serageldin, 1984b). Others could be considered as 'common sense', such as the overlapping of responsibilities as a result of lack of co-ordination. However, the findings specific to the pedestrian environment could be considered as new to the field of knowledge about pedestrian environments in Cairo and in CCC.

9.5 CONCLUSION

This chapter integrates the findings of the various parts of the research according to the two frameworks of the ESC and ERA. The integration process involved a cross-referencing analysis of the findings of the three areas of investigation into the environmental structure. This cross-referencing showed that there is no significant conflict among the three of them. They did not contradict each other; they were supportive, particularly in raising common findings. It is reasonable to suggest that using the three approaches together complemented the comprehensiveness of the study and can be recommended for use in future analyses of pedestrian environments.

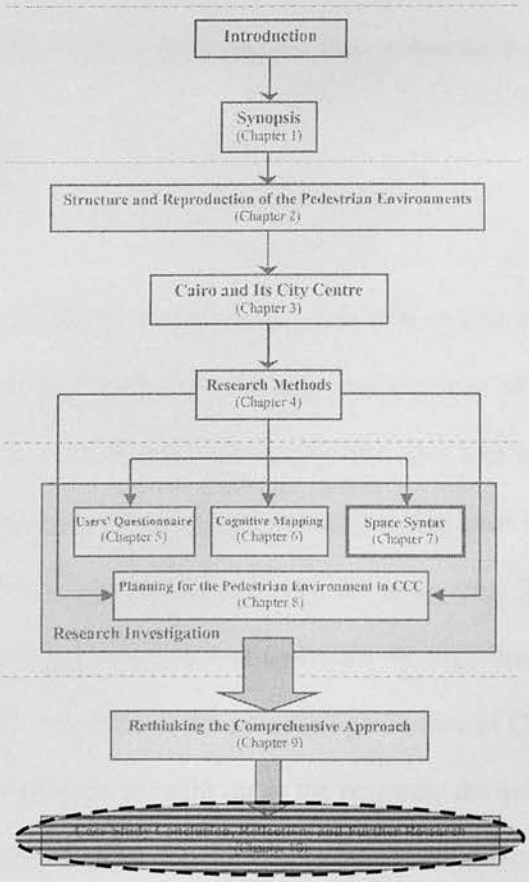
The second part of this chapter aimed at testing the ESC from the environment and their associated ERA against the ERA of the current reproduction system of the pedestrian environment in CCC. The aim was to test for shortfalls in the reproduction system. The evidence points to the existence of shortfalls. The test run in section 9.3 raised many issues which need more attention from the authorities and the reproduction system in general.

Finally this chapter developed a picture of the various components of the pedestrian environment model in CCC, which was proposed in Chapter One (see figure 1.2 and subsection .1.2.2). This development can then serve as a complementing structure for policy, planning and design of the pedestrian environment in CCC. Some of the findings reported in section 9.4 can serve as guidance for pedestrian environments and the urban environment in CCC in general. Others are more specific and localised to the case study of the pedestrian environment in Cairo City Centre.

The total collection of relationships is also categorised according to its relevance to the current body of knowledge. Some of them are a confirmation of the literature in the context of the specific case study of CCC. Others are 'common sense' but, to the knowledge of the author, have not been clearly cited in literature. The third groups of relationships are a genuine introduction from the current study to the body of knowledge, either locally or generally.

Chapter Ten

CASE STUDY CONCLUSION, REFLECTIONS AND FURTHER RESEARCH



INTRODUCTION

This chapter presents three major points. The first covers the main theoretical contributions to knowledge that this research achieved. The second reflects on various aspects and parts of the current study as an attempt at self-assessment. The third recommends some further research topics which would prove fruitful and worth exploring.

10.1 THE CASE STUDY CONCLUSION

Chapter Nine ended by concluding with a long list of conclusions from the investigation that has been carried out in this research. This was a result of employing four research methods and investigating into four areas of research, as each one of them has contributed to the understanding of the case study with various types of inputs, of different relative importance and significance for each finding. In this section the most important findings reflecting on the enhancement of the case study are presented and discussed from both, how they were reached (evidence) and how they can be useful. They might not be mentioned in their specific terms in the investigation, but indicators and findings from various parts suggest their importance as a concept or approach for development.

10.1.1 Familiarity and Affinity

This concept has been reflected heavily in the research in two ways. The first is that most Cairenes love living in Cairo because of their familiarity with the city and because of the emotional bond they have either with the city or their friends and family who also live in it. Although this aspect might seem out of the main focus of the current research it was seen very important for its reflection on a problem which Egypt has been facing for long time. This problem is the failure of most of the new cities which were planned to absorb the high density of Cairo. Beside the fact the no one can deny the influence of the general significance of Cairo and its dominance on the national scale, which was even brought up in the research, the author thinks that this might a very major complementary reason for the Cairenes' unwillingness to

leave Cairo. Egyptians since early times have not proved to be an easy pack-and-move population (Hamdan, 1980). This might be the result of being dependent on agriculture and strongly attached to the narrow Nile valley (ibid).

This suggests a role that the common culture can play with the help of the public media. This role might be in creating a public image of the new cities as convenient alternatives to the inconvenient living conditions in Cairo. However, planning authorities have a task of investigating the most appropriate planning and design for the new settlements for each context to create a strong attraction that exceeds their desire to stay on Cairo. Other areas of the research suggest that people establish links with the built environment at an early stage in their experience of a new setting and as they interact with it they start to develop links with the social context as a whole. The social group that is more willing and able to leave the city should be investigated in more detail as they have different attitudes either towards living in Cairo, as the research findings suggest.

10.1.2 Legibility and Intelligibility

Legibility, as defined in Lynch's (1960) terms, plays an important role in giving a place its distinguished image and results in better performance in way finding tasks. The *legibility* of the shape and form of this network in CCC helps to maintain its dominance and significance. This legibility is a result of the diversity within unity that CCC enjoys. For example, it does not have a similarity of building facades and streets appearance such as that in Nasr City. It also does not have the complexity of road pattern of Garden City. CCC is perceived as a network of streets, which start or meet at squares and some significant buildings further articulate this network. However, the accuracy of mental image is enhanced by the subject's familiarity with the area.

Intelligibility, as defined in Hillier's (1996b) terms, is a key variable which measures the ease with which an urban area can be digested into an informative format which links the local properties of space to its global properties. It is therefore a major indicator of the difficulty of

wayfinding tasks from one area to the other. The analysis of CCC and Cairo provides a strong indicators that CCC enjoys an intelligible urban form compared to other areas of Cairo. The analysis identified areas that are not intelligible and to an extent they matched what other areas of the research suggested to be problematic in wayfinding, such as Garden City and Fatimid Cairo. The basic urban grid does not automatically produce intelligibility, if the inherent permeability is not maintained such as in the case of Nasr City where the permeability of the orthogonal grid is interrupted on many occasions which results in a looping system.

The good performance of CCC in Space Syntax and cognitive mapping analysis suggests that it could be used as an example which lends itself to other situations to increase legibility. It also recommends higher appreciation of this as an urban solution, or its benefits may be lost as the city changes. For example the recent changes in CCC due to Al-Azhar Tunnel and other projects running in major squares such as the underground parking garage and shopping mall in Al-Tahrir square, should both take the mental image of CCC into account and not fragment it. It also suggests further actions may be needed to enhance wayfinding in problematic areas. These action could be as simple as the addition of signs and markers in key decision points in Garden City and Fatimid Cairo.

10.1.3 Accessibility and Integration

Accessibility is a key factor in pedestrian movement and it can be one of two types: physical or visual. CCC, through the analysis, was found to be accessible in both these regards, and on both the global and local levels. From the global level it was found to be reasonably integrated on the level of Cairo. However, if an extension is sought, the best direction would be towards the North Eastern direction (El-Zaher and El-Fajjalah) for its high global integration. On other hand, lack of accessibility was noticed in several central areas. The most significant areas are El-Sabtiiah and El-Sharrabia to the North of Ramsis Street and Fatimid Cairo to the East. These areas require integration with adjacent areas to be increased to match their central location significance.

Accessibility was also noticed on the cognitive level of respondents. The closeness of the Nile and its Corniche to CCC and the availability of two main direct links between them was weakened by the presence of some semi-public functions which border El-Tahrir Square to the West (Faisal Bank, Hilton Hotel, Arab League HQ and Ministry of Foreign Affairs. This suggests that the type of functions categorised according to their accessibility plays a role in environmental recognition. Private uses act as barriers or edges (but which are not directly noticed by the user) and result in the discontinuation of public spaces and functions. If a passage is introduced which provide a totally public link from El-Tahrir Square to the Corniche, then the integration between CCC and the waterfront could be very much strengthened and which should have a positive impact on CCC perception and use.

Visual accessibility also plays an important role in wayfinding. It was found that narrow streets affect isovest regions of urban spaces and cause problems in wayfinding.

10.1.4 Congestion: An illness or a symptom

The particular issue of congestion in Cairo is significant even before doing this research. It was raised in many parts of the research, and when it was the issue, it was clearly a serious problem. However, it can be seen from two main points of view. The first sees congestion as an illness which needs curing by increasing street width or reducing the number of cars allowed to enter the CCC. The other viewpoint sees it as a symptom of some other causes such as a lack of law enforcement or irresponsible behaviour of users.

The research argues that congestion is a symptom of a more complex situation in which social, economic and political influences greatly contribute in producing all other superficial reasons behind congestion. For example, a lack of law enforcement is interchangeable with irresponsible behaviour, i.e. each one of them can produce the other. The economic and social changes that have happened to Egyptian society in the last few decades have resulted in a lack of trust

between the public and the government (of which law enforcement is a part). It also allowed a parasitic sub-class to develop and to expand, and this particular sub-class is attributed with selfishness, disloyalty to its community and irresponsibility. The parasitic behaviour is apparent in the behaviour in the urban environment in Cairo. To tackle the problem of congestion, society needs to operate around a set of values that would open the eyes of each street user to the effect he or she is exerting on the environment of others. Otherwise, introducing new traffic laws or widening any street would be just palliatives for an illness that is not cured for it should be treated from roots.

10.1.5 Urban grid and local centres

Space syntax analysis revealed many aspects related to the urban grid of Cairo. It clearly identified several urban grids in the city separated by major roads and each one was identified as being distinguished from the others by its local properties that reflect on its origination circumstances. Each of these areas has its own centre, which was again highlighted by the analysis. The development of the Metric Axial Model (MAM) was indispensable in picking the more localised centres and hotspots of metric integration. These hotspots are suggested by Newman and Kenworthy (1999) and Willoughby (1994) as key locations for urban centres and which satisfy some of sustainability indicators and that is to minimise travel distance and time. These can then form a network of centres, which is similar to what Roberts *et al.* (1999) calls the "integrated metropolis".

Two grids were clearly picked as performing locally better than the rest in Cairo's spatial map; these were CCC and Heliopolis. Their radial road patterns increased their local integration to the extent that qualifies them as global and local centres. On the other hand, the more localised centres are those identified by the MAM integration as this is directly related to short block length which has proved to be an important criterion in urban centres (Siksna, 1997). However, it should be noticed that there is no relation between local integration and global importance. Excessive locally-generated activities might even incur global isolation, such as in Shubra district.

10.1.6 Size and scale

The role of scale and size of the built environment was found to be significant in many of the findings. First, when recognition is considered, it was found that Cairo, as a large-scale environment, is recognised as a collection of spatially structured abstract elements such as areas and edges, whereas CCC, as a small-scale environment, is recognised as a composition of sequentially structured detailed elements such as paths, nodes and landmarks. It is therefore possible to suggest that in order to enhance the imageability of each scale, emphasising its associated elements would be necessary and employing elements which are not associated within it would have a lesser effect. It was noticed also that, at larger scales, the amount of spatial cues increases and results in less agreement among the population on what is significant. Thus it is valid to suggest that, as the scale increases, the level of detailing and the amount of emphasised elements should be decreased. Finally, as the scale of the environment increases, personal background influences the environmental recognition of individuals more than on the micro and detailed levels.

The size of the functional features of street layout was also apparent. Respondents mentioned the pavement width as one of the most important design aspects to be considered when designing for pedestrians, which however might reflect on their anxiety of congestion. The combination of CAM and MAM in the spatial analysis of CCC suggested that there is an important relationship which should be respected between the length of a street and its global importance, where the number of connections (per unit length) it has should be proportional to its local importance. Finally the rule of the multiplier effect (Hillier, 1996b) should be considered on consecutive levels starting from a local community to a whole city and from a single shop to a whole retail area.

10.1.7 Management System

Management system was found to be a major influence on the pedestrian environment in CCC. Many of the difficulties that is facing pedestrians in CCC might be solved by a better

management system with minor changes in the built environment. That includes better traffic which puts the pedestrians as a priority and not a by-product. It also seeks to maintain a more comprehensive network of pedestrian crossing points which, at the same time, complements a pedestrian plan for the city centre. That should not mean complete 'pedestrianisation', as the community is not ready yet for such a major change, and the complementing facilities which usually accompany such a change, such as strategically placed parking facilities and an efficient and adequate public transport system, are not available. If the pedestrianisation plan is to be introduced with no change in these supportive facilities, that might result in prohibiting CCC from playing its major urban function. On a more cognitive level, the changes in the management system greatly affect the mental image of CCC and, as these changes happens frequently, they result in wayfinding problems.

Condition and upkeep of the environment was found to significantly affect pedestrian movement in CCC. For example, uneven pavement surfaces and the bad condition of many of side streets which do not hold major traffic and are avoided by users affect the overall efficiency of pedestrian network in CCC. Also a lack of maintenance of the lighting system, litter-bins and greenery all contribute to an inadequate pedestrian environment. The deficiency in enforcement of rules of urban conduct is also a problem which need solving by the authorities.

10.1.8 Decentralisation and the centre

Cairo's dominance is on the national scale and is accentuated because CCC is the result of having been the centre of activity from the 1870s until the 1960s, during which major changes in the demographic and economic attributes of the city occurred. Even after some expansion plans CCC kept many functions which should have been distributed to the suburbs or even relocated outside Cairo, facilitated by huge advances in information and communication technologies.

Despite many plans have being proposed to do that, none of them shows significant change. A realistic and comprehensive decentralisation plan of some of those governmental and official

bodies which are currently located at the heart of CCC but which do not require periodic visits by most of the population could benefit and cause benefit by being relocated outside CCC. Among these might be the Ministry of Health, the Ministry of Interior Affairs and Ministry of Education.

10.1.9 Planning system

The study of the planning system in this research aimed at consolidating the image about the product, which is the pedestrian environment, by studying the process of the planning system in Cairo and in the case study area. Previous research pointed to the problem of a lack of co-ordination between various institutions, which results in conflict of responsibilities, interests and decisions. This was also apparent in this research. However, discontinuity in the plans and strategies by successive management teams was found to be another problem. It was noticed also that analysis is not highlighted in their work plans. This stage is the most important stage for formulating the foundations, purposes and framework for decision making. It is a necessary step towards a socially beneficial outcome. The current attitude of the authorities to increase their dependence on consultants and not 'in-house' personnel, which is some cases lack sufficient skills (GOPP, 1991), is also supported given that they work according to a comprehensive plan.

The issues that the planning process itself tackles also require some reconsideration. Social considerations were found to have a low, if any, priority in most studies. More particular to this research, the pedestrian environment is marginal, a secondary consideration in most cases, while vehicular movement occupies the centre stage of attention. Finally, users are being blamed for the failure of some proposals by the planning system, even in analyses in which the user participation in the planning process was not observed. A system which involves users' participation is important if the proposals are to be more amenable to city living conditions. The investigation of the users' opinion in the questionnaire in this thesis might serve as a basis for a wider investigation which targets the enhancement of the pedestrian environment in CCC.

10.2 THEORETICAL REFLECTIONS

This research was initiated by a real problem and a practical hypothesis. Over and above these practical aspects there are several theoretical, perhaps philosophical, concerns and concepts that emerged from the experience of doing this research. The aim of this section is to synthesise these concerns and concepts.

1) Although the division between physical and non-physical aspects of the environment may appear to be a reasonable approach to research, this division does not exist in reality and is an artificial distinction in research and in design.

2) An appreciation of the continuous interaction and the complex nature of the relationships between the physical and non-physical aspects of the environment is an important, if not the most important, factor in all environmental actions. These actions include design, planning and policy making.

3) Whereas most literature and research methods in the field of urban planning and design prefer to think of physical aspects of the environment, the research highlighted the importance of non-physical aspects. One explanation for this lies in the issues which raised the difference in each category. Whereas non-physical aspects dominated those dealing with opinions, attitudes, preference and cognition, physical aspects dominated answers concerning required changes. Therefore it is possible to suggest that people think in non-physical terms but act in physical terms. In other words motivation is always non-physical, which is then translated into physical actions in the environment.

4) Although the integration of several research methods revealed many useful and complementary results, what was more apparent is that comprehensiveness in its ultimate meaning is extremely difficult to achieve in one single piece of research.

5) The importance of a specific piece of research lies in its location within the body of knowledge. This body of knowledge relies on both cross-sectional research within which the current research might be categorised, and longitudinal research. The findings of this research suggest that the process should start with cross-sectional research to identify issues for more specific longitudinal research. However, the cycle should return to cross-sectional research for evaluation to restate the situation and recommend further specific research.

10.3 REFLECTIONS ON THE CURRENT RESEARCH

This section contains a self-evaluation. It is useful in that it helps the reader's awareness of the limitations of the findings of the whole research and its parts. In addition it works as a guide for future research which adopts a similar approach. The reflection is organised in three parts: the initial research methodology; the selected research method (both the selection and analysis process of each one of them); and the experience of combining the findings of the four research methods.

10.3.1 Initial Research Methodology

The research started with a comprehensive and multi-disciplinary attitude which has been beneficial in collecting many interesting findings. This approach provided cross-sectional types of information, some deeper than others. It is therefore useful for exploratory research which is designed to allow for further detailed longitudinal research. However, as mentioned earlier the continuous feedback between cross-sectional and longitudinal research is essential to ensure the compatibility of their directions over time.

The initial methodology helped in outlining the main argument, however its application in a field of knowledge other than its origin, *sociology*, made it difficult to continue using the original vocabulary during the empirical stages of the research which are more related to the context of *urban planning and design*.

10.3.2 Selected Research Method

After settling on the initial research methodology four research methods were selected for the investigation. This section considers the selection itself and the way the selected methods were used in this study.

The selected methods were found to be satisfactory in their own right. However, the research in its later stages, the integration of findings, suggested the existence of shortfalls in one area of investigation, that is the investigation into the relationship between the physical and non-physical environments. Cognitive mapping was selected for that aim, but it seems to be biased towards the point of view of the non-physical environment, in other words the users. Therefore, the reflection suggests that a field observation might discover more aspects from the physical environment. The research employed field observation at some stages such as in the verification of Space Syntax findings, but it was selective field observations to test certain notions or aspects of the environment. In order to make up the shortfall a systematic field observation that does not have a predefined set of considerations would be necessary.

Users' Questionnaire: In most aspects of enquiry the questionnaire favoured the open ended format of questions. However, quantitative responses were required for the evaluation of factors found in the literature. Therefore, the respondents were asked to score these factors in the form of a list. The findings constrain the validity and reliability of this specific question for several reasons. The number of factors in the list, their order in the list and the context in which each factor might exist have all affected the results. Furthermore the respondents were sometimes confused by the meaning of the factor and the criteria for scoring. This question was not completely compatible with the exploratory nature of the enquiry. However other parts of the questionnaire adequately managed to explore their objectives.

Cognitive mapping: This method as used in the research was found to give rich and varied findings. However, the nature of the research, investigating many areas of concern placed constraints on data collection. For example, the objective of investigating the difference

between the image of Cairo and CCC resulted in compromises between the data collected and those valid for comparison. The results might have benefited from obtaining verbal reasoning for the sketch map as with the verbal map or at least a note on the actual sequence of drawing the map.

Space Syntax: This was found to be a flexible analysis technique that could be used to study various aspects of the environment. Its exploratory nature allows the comparison between its findings and real world experience. The analysis relied on a limited amount of observations to test the findings of the analysis against pedestrian movement and other sorts of social activities; for more reliability the quantity and quality of these observations could be enhanced. The study would have benefited from a comprehensive systematic field observation, which the limitations of the research did not allow.

Document analysis: The critical analysis of documents provided a good basis for the analysis of the reproduction process. However, the study only analysed what was available and not all that might exist, ongoing research was not included. The response rate in the professional questionnaire was disappointing. The pace of life in Cairo indicates that researchers should allow a flexible time schedule for professional questionnaires.

10.3.3 The Comprehensive Approach

The combination of the findings of the four research methods employed was a difficult task. No previous examples were found which combine four such different research methods some qualitative and others quantitative, and each with different perspective and dimension. The only study found which used a closely related methodology adopted a quantitative approach as the methods used and the way they were analysed facilitated such an approach (Young, 1999).

May be one of the difficult tasks that faced this process was the unification of terminology. Different research methods and research approaches use different terms to refer to similar things and sometimes they use the same terms to refer to different things. These differences resulted,

in some cases, in confusion and contradiction. In order to avoid this confusion, the process required several visits to refine it and feed the results back into other parts of the research.

The selected approach for combining the results in this thesis was deduced from the initial research methodology, which was found to be reasonable. However, prior to that selection a trial of different approaches of integration were examined. For example, one of the methods tried to compare the findings of the four areas of investigation in pairs, to raise aspects of similarity and conflict, but it did not. Then, deducing the findings longitudinally from all four areas of investigation was tried, but it did not reveal a strong logic behind the findings because of the contrast between the reproduction system and the other three areas of investigation.

The selected method was to compile the findings of the three areas of investigation according to the *Environmental Structural Considerations*, then, to check for the existence of the actions associated with the compiled considerations in the information collected from the reproduction system. A summary of these actions is included in Chapter Eight.

The last part of the process was to develop a picture of the model of the pedestrian environment in CCC, which was proposed in the initial research methodology. The development process revealed an important observation. The model was helpful in understanding the various components of the environment, but constructing it from the findings was difficult because of the complex interrelationships among the components. Instead of dividing the findings into those related to the built environment and those to the social-grouping, it was decided to organise them according to the area of investigation that helped in raising the issue.

10.4 RECOMMENDATIONS FOR FURTHER RESEARCH

This research benefited greatly from the initial theoretical premise adopted from a sociological theory by Giddens (19984) and supported by GST (Bertalanffy, 1971). Much of the contemporary literature which the author came across recommend multi- and inter- disciplinary

research for the future in the field of social science. GST prefers to build wholes, even if they are complex and not fully covered, instead of individual parts which might be lost in a more holistic entities.

The following points have shown some promising and interesting preliminary findings in the present study.

1) The application of the initial methodology either with a different set of research methods or in other contexts. This methodology was found to be clearly useful in the current research, and it would be helpful to test it elsewhere to establish its applicability as an approach to comprehensiveness in the urban environment.
2) The current study was interested in the *analysis* as an approach to successful planning. However, the findings of the research raised the role that urban management plays in the success or failure of the urban environment. A study using the same approach or adopting a more tailor-made approach to investigate the specific nature of the management stage of the urban environment is strongly recommended.
3) The role that the size of the environment plays started as a notion and it has grown to be a clear environmental determinant. A dedicated study of the role that environmental size plays in shaping our perception might be a natural follow up to this research.
4) Previous research has blamed professionals for being separated from the users. This research argues that it is not that simple. Professionals in their questionnaire were compatible with the users, so why do the reproduction processes not bring compatible results? The problem is not totally with the professionals but with the process itself. The operation of producing urban artefacts is influenced by many other factors apart from the users' needs.
5) The research also raised the existence of some aspects which are beyond the responsibility of the urban designer or planner, such as the attractiveness of certain types or categories of services over others to certain groups of people. A dedicated investigation into this would help the understanding of the limitations or the success of certain projects and situations.

6) The relationship between spatial configuration and the origin of the generated movement in various parts of the spatial system is a promising field of investigation. Not only it can help in the understanding of the existing urban dynamics, but it also plays an important role in the urban design for new settlements through improving the location of various types of urban centres.

7) An investigation into the relationship between various grid patterns and their spatial configuration and the resulting function distribution is another study, which is recommended by the findings of this research. Adopting a typological approach this study might serve as a basic information system for urban patterns.

8) The influence of public media and commonly shared culture on environmental opinion is a field which needs more research to examine, which aspects are influenced by them and how they might be used in urban planning and management.

9) Co-ordination and administrative aspects of the urban environment have not received enough attention compared to the physical aspects of urban planning and design. The question is, how they could be integrated into the design process to provide planned environments more compatible with the real situation?

APPENDICES

Appendix A - Components of the Environmental Structure and System

This appendix presents the definitions of the components of the environmental structure and system suggested in Chapter One (see figure 1.2) and refined in tables 5.1 and 5.2. The components are of one of two categories: Environmental Structural Consideration (ESC) or Environmental Reproduction Actions (ERA).

First: Environmental Structural Considerations

Source: Adopted from Harrison and Howard. (1972) with modifications.

I. Built Environment Considerations: Configuration

- *Aerial Location* – The physical location within a city, This includes relative designations, such as 'near the centre', or specific locating techniques, such as by street address.
- *Spatial Relationships* – The physical relationship to other areas or features of the city or metropolitan area. For example, the element may be described as a reference point in locating other elements. Also, in the case of districts, this category might include certain internal structural relationships.
- *Scope* – The description of the 'view' from the element. However, this also could include the indication that the element is of significance due to its physical surroundings.
- *Associated Features* – The feature which is either a part of the element or is related directly to the element. An example might be the park as the location of a baseball field. The ball field is a separate feature which is associated to the element, the park.
- *Signs and Markers* – The signs or markers which help the observer to locate himself or other elements. These signs may not actually name the element but, for some reason, are distinguishing criteria to the respondent.

II. Built Environment Considerations: Description

- *Size* – The physical size This might include descriptions of the dimensions of the element, or of its total mass. Size could include descriptions of relative smallness as well as bigness.
- *Design and character* – The type of design. This might include a reference to a particular style of design, such as 'Colonial', or might be a detailed description of the actual design of the element.
- *Shape, Pattern, and Form* – In case of elements of sufficient aerial extent, this might be a description of the element's internal composition, as this relates to appearance. This category generally includes only descriptions of the shape, pattern, or form of the element itself and does not include the element's relationship to its surroundings.
- *Construction Materials* – The materials utilised in its construction, or other architectural or engineering considerations.
- *Condition and Upkeep* - The general physical condition, its upkeep, or its immediate landscaping Characterisation of an element in this manner necessarily does not mean a favourable reaction to its physical state, but could include descriptions of the element's deterioration.
- *General Visual significance* – The element's general appearance which is characterised in such a way that no further analysis of the description can be made. For example, the description of an element as simply 'beautiful' or 'ugly' would be recorded in this component category.
- *System management tools* – The element is employed to control and manage the way the urban space is used. That include traffic lights, crossing areas and several features used to separate between functions or between modes of movement.

III. Social-grouping Considerations: operation

- *Economic* - The economic considerations concerning either the element or persons or things. It may be an expression of cost or an evaluation of status.
- *Political and Social* - The reference to either political or social associations. Generally, these characterisations are inferred through cultural association.

- *Religious and Ethnic* – The reference to either religious or ethnic associations. Generally, these characterisations are inferred from the appearance of the element or through personal association.
- *Historical* – The historical origin or development, or any associated historical factors.
- *Functional* – The generally accepted purpose. Examples would include a park in terms of its recreational facilities, or the central business district as a shopping area
- *Convenience and Welfare* – The aspects of either convenience or welfare to the observer. Examples might include convenience of access or physical safety.
- *General Significance* – The recognised or assumed value, which would not allow further evaluation. For example, the characterisation as simply 'important'.
- *Congestion* – The over-crowdedness and the high density of movement. This is a consideration of a particular importance in cities like Cairo and its city centre where congestion can dominate many other spatial considerations.

IV. Social-grouping Considerations: Association

- Atmosphere – The pervading influence, mood, or impression which observers associates with the environment. The description of a park as 'peaceful' would be in example of this component type.
- *Familiarity* – The observer's knowledge of the element. Generally, this involves continual contact with the element, such as driving by it often on the way to work.
- *Affinity* – The observers describe their personal relationship. Knowledge of the individuals directly related to the element or describes their personal attachment with the element.

Second: Environmental Reproduction Actions

Source: Adopted with modifications from (Wallace *et al.*, 1998: p 10-1).

I. Built Environment Actions:

- *Planning* – refers to developing data, priorities, and plans to provide a foundation for projects and programmes. In general it involves large-scale alterations which might involve a range of several buildings to a whole area.
- *Urban Design* – refers to modifications or improvements in regard to the urban space or to individual buildings.
- *Maintenance* – refers to the refurbishment or periodical maintenance work and to the upkeep of the physical environment.

II. Co-ordination – refers to complex actions which need communication among agencies and organisations that have roles to play and which evolve several types of actions.

III. Social-grouping Actions:

- *Legislation* – refers to the introduction of new laws or rules.
- *Administration* – refers to the managing and controlling the urban environment including the improvement of adherence to regulations that apply to vehicle and pedestrians.
- *Encouragement and Education* – refers to actions to promote walking and others which involve professional training and public safety education.

Appendix B – Detailed Findings from Users' Questionnaire

In this appendix, findings from the questionnaire which involved the third level of categorisation (LC3) are listed.

2.2) How do you feel about living in Cairo? Would you explain why?

Main category	Sub-category	Minor reason category	Preference of Cairo				Total
			no	Neutral	yes	v. much	
Built environment	description	System management tools	1				1
	T o t a l		**1**				**1**
Social-grouping	Operational	economic				1	1
		political and social			1		1
		religious and ethnic				1	1
		functional			2		2
		Convenience and Welfare	1				1
		general significance			13	6	19
		congestion	1	4	1		6
		Sub-total	2	4	17	8	31
	Association	atmosphere	4	5	1		10
		familiarity			3		3
		affinity			11	23	34
		Sub-total	4	5	15	23	47
	T o t a l		**6**	**9**	**32**	**31**	**78**
		No reason given			1		1
G r a n d t o t a l			**7**	**9**	**33**	**31**	**80**

2.3) Do you like to live somewhere else? Would you explain why in all cases and where if you like to live some where else?

Main category	Sub-category	Minor reason category	Preference of somewhere else					Total
			not at all	no	Neutral	yes	very much	
Built environment	configuration	associated features					1	1
		Sub-total					1	1
	description	Condition and upkeep					1	1
		Sub-total					1	1
	T o t a l						**2**	**2**
Social-grouping	Operational	religious and ethnic					1	1
		Convenience and Welfare				1	2	3
		general significance	1	2	1			4
		congestion				7	1	8
		Sub-total	1	2	1	8	4	16
	Association	atmosphere				17	9	26
		familiarity	4	5	2	1		12
		affinity	3	6	1	3		13
		Sub-total	7	11	3	21	9	51
	T o t a l		**8**	**13**	**4**	**29**	**13**	**67**
		No reason given	**3**	**4**	**3**		**1**	**11**
G r a n d t o t a l			**11**	**17**	**7**	**29**	**16**	**80**

2.4) Do you shop at the city centre shopping streets after the recent development of many new shopping centres? Please mention why?

Main category	Sub-category	Minor reason category	Degree of shopping					Total
			much less	less	as before	more	much more	
Built environment	configuration	aerial location					1	1
		spatial relationships	11	2	9		1	23
		associated features					1	1
		Sub-total	11	2	9		3	25
	description	System management tools			1			1
		Sub-total			1			1
	T o t a l		11	2	10		3	26
Social-grouping	operational	economic			5			5
		political and social		1				1
		functional		1	3			4
		convenience and welfare			1			1
		general significance	8	10	6	1	2	24
		congestion	4	4				8
		Sub-total	12	16	15	1	2	46
	Association	atmosphere	2	1				3
		familiarity			2			2
		Sub-total	2	1	2			5
	T o t a l		14	17	17	1	2	51
No reason given				**1**	**2**			3
G r a n d t o t a l			**25**	**20**	**29**	**1**	**5**	**80**

3.4) What are the most important three factors that affect your movement in the city centre as a pedestrian? and how each of these factors affect your movement?

Main category	Sub-category	Minor category	Frequency	Percent
Built environment	Configuration	aerial location	2	1.0
		spatial relationships	8	3.8
		associated features	6	2.8
		signs and markers	1	0.5
		Sub-total	17	8.1
	description	size	10	4.8
		design and character	5	2.4
		shape pattern and form	6	2.8
		condition and upkeep	22	10.6
		System management tools	49	23.6
		Sub-total	92	44.2
	T o t a l		109	52.3
Social-grouping	Meaning	economic	1	0.5
		political and social	1	0.5
		historical	1	0.5
		functional	3	1.5
		Convenience and Welfare	10	4.8
		congestion	44	21.2
		Sub-total	60	29
	Association	atmosphere	25	12.1
		affinity	8	3.8
		familiarity	1	0.5
		Sub-total	34	16.3
	T o t a l		94	45.3
None exists			5	2.4
G r a n d t o t a l			**208**	**100.0**

3.5) What are the most preferred three places to you in CCC? why?

Main category	Sub-category	Minor category	Frequency	Percent
Built environment	Configuration	Aerial location	2	1
		spatial relationships	10	5.1
		scope	4	2.1
		associated features	32	16.4
		sub-total	48	24.6
	Description	size	5	2.6
		Design & character	3	1.5
		shape pattern and form	2	1
		Condition and upkeep	5	2.6
		System management tools	6	3.1
		sub-total	21	10.8
	t o t a l		**69**	**35.4**
Social-grouping	Operation	economic	9	4.6
		political and social	5	2.6
		religious and ethnic	9	4.6
		historical	4	2.1
		functional	59	30.2
		general significance	4	2.1
		Convenience and Welfare	3	1.5
		congestion	1	0.5
		sub-total	94	48.2
	Association	atmosphere	7	3.6
		familiarity	2	1
		affinity	23	11.8
		sub-total	32	16.4
	t o t a l		**126**	**64.6**
G r a n d T o t a l			**195**	**100**

Main category	Built environment							Social-grouping									
Sub-category	Configuration			Description				Operational							Associa-tion		T o t a l
Minor reason category	aerial location	spatial relationships	associated features	size	Design and character	shape pattern and form	Condition and upkeep	economic	Political and social	religious and ethnic	historical	functional	Convenience and Welfare	congestion	atmosphere	affinity	
Tahrir sq.	1	1	9	2		1						3			1		18
26 July st.		2	5	1				1				7			1	1	18
Kasr El-Neel st.			3	1	1		1					8	1	1			16
Talaat Harb st.	1		4				1					5					11
Al-Azhar & Al-Houssain district										4	1	2			2		9
Emad El-Din st.			3								1	4				1	9
Opera sq.		2	1				1					1			1	2	8
El-Ataba & El-Moski area								3				3			1		7
Al-Azbakia Wall & garden								3	2			1					6
Al-Alfy pedestrian segment			1				1					2			1		5
Sherief st.												2				3	5
Sub-total	2	5	26	4	1	1	4	7	2	4	2	38	1	1	5	7	
T o t a l	33			10				55							14		**112**
G r a n d T o t a l	**43**							**69**									

3.7) If you have two routs to go from place to another, one is short but has many changes in direction, and the other is a slightly longer but more direct with less changes in directions, which one you choose as a pedestrian to walk through?

A The shortest B The one with less changes in directions

	The longer path with fewer direction changing points		The shorter path with more direction changing points		Reservations	
Category	Reason for choosing	Freq.	Reason for choosing	Freq.	Reason for reserving	Freq.
Time and distance based reasons	To avoid the congestion points that waste time	4	More effort to save time better then wasting time	1	It depends on the available time	1
	To avoid wasting time	10	To save time	2		
	To avoid waiting at traffic lights or crossing streets and wasting time	4	It is shorter	0.5*		
	To save time, effort, money and concentration	8	To avoid being tired because of the long distance	2		
	Direction changing points waste time and reduce the joy of the trip	1				
	Changing direction results in losing concentration and could lead to delay	3				
	Direction changing points makes the distance longer	0.5*				
	The shortest way is the most straight one	3				
	To avoid waiting and manoeuvring	1				
	Faster because it is direct	3.5*				
	Direction changing points consume a lot of time to reduce the speed and change the direction	1				
	SUB-TOTAL	**(39)**		**(5.5)**		**(1)**
Ease based reasons	Easier for car driver	2	Better if I am walking, But worst if I am driving	2		
	Reduce the tension caused by congestion at direction changing points	5				
	It is easier	5.5*				
	SUB-TOTAL	**(12.5)**		**(2)**		
Safety based reasons	" walk a year but never cross a canal"	1				
	More safe	3.5*				
	Not to be lost	2				
	More safe while accompanied by children	1				
	To avoid going up and down	2				
	It is probably better paved then the indirect one	1				
	SUB-TOTAL	**(10.5)**				
Personal differences	Morally preferred	2			It depends on the importance of the trip	1
	The availability of Public transit in case of getting tired	1				
	SUB-TOTAL	**(3)**				**(1)**
Perceptual	The visual permeability is better then the physical permeability	1	To avoid feeling bored	2.5*		
None	Did not mention a reason for choosing	2				
T O T A L		**68**	**T O T A L**	**10**	**T O T A L**	**2**

* When a half (0.5) appeared means that it was one of two reasons the respondent mentioned.

4.8) In terms of pedestrian moving in Cairo City centre, here is a list of some factors that could affect your movement. What is your valuation of the relative importance of each of them? (give degree for each one between brackets from 0 to 10 where 0 represents the least in importance and 10 represents the most for importance)

Responses to evaluation of factors deduced from literature:

	Factor	0	1--3	4--7	8--10
Social-grouping	Safety	2.6	1.3	13.1	82.9
	Security	1.3	4	14.6	80
	Cleanliness	0	2.6	20	77.3
	Regulations	2.8	1.4	28.1	67.6
	Protection	2.8	4.2	25.4	67.6
	Crowdedness	17.8	4.1	12.3	65.8
	Pollution	16.7	2.8	15.4	65.2
	Traffic	4.5	1.5	30.3	63.6
	Maintenance	4.1	5.5	27.1	63.5
	Public transport	8.8	1.5	26.5	63.3
	Pleasure	12.7	1.6	28.5	57.1
	Interest	22	6.8	18.7	52.5
	Pedestrian density	6.2	7.7	34	52.3
	Management	5.8	7.1	36.1	50.6
	Coherence	14	6	30	50
	Activity	12.5	6.2	35.9	45.3
	Mystery	34.4	18	29.5	18
Built environment	Crossing	3.1	4.6	16.9	75.4
	Parking	7	7	15.4	70.5
	Greenery	13	1.4	17.3	68.1
	Sidewalk	4.4	4.4	23.5	67.6
	Short cut	6.2	3	26.1	64.6
	Window shopping	1.5	6	28.8	63.6
	Utilities	4.4	4.4	28	63.2
	Aesthetics	12.7	2.8	25.3	59.1
	Buildings shape	7.4	13.3	20.6	58.9
	Services	8.7	4.2	30.4	56.4
	Street furniture	9.4	7.9	26.6	56.3
	Unfolded views	13.2	5.7	28.2	52.9
	Legibility	7.7	9.2	32.4	50.7
	Continuity	9.3	5.6	38.9	46.4
	Directness	12	6	36	46
	Building uses	14.8	9.3	33.4	42.7
	Land-use pattern	22	0	34	42
	Direction change	12.3	3.5	45.5	38.6
	Restaurants	4.5	4.5	53	37.8
	Topography	18.3	11.7	33.3	36.7
	Variety	16.3	8.2	42.8	32.6
	Surrounding	12.7	12.7	43.6	30.9
	Diversity	24.4	6.6	40.1	28.8

Factor	N	Sum	Mean		Std. Deviation	Variance	Skewness	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error
Safety	76	670.00	8.8158	.2693	2.3478	5.512	-2.293	.276
Security	75	645.00	8.6000	.2744	2.3767	5.649	-1.971	.277
Cleanliness	75	644.00	8.5867	.2562	2.2184	4.921	-1.488	.277
Crossing places	65	541.00	8.3231	.3163	2.5502	6.503	-1.791	.297
Regulations	71	575.00	8.0986	.2766	2.3309	5.433	-1.662	.285
Protection	71	573.00	8.0704	.3116	2.6258	6.895	-1.433	.285
Traffic	66	524.00	7.9394	.3098	2.5169	6.335	-1.547	.295
Sidewalk	68	529.00	7.7794	.3345	2.7581	7.607	-1.298	.291
Utilities	68	526.00	7.7353	.3317	2.7352	7.481	-1.301	.291
Parking	71	548.00	7.7183	.3765	3.1721	10.062	-1.395	.285
Window shopping	66	508.00	7.6970	.2905	2.3597	5.568	-1.052	.295
Short cuts	65	500.00	7.6923	.3417	2.7552	7.591	-1.500	.297
Maintenance	74	566.00	7.6486	.3262	2.8062	7.875	-1.169	.279
Greenery	69	519.00	7.5217	.4163	3.4582	11.959	-1.368	.289
Public transport	68	499.00	7.3382	.3722	3.0694	9.421	-1.207	.291
Services	69	498.00	7.2174	.3829	3.1802	10.114	-1.080	.289
Pollution	72	517.00	7.1806	.4438	3.7654	14.178	-1.092	.283
Aesthetics	71	507.00	7.1408	.3938	3.3179	11.008	-1.199	.285
Management	69	478.00	6.9275	.3554	2.9522	8.715	-.859	.289
Crowdedness	73	503.00	6.8904	.4390	3.7512	14.071	-.982	.281
Pleasure	63	432.00	6.8571	.4078	3.2372	10.479	-1.073	.302
Buildings Shape	68	466.00	6.8529	.3988	3.2884	10.814	-.797	.291
Pedestrian Density	65	444.00	6.8308	.3666	2.9558	8.737	-.766	.297
Continuity	54	363.00	6.7222	.4021	2.9551	8.733	-.911	.325
Street Furniture	64	429.00	6.7031	.4032	3.2253	10.403	-.866	.299
Unfolded view	53	353.00	6.6604	.4743	3.4527	11.921	-.884	.327
Directness	50	333.00	6.6600	.4639	3.2802	10.760	-.910	.337
Coherence	50	331.00	6.6200	.4797	3.3920	11.506	-.911	.337
Restaurants	66	435.00	6.5909	.3253	2.6427	6.984	-.644	.295
Legibility	65	420.00	6.4615	.3892	3.1379	9.846	-.693	.297
Activity	64	408.00	6.3750	.4098	3.2781	10.746	-.710	.299
Direction Change	57	356.00	6.2456	.4272	3.2253	10.403	-.600	.316
Personal interest	59	363.00	6.1525	.5064	3.8899	15.132	-.665	.311
Land-use	50	303.00	6.0600	.5146	3.6388	13.241	-.749	.337
Building use	54	316.00	5.8519	.4582	3.3669	11.336	-.477	.325
Variety	49	273.00	5.5714	.4470	3.1292	9.792	-.549	.340
Surround	55	303.00	5.5091	.4094	3.0360	9.218	-.454	.322
Topography	60	327.00	5.4500	.4500	3.4857	12.150	-.354	.309
Diversity	45	222.00	4.9333	.4907	3.2919	10.836	-.490	.354
Mystery	61	233.00	3.8197	.4678	3.6538	13.350	.402	.306

3.9) Mention three places you feel lost in them, and give reasons for each

Main category	Sub-category	Minor category	Frequency	Percentage
Built environment	Configuration	associated features	3	5.5
		signs and markers	9	16.7
		Sub-total	12	22.2
	Description	size	7	13.0
		shape, pattern, and form	18	33.3
		condition and upkeep	2	3.7
		Sub-total	27	50.0
	T o t a l		**39**	**72.2**
Social-grouping	Operational	Functional	1	1.9
		convenience and welfare	2	3.7
		Congestion	5	9.2
		Sub-total	8	14.8
	Association	atmosphere	3	5.5
		familiarity	4	7.5
		Sub-total	7	13.0
	T o t a l		**15**	**27.8**
G r a n d t o t a l			**54**	**100.0**

* Number of cases mentioned that none exists: **34**
* Number of cases skipped the question: **18**

3.10) Mention three difficulties you face in moving around the city centre,

Main category	Sub-category	Minor category	Frequency	Percentage
Built environment	Configuration	spatial relationships	2	1.1
		associated features	17	9.4
		signs and markers	1	0.5
		Sub-total	20	11.0
	Description	size	7	3.9
		shape, pattern, and form	6	3.3
		construction materials	10	5.5
		condition and upkeep	29	15.9
		general visual appearance	1	0.5
		System management tools	22	12.1
		Sub-total	75	41.2
	T o t a l		**95**	**52.2**
Social-grouping	Operational	political and social	6	3.3
		Functional	12	6.6
		convenience and welfare	6	3.3
		Congestion	62	34.1
		Sub-total	86	47.3
	Association	atmosphere	1	0.5
		Sub-total	1	0.5
	T o t a l		**87**	**47.8**
G r a n d t o t a l			**182**	**100.0**

3.11) Do you consider the experience of transforming El-Shawarby Street to pedestrian area successful? Why?

Main category	Sub-category	Minor category	Success rating					Total
			Not at all	No	Neutral	Yes	Very much	
Built environment	Configuration	associated features		2	1	4	14	21
		Sub-total		2	1	4	14	21
	Description	shape, pattern, and form			1			1
		construction materials			1			1
		condition and upkeep			1			1
		System management tools		1	1	1		3
		Sub-total		1	4	1		6
	T o t a l			**3**	**5**	**5**	**14**	**27**
Social-grouping	Operational	Economic	1		1		1	3
		functional			1		1	2
		general significance		2	2	1	2	7
		convenience and welfare			1	5	8	14
		Congestion					1	1
		Sub-total	1	2	5	6	13	27
	Association	atmosphere		1	1	4	10	16
		Sub-total		1	1	4	10	16
	T o t a l		**1**	**3**	**6**	**10**	**23**	**43**
No reason given						**2**	**3**	**5**
G r a n d T o t a l			**1**	**6**	**11**	**17**	**40**	**75**

3.12) Do you consider the experience of transforming El-Alfy Street to pedestrian area successful? Why?

Main category	Sub-category	Minor category	Success rating					Total
			Not at all	No	Neutral	Yes	Very much	
Built environment	Configuration	aerial location		1				1
		spatial relationships	1	1		1	1	4
		associated features	1	2	2	3	3	11
		Sub-total	2	4	2	4	4	16
	Description	size			1			1
		construction materials			2			2
		condition and upkeep			1		1	2
		System management tools		1	2			3
		Sub-total		1	6		1	8
	T o t a l		**2**	**5**	**8**	**4**	**5**	**24**
Social-grouping	Operational	political and social			1	1		2
		functional	1	1	2	2	5	11
		general significance	1	1		1		3
		convenience and welfare	1			3	4	8
		Congestion					2	2
		Sub-total	3	2	3	7	11	26
	Association	atmosphere			1	4	10	15
		affinity	1					1
		Sub-total	1		1	4	10	16
	T o t a l		**4**	**2**	**4**	**11**	**21**	**42**
No reason given						**2**	**5**	**7**
G r a n d T o t a l			**6**	**7**	**12**	**17**	**31**	**73**

3.13) Do you think there are other areas in the city centre could be transformed to pedestrian areas? Why? A Yes B No

Main category	Sub-category	Minor category	opinion		Total
			No	Yes	
Built environment	Configuration	spatial relationship		1	1
		associated features	2	7	9
		Sub-total	2	8	10
	Description	size		2	2
		design and character	1		1
		System management tools	1		1
		Sub-total	2	2	4
	T o t a l		**4**	**10**	**14**
Social-grouping	Operational	economic	4	2	6
		political and social	1	1	2
		Historical	1	2	3
		functional		4	4
		general significance	5		5
		convenience and welfare		6	6
		Congestion	3	1	4
		Sub-total	14	16	30
	Association	atmosphere		3	3
		affinity	1		1
		Sub-total	1	3	4
	T o t a l		**15**	**19**	**34**
		No reason given	**14**	**12**	**26**
G r a n d T o t a l			**19**	**29**	**74**

3.14) Please give three aspects you like the designer to take in consideration in planning for pedestrian

Main category	Sub-category	Minor category	Frequency	Percentage
Built environment	Configuration	spatial relationships	6	3.0
		scope	1	0.5
		associated features	10	5.0
		signs and markers	14	7.0
		Sub-total	31	15.4
	Description	size	32	16.0
		design and character	6	3.0
		shape, pattern, and form	9	4.5
		construction materials	26	12.9
		condition and upkeep	14	7.0
		general visual appearance	1	0.5
		System management tools	14	7.0
		Sub-total	102	50.8
	T o t a l		**133**	**66.2**
Social-grouping	Operational	Economic	2	1.0
		political and social	10	5.0
		Historical	1	0.5
		Functional	14	7.0
		convenience and welfare	18	9.0
		Congestion	7	3.5
		Sub-total	52	25.9
	Association	atmosphere	15	7.5
		affinity	1	0.5
		Sub-total	16	8.0
	T o t a l		**68**	**33.8**
G r a n d t o t a l			**201**	**100.0**

41) Mention five changes or additions you wish to happen in the city centre of Cairo in the future to provide appropriate environment for both the pedestrian and the area itself.

Main category	Sub-category	Minor category	Frequency	Percentage
Built environment	Configuration	aerial location	28	9.4
		spatial relationships	9	3.0
		associated features	16	5.4
		signs and markers	8	2.7
		Sub-total	61	20.5
	Description	size	8	2.7
		design and character	23	7.7
		shape, pattern, and form	2	0.7
		construction materials	50	16.8
		condition and upkeep	44	14.8
		System management tools	78	26.3
		Sub-total	205	69.0
	T o t a l		**266**	**89.6**
Social-grouping	Operational	Economic	3	1.0
		political and social	11	3.7
		convenience and welfare	13	4.4
		Sub-total	27	9.1
	Association	atmosphere	4	1.3
		Sub-total	4	1.3
	T o t a l		**31**	**10.4**
G r a n d t o t a l			**297**	**100.0**

Appendix C - Imageability Components of Cairo and its City Centre

The following table lists the imageability components accompanied the distinguished features mentioned in the cognitive maps of Cairo and the City Centre.

	imageability Component		CCC	Cairo
Configuration	Geographical location	Frequency	3	1
		% of subtotal	14.3%	1.3%
		% of total	3.0%	0.4%
	Spatial relationships	Frequency	6	43
		% of subtotal	28.6%	55.1%
		% of total	6.1%	17.6%
	Scope	Frequency	1	15
		% of subtotal	4.8%	19.2%
		% of total	1.0%	6.1%
	Associated features	Frequency	11	11
		% of subtotal	52.4%	14.1%
		% of total	11.1%	4.5%
	Signs and markers	Frequency		8
		% of subtotal		10.3%
		% of total		3.3%
	Subtotal	Frequency	21	78
		% of total	21.2%	32.0%
Description	Size	Frequency		1
		% of subtotal		2.0%
		% of total		0.4%
	Design and character	Frequency	8	18
		% of subtotal	61.5%	35.3%
		% of total	8.1%	7.4%
	Shape, pattern and form	Frequency	3	5
		% of subtotal	23.1%	9.8%
		% of total	3.0%	2.0%
	Construction materials	Frequency		6
		% of subtotal		11.8%
		% of total		2.5%
	Condition and upkeep	Frequency		8
		% of subtotal		15.7%
		% of total		3.3%
	General visual appearance	Frequency	2	6
		% of subtotal	15.4%	11.8%
		% of total	2.0%	2.5%
	System management tools	Frequency		7
		% of subtotal		13.7%
		% of total		2.9%
	Subtotal	Frequency	13	51
		% of total	13.1%	20.9%
Operation	Economic	Frequency	3	1
		% of subtotal	5.3%	1.3%
		% of total	3.0%	0.4%
	Political and social	Frequency	11	7
		% of subtotal	19.3%	9.1%
		% of total	11.1%	2.9%
	Religious and ethnic	Frequency	6	10
		% of subtotal	10.5%	13.0%
		% of total	6.1%	4.1%
	Historical	Frequency	8	32
		% of subtotal	14.0%	41.6%
		% of total	8.1%	13.1%
	Functional	Frequency	29	18
		% of subtotal	50.9%	23.4%
		% of total	29.3%	7.4%
	Convenience and welfare	Frequency		6
		% of subtotal		7.8%
		% of total		2.5%
	general significance	Frequency		3
		% of subtotal		3.9%
		% of total		1.2%
	Subtotal	Frequency	57	77
		% of total	57.6%	31.6%
Association	Atmosphere	Frequency	5	17
		% of subtotal	62.5%	44.7%
		% of total	5.1%	7.0%
	Familiarity	Frequency	1	1
		% of subtotal	12.5%	2.6%
		% of total	1.0%	0.4%
	Affinity	Frequency	2	20
		% of subtotal	25.0%	52.6%
		% of total	2.0%	8.2%
	Subtotal	Frequency	8	38
		% of total	8.1%	15.6%
	Total	Frequency	99	244
Grand Total		% of total	100.0%	100.0%

Table D.1 – *Detailed Findings from Critical Analysis of Planning Reports*

Key to type of report: **1)** Public opinion; **2)** Professional opinion; **3)** Mixed opinions.

	Official reports (6)	Research documents (8)	
		Consultancy research (5)	Academic research (3)
Q.1	**In what kinds of documents and texts does it appear? (Representing the typology of the document).**		
	1.b, **1.d** and **1.e** are state official reports with open-archival access. **1.a** and **1.f** are state official reports with restricted access and **1.c** is a private official report with restricted access.	They are all official documents with open-archival access.	They are all personal documents with open-archival access.
Q.2	**Who writes or speaks this document and whom do they represent or purport to represent?**		
	1.a, **1.b** and **1.f** were prepared in various departments in the Cairo Governorate. **1.d** and **1.e** were prepared by various branches of the Traffic Department of the Internal Affairs Ministry. **1.c** was written by planning and landscape consultants.	**2.a**, **2.b** and **2.c** were joint ventures between the General Organisation of Physical Planning (GOPP) and French consultants. **2.d** was prepared by the Japan International Co-operation Agency (JICA). **2.e** was prepared by the consultancy unit for Transportation and Traffic, Ain-Shams University.	The authors, at the time of submitting the dissertation, were occupying junior lecturers' posts.
Q.3	**Who is the intended audience of such writing or speech?**		
	All of the state official reports were presented to higher authorities in the same institution as their writers. The private report was presented to Government institutions, specifically Cairo Governorate and the Traffic Department in the Ministry of Internal Affairs.	The audience for the three reports involving the GOPP is the Ministry of Development and for the JICA report the audience is the Cairo Governorate. For Ain-Shams report the audience is the Ministry of Transportation and Communication. However, because they are open-archival reports, they are offered to all governmental institutions.	The audience for this work is the academic examiners and the respective discipline.

Q.4		**What criteria are important in terms of the criteria governing the topic?**		
		None of the six reports clearly indicates the criteria important to it. However, it is possible to say that the private official report (**1.c**) is mainly influenced by the ultimate clients, the Stock Exchange. All five official reports are on the one hand, technically, governed by the common practice of transportation and traffic and, on the other hand, guided by different development plans for Cairo.	The Master Scheme report (**2.a**) carefully considers the integration of both the national goals retained by the government and the recommendations of the National Urban Policy (NUP)[1] together with economic reports[2]. The other two reports of the GOPP (**2.b** and **2.c**) and the JICA report (**2.d**) have considered GCRS as the main guide to their studies. The Ain-Shams Report (**2.e**) is initially guided by the Fatimid Cairo development plan and the traffic plan of CCC.	**3.a** was guided by the cognitive mapping approach established by Lynch (1960). **3.b** was guided by the pedestrianisation policy of city centres especially the approach of Brambilla *et al.* (1981). In **3.c**, the author is guided by literature on pedestrian movement from transportation engineering.
Q.5		**What does a critical reading of these documents uncover in terms of:**		
	Q.5.1	**what is the main topic considered by the document?**		
		Although all six reports consider movement, only one (**1.b**) of them is focused on pedestrian movement. **1.a**, **1.d** and **1.f** consider traffic problems, **1.e** considers parking problems and **1.c** considers changes in traffic management as part of an urban design proposal for the Stock Exchange site. **1.b** is the only report that considers the pedestrian environment as it defines its aim as to find streets suitable for pedestrianisation.	In **2.a**. it was clear that the major problem considered is the huge size of the Greater Cairo Region and its growth due to the economic changes in the seventies. Thereafter it explores how to organise the urban agglomeration into a manageable, feasible and workable physical system. **2.b** considers the Homogenous Sector # 1 (which includes CCC) and analyses the current situation, to come out with a plan to make the sector self-sufficient. **2.c** evaluates the achievements accomplished from the GCRS up to the date of publication. It critically tackles the mistakes of the GCRS and any emerging changes in the region causing new problems. In **2.d** the main problem is the traffic congestion in Cairo. The study aims at improving the transportation facilities. Report **2.e** critically studies the traffic situation after the construction of Al-Azhar Tunnels and the removal of Al-Azhar bridges.	**3.a** clearly states the problem of finding a pedestrianisation solution for CCC as the starting point and adopts the concept of pedestrianisation to reduce the use of vehicles in public areas. 3.b and 3.c define a gap in the criteria which they aimed to explore. **3.b** defines a gap in current research and practice in urban planning and design in Egypt as the 'negligence' of visual topics in favour of functional ones. **3.c** focuses on defining characteristics of pedestrian movement in Cairo.

[1] National Urban Policy, Ministry of Development/PADCO Inc., (1982).

[2] Such as: Recent Development in the Egyptian Economy – Ministry of Economy (January 1981.); also Domestic Resource Mobilisation and Growth Prospects for the 1980's Arab Republic of Egypt – IBRD (December 1980).

Q5.2	**What explanation is offered for tackling the topic considered?**		
	The explanation of the traffic problem is stated in two (**1.a** and **1.d**) of the six reports. However, **1.a** used the explanation as an introduction to the main objectives of the report, which is to propose new changes in traffic rules or street networks. **1.d** gives thorough explanations on the topic it considers. **1.f** is a summary report and therefore does not include explanations. **1.e** gives reasonable explanations which consider both accumulated problems over time and recently emerged ones. **1.c** mentions that the new project will enhance the area and that is the reason for the replanning of the Stock Exchange area. **1.b** does not give any explanation of the initial objectives, that is to have pedestrian streets in CCC.	In the GCRS report (**1.a**) the explanation for the condition of the Greater Cairo Region is the rapid increase in urbanisation since the second half of the seventies which was followed by more centralisation in services in the city centre. The same explanations hold for the report **2.b** of sector one that contains CCC. In the evaluation report of the GCRS, **2.c**, various explanations are offered to the stated problem, among them are funding difficulties and wrong projections in the GCRS. The most important explanation mentioned by the report is related to urban planning and development management on the local level. The report describes the localities as "suffering from a lack of planning abilities" (GOPP and IAURIF, 1991: p 13). Another reason is the weak relationship between localities' responsibilities proposed by the GCRS and their current daily responsibilities. The most crucial of all of these explanations is cited by the report about the localities technical offices as: "…not acquainted with the guiding plans, issued by the GOPP, of the homogenous sector they work for and even if they are familiar with it, they continue implementing concepts and directions from the sixties plans which are no longer suitable according to the current GCRS" (Ibid., 1991: p 14). In the JICA report (**2.d**) the problem of traffic congestion is partially referred to network capacity and the lack of well-developed traffic management system and facilities. The report of Ain-Shams (**2.e**) says that the movement changes caused by Al-Azhar tunnels are the motive behind the proposed plan.	In **3.a**, the explanation offered for the neglect of visual aspects is that planners in Egypt consider the functional aspects to be more important than the visual ones. In **3.b**, the explanation for the need to have pedestrian areas was evoked by reasons under four main categories deduced from literature developed in other countries: traffic management; economic revitalisation; environmental improvements; social benefits. In **3.c** the explanation is that the identification of pedestrian movement characteristics can enhance the facilities offered to pedestrians.

Q5.3	What, therefore, is proposed or suggested?		
	Sufficient reasoning is rarely offered to justify selected proposals. Proposals are put to enhance the situation rather than emerging from it. Report **1.a** selected several design actions extracted from the extensive study of the Greater Cairo Region done by the JICA (report 2.d). This selection is not according to a time plan suggested by the JICA, nor according to any other apparent criteria. In **1.d** an extensive explanation process which does not seem to have much effect on the recommendations. **1.f** was a summary report, so it was not supposed to include explanations. In the report on parking (**1.e**), the definition of the problem, as found in Q5.1, despite not being clearly explained, as found in Q5.2, has led to reasonably justified solutions. Reports **1.b** and **1.c** described the proposal without reasoning. The lack of reasoning was more apparent in the Governorate report, which aimed at the pedestrianisation of some of CCC streets as it contradicted its own criteria by selecting two major traffic intersections to be pedestrianised.	The GCRS in **2.a** proposes five main concepts for the solution: 1) Homogenous Sectors; 2) New Settlements; 3) Development Corridors; 4) Urban Region; 5) Urban Expansion to be discouraged (in agricultural areas). It also suggested the introduction of new centres and the decentralisation of the activities located in CCC to reduce the congestion. In the detailed report of the Homogenous Sector #1 (**2.b**), a rehabilitation strategy plan and several action projects were proposed. None of these plans and projects deals with pedestrian movement in specific terms, but rather with total environmental qualities. In evaluating the GCRS report **2.c** recommends better co-ordination between different organisations and departments involved in development policy making and implementation. Also the work to enhance the technical qualifications and awareness of the localities to be able to handle and deal with the requirements of the scheme. In the JICA report (**1.d**), the recommendation of pedestrian bridges was to prevent pedestrians crossing the street from obstructing and therefore slowing down the traffic. Ain-Shams's report (**1.e**) recommends that Al-Azhar street be pedestrianised with full access to public transport. It also suggests some modifications in the CCC traffic plan to suit the new situation with more pedestrianised streets.	**3.a** presents a 'better understanding' of the visual qualities of the case study and the reinforcement of visual elements. **3.b** suggests a pedestrianisation plan for CCC based on western experience. **3.d** developed a mathematical model of pedestrian movement characteristics on walkways with any width and with different land uses along side the roads in Cairo.

Q.6	What does a critical reading of these documents tell us about		
Q6.1	**What is not seen as problematic?**		
	Four reports did not touch on the pedestrian environment at all and were focused on vehicular movement and the smoothness of traffic flow. Of the other two reports, **1.b** lacks an explanation of the need for a pedestrian area in the first place with and does not even consider the contradiction between the criteria it puts forward to select the appropriate pedestrian areas and the final selection of two major traffic intersections. **1.c** isolates itself from its surrounding area and does not consider any mutual influence between the project and the near by pedestrian area of El-Shawarby.	The report on GCRS (**2.a**) blames changes in society for the stated problems, but does not give enough effort to go beyond its outer appearance to discuss the problems in the system which allowed this to happen in the first place. This might be due to political reasons which prohibit criticism of the government's policies. Although the report analyses some demographic data, very little care was given to social problems even on the more local scale report of the Homogenous sector #1 in report **2.b**. Although the team comprised forty-two individuals, none of them was a sociologist. The evaluative report of the GCRS (**2.c**) found that the economic and social circumstances from which the G.C.R.S. was derived are still the same, so there is no need to change its strategies, especially those related to new settlements. The JICA (**2.d**) and Ain-Shams (**2.e**) reports do not clearly state any situation that is not problematic.	The three did not clearly state unproblematic issues.
Q6.2	**Which explanations are rejected or omitted?**		
	It was not clear that any of the reports rejects any explanations. However some of them omit various explanations. **1.a** omits explanations with regard to the stated problem as follows: the current physical condition of the network; traffic management deficiency either in the traffic rules or the application of these rules; social explanations which might have an implication for public behaviour; and economic explanations of the problem like cost-benefit formulae for using public or private transportation.	In the GCRS (**2.a**), the explanations, although they look reasonably justified, lack an in-depth understanding of the reproduction system that resulted in the disorder identified in the urban system and which, if continued, does not guarantee a better situation even with the new schemes. It could be suggested that the attitude of the report, with the physical environment in the foreground and all other aspects in the background, omits many non-physical, but essential, explanations. These explanations include the management system, decision-making system, and co-ordination between different institutions. The same type of explanation was also omitted in the detailed report on the Homogenous sector # 1 (**2.b**).	**3.a** claims that functional aspects are favoured over visual aspects in research due to negligence but it omits the influence of the social and political changes in Egypt since the revolution in 1952 and the international functionalist movement which affected all planning and architectural attitudes during the twentieth century. It also omits the explanation of the starting problem

	1.b does not justify breaking its own criteria for pedestrianisation when selecting major traffic streets to be pedestrianised. **1.c** does not consider the impact of the project on the immediate residents. The parking report (**1.e**) omits the habit of the public to park as close as possible to their destinations because of the bad condition of pedestrian paths and facilities available to walkers. Two reports are exceptions, **1.d** managed successfully to report the most important explanations of the problem it handles. The other, **1.f**, was not able to be assessed because it is a summary report.	The explanations included in the evaluation report (**2.c**) about the problem of applying the planning scheme in GCR confirm the notion of concentrating on deficiencies in the operating system. On the other hand, the evaluation report of the GCRS manages to point out the administrative and organisational causes of delay and misconduct in the plans of the GCRS. However, it does not discuss the relationship between lower and higher authorities which might be causing another kind of conflict in decisions and implementation. In other words, the report handled only one type of organisational problem, that is the individual level. There are two other levels, which are the group level within one organisation and inter-group level between different organisations. The JICA (**2.d**) and Ain-Shams (**2.e**) studies do not give as much weight to pedestrian movement as they give to vehicular movement. Aspects beyond the main topic of the two reports were only marginally dealt with or ignored.	which was even supported by the findings, which is that *people in their attitudes and even in their perception are motivated by their needs.* **3.b** does not explain the reason behind many assumptions it made, starting from the assumption of the need for pedestrianisation and ending with the expected results of the new proposal. No explanation was found rejected or omitted in **3.c** because the results and explanations were driven by the facts found in the field survey.
Q6.3	**which solutions are not preferred?**		
	There are no alternatives suggested in any report, therefore no preference was found.	The GCRS (**2.a**) and the detailed report on the Homogenous sector #1 (**2.b**) do not give alternatives. However, it is suspected that there were some alternatives which were eliminated in the procedure of the study but which were not included in the final reports. The evaluation report of GCRS (**2.c**) does not recommend any alterations to the general strategies of the GCRS as the situations did not change and the plan is going as projected. That contradicts the seven problems found in the report. In the JICA (**2.d**), the report offers more than one alternative and selects the suitable alternative. However, the criteria used in the selection could be questionable due to considering physical and specific traffic aspects only. Ain-Shams report (**2.e**) does not prefer the complete pedestrianisation of Al-Azhar Street or restricting public transport for functional and practical reasons.	It was surprising that none of the studies, even the one which aimed at a design proposal (**3.b**), offer any alternatives or even a comparative study.

Table D.2 – Review of newspaper reports.

Source: Al-Ahram International Newspaper (dated as indicated in the table).

#	Date	Type	Subject	Explanation	Message	Comments
1	25/06/98	2	Refurbishing streets in CCC, both the vehicle and pedestrian paths.	Streets in CCC were not cared for during the last fifty years.	To report recent decisions by the Governorate to enhance the condition of CCC streets. And to report the increase of green areas and number of trees. AL-Azbakia wall relocated in its original place with a more civilised outlook.	The report points to the pedestrianisation of low traffic streets like El-Alfy st.
2	25/01/99	3	The bad condition of the sidewalks in Cairo.	The reason given by the public is the lack of maintenance, illegal occupation by shops or peddlers and the small penalty for the illegal occupation.	The report managed to convey the problem users are facing but did not carry reasonable reasoning from the responsible speakers.	The Cairo governor only mentions the maintenance plan since he was appointed as if there was none before. The head of Nasr City District stated that the size of the district is difficult to control.
3	04/02/99	3	The new plan of Fatimid Cairo and Al-Azhar street.	Because of the high volume of traffic and the historical importance of Al-Azhar street.	It reports the current work on Al-Azhar tunnels and the refurbishing work of the street and building facades as part of a broader plan to develop Fatimid Cairo.	The public interviews mention the great advantage of such a project.
4	31/03/99	3	Under use of pedestrian bridges.	The poor visual and functional design of the bridges	The need to replace all bridges with tunnels	Both professionals and ordinary users share the same opinion
5	04/04/99	1	Illegal occupation of the sidewalk by peddlers.	Insufficient legal and public actions.	A public outcry for an urgent solution to the problem, which is causing so many other problems either to traffic or regarding inappropriate behaviour.	The report lists many areas with major problem in all districts of Cairo.

6	16/05/99	2	The new plan of Tahrir square.	The new attitude of public policy towards the Build-Operate-Transfer system (BOT) and to benefit from a new underground garage and commercial centre.	The first of ten planned underground garages as a new policy in Cairo.	The report starts with "after 25 years of study and analysis".
7	16/07/99	2	150 traffic management changes in Cairo during the last months	The huge increase in number of cars coming from the suburban areas.	Although these changes were essential they changed the mental image drivers have about the city.	Changes in the mental image resulted in an increase in penalty tickets.
8	24/07/99	2	Remaking of old Cairo.	The growth of the stock exchange has made it important to refurbish the building and the surrounding area.	The project is self-funding and is adopting the old architectural style of the area even in street furniture.	An engineer from the executive team work has commented that the residents of the building they refurbish can only help by not interfering.
9	24/07/99	2	The noise pollution in Cairo.	70% from that pollution is from traffic, 20% construction sites, 9% airport, and 1% all other sources.	The need to reduce the pollution for it's a huge danger to human health and productivity.	The UN categorises Cairo as one of the top ten nosiest cities in the world.
10	30/07/99	3	Pedestrian streets out of control.	The report lists many disadvantages of the pedestrianisation experience along with few advantages.	The urgent need to increase security in the street and to allow for a compromise with those who essentially need to reach some where in the street with a car.	The head of the district confirmed the significant success of the experience and that it will be applied in other places, however he agreed on the need for more security as it is not a district responsibilities.
11	17/08/99	2	The slums of CCC.	The poor condition of some legal and illegal areas which need the relocation of residents to allow further development.	The great potential available by having these areas ready for investment.	The report has a reservation on the failure to follow the G.C.R.S and allowing high standard housing to take the place of low standard which affected the relocation plan of the internal high density areas in the city centre.
12	24/08/99	1	The conflict: is it a traffic problem or a behaviour problem?	The speakers refer the problem first to the behaviour of drivers, service car drivers, then those of public busses, and also some private car drivers.	Urgent need for more discipline in the street instead of more flyovers or tunnels.	The report was initiated by the problems which accompanied the opening of the ninth and last stage of 6th of October bridge.
13	03/10/00	2	New plan of Opera Square.	The project was caused by Al-Azhar tunnels, which will result in removing AL-Azhar bridge from the background of the square.	To retrieve the lost cultural image of Cairo.	Ministry of cultural affairs is in charge of the project.

14	29/10/00	**3**	Pedestrian movement is part of the traffic problem.	The disorder in pedestrian movement (according to the report) is attributed first to their behaviour and second to a lack of facilities available to them for example sidewalks and crossing areas.	More attention should be given to pedestrian movement which was translated by the Cairo governor into the sidewalk refurbishing plan, and the presence of traffic men at intersection to facilitate crossing safely and the need for penalties for pedestrians crossing illegally.	Although the governor mentioned the refurbishing of sidewalks as a solution offered by the Governorate to solve the pedestrian problem according to street priorities, he mentioned that Salah Salem Street was first priority despite this being a highway with low pedestrian flow.
15	01/11/99	**2**	The need to reallocate the central and governmental services outside Cairo.	Immigration to the capital because of this centralisation and at the same time the traffic congestion problem and insufficient infrastructure.	To renew the old proposal of relocating these central services.	The reason mentioned for the previous failure is the incomplete planning vision and the short sightedness of some of the executive committee.
16	28/02/00	**2**	The need for pedestrian streets in CCC.	It is part of long list of actions needed to recreate an attractive visual image of Cairo.	The need for a comprehensive plan to recreate the visual and functional image of the city.	Some comments were anti-social like referring to immigrants from the rural area as having low standards, bad habits and behaviour, also describing workers in government posts as 'having low professional level' to accept the low salary offered in these posts.
17	06/04/00	**2**	New traffic plan for CCC.	Part of revitalising Fatimid Cairo especially after the construction of Al-Azhar bridge.	An update of the work in Fatimid Cairo project.	The speaker here is from the Ministry of Transportation and Communication.
18	15/05/00	**2**	The disorder in squares and absence of discipline.	The problem is attributed to pedestrian and drivers behaviour together with a lack of adequate traffic management and traffic signs, and inadequate enforcement of rules.	An inquiry into the Governorate plans for bringing order back to the streets of Cairo.	The report cites almost all the recent changes in the last year in Cairo.
19	13/06/00	**1**	Disorder of pedestrians in squares.	The problem is attributed to pedestrian behaviour together with a lack of adequate traffic management and traffic signs, and inadequate enforcement of rules.	The report tackles the problem of pedestrians crossing in places like Ramsis Street, which could put their life in danger and causes traffic conflict and delay.	The users object to the enforcement of methods of on pedestrians that treat them like 'cattle'.

Appendix E - Users' Questionnaire

The following is the test given to the respondents in the questionnaire. It should be noted that the format in which these questions were given is different from the way it is presented below. In the distributed questionnaire forms, sufficient answering space was provided to each question and a whole page for the two questions requesting maps.

ACADEMIC QUESTIONNAIRE

Dear Citizen,

This questionnaire is part of a study that concerns the urban development of Cairo in general and the city centre specifically The research focus on the pedestrian movement It is obvious to you the importance of the planning and design according the real needs of the place users Therefore you can realise the importance of your opinions that you going to mention in this questionnaire and the necessity for it to be derived from your own mind and experience Your participation in this questionnaire will have a strong effect in this research success and would be a positive contribution to develop Cairo to a better environment in the future

THANK YOU FOR YOUR COOPERATION

Notes:
* All information collected will be kept with the researcher for academic and research purposes.
* There are no right or wrong answers, I only want your honest opinions
* If the available space is not enough you can always write on the other side of the paper

Researcher: Mohamed A Salheen
Post-graduate Student
Heriot-Watt University - Edinburgh
Home University: Ain-Shams University

Date of Survey:
Date of Collection:
Respondent Code:

Respondent name (not obligatory) :
Place of Residence:
Type of Residence (including number of rooms):

I - BACKGROUND INFORMATION

1.1) The sex of respondent
A Male B Female

1.2) How old are you?

1.3) How much is your monthly income? (not obligatory)

1.4) What is your place of birth?

1.5) What is your occupation?

1.6) Where is your work?

1.7) Is Cairo your hometown?
A YES B No

1.8) How long have you been living in Cairo?

1.9) What is the highest level of your education?

1.10) How do you usually go to work?

II - THE IMAGE OF THE CITY AND ITS EVALUATION AS A WHOLE

2.1) Please name three places that you consider distinctive to Cairo and explain why if possible?
1
Reason:
2
Reason:
3
Reason:

2.2) How do you feel about living in Cairo?

I like it very much	I like it	I am neutral	I don't like it	I don't like it at all

Would you explain why?

2.3) Do you like to live somewhere else?

very much	yes	I don't know	No	Not at all

Would you explain why in all cases and where if you like to live some where else?

2.4) Do you shop at the city centre shopping streets after the recent development of many new shopping centres?
Please mention why?

Much more then before	more then before	Exactly as before	less then before	much less then before

III - PEDESTRIAN MOVEMENT IN THE CITY CENTRE

3.1) How many times you visit CCC?

A 5-7 days a week	B 2-4 days a week	C Weekly	D Monthly
E Seasonally	F Once a year	G Not at all	

3.2) What is the main purpose of your visit?

A Shopping	B Work	C Business visits	D Social
E Entertainment	F Study	G Administrational services	
H Other (specify)			

3.3) Which mode of transportation do you arrive to CCC by?

A Walk	B Take bus	C Private car	D Underground
E Other (specify)			

Do you prefer this mode then the others?
A Yes B No
Do you have another choice rather then this mode?
A Yes B No
If yes, what is it and why you do not prefer it?

3.4) What are the most important three factors that affect your movement in the city centre as a pedestrian? and how each of these factors affect your movement?
First factor
How:
Second Factor
How:
Third factor
How:

3.5) What is the most preferred three places to you in CCC? why?
First place
Reason:
Second place
Reason:
Third place
Reason:

3.6) Please, *list* the most distinctive *five* things of Cairo city centre Explain briefly why you include such an element, any reason that you can think of

First thing
Reason
Second thing
Reason
Third thing
Reason
Forth thing
Reason
Fifth thing
Reason

3.7) If you have two routs to go from place to another, one is short but has many changes in direction, and the other is a slightly longer but more direct with less changes in directions, which one you choose as a pedestrian to walk through?

A The shortest B The one with less changes in directions

4.8) In terms of pedestrian moving in Cairo city centre, here is a list of some factors that could affect your movement What is your valuation of the relative importance of each of (give degree for each one between brackets from 0 to 10) where 0 represents the least in importance and 10 represents the most for importance)

Can you also mention in front of each factor how it could be achieved if you consider it as a positive factor or how to avoid it if you consider it negative factor

Factors	Degree	How to be achieved or avoided
* Safety	( )	
* Regulations	( )	
* Security	( )	
* Protection	( )	
* Cleanliness	( )	
* Management	( )	
* Maintenance	( )	
* Congestion	( )	
* Pollution	( )	
* Existence of human activities	( )	
* Legibility	( )	
* Mystery	( )	
* Aesthetic pleasure	( )	
* Interest	( )	
* Pleasure	( )	
* Land-use pattern	( )	
* Topography	( )	
* Surroundings	( )	
* Building use	( )	
* Building shape	( )	
* Parking	( )	
* Services	( )	
* Utilities	( )	
* Street furniture	( )	
* Sidewalks	( )	
* Greenery	( )	
* Window shopping	( )	
* Restaurants	( )	
* Short cuts for pedestrians	( )	
*Crossings	( )	
* Number of direction changes	( )	
* Traffic	( )	
* Public transit	( )	
* Density of pedestrians	( )	
* Accessibility	( )	
* Continuity	( )	
* Directness	( )	
* Coherence	( )	
* Unfolding views	( )	
* Variety	( )	
* Diversity	( )	
* Others:		
*	( )	
*	( )	
*	( )	

3.9) Mention three places you feel lost in them, and give reasons for each
First place
Reason:
Second place
Reason:
Third place
Reason:

3.10) Mention three difficulties you face in moving around the city centre, and give two for each
First difficulty
Second difficulty
Third difficulty

3 11) Do you consider the experience of transforming El-Shawarby street to pedestrian area successful?

very successful | successful | I don't know | not successful | not successful at all

Why

3 12) Do you consider the experience of transforming El-Alfy street to pedestrian area successful?

very successful | successful | I don't know | not successful | not successful at all

Why?

3 13) Do you think there are other areas in the city centre could be transformed to pedestrian areas?

A Yes B No

Why?

If yes, please list these areas

3 14) Please give three aspects you like the designer to take in consideration in planning for pedestrian
First aspect
Second aspect
Third aspect

3 15) We would like you to *draw* a quick map of ***Cairo city centre*** covering the main features distinguished to the city centre through your experience and mental image Can you also show the limits of the city centre I don't expect an accurate drawing just a rough sketch

IV - FUTURE PROSPECT

4.1) Mention five changes or additions you wish to happen in the city centre of Cairo in the future to provide appropriate environment for both the pedestrian and the area itself
First
Second
Third
Forth
Fifth

4.2) Do you have other comments on the future of Cairo and its centre?

THIS IS THE END OF THE QUESTIONNAIRE,
THANK YOU AGAIN
FOR YOUR COOPERATION AND HELP

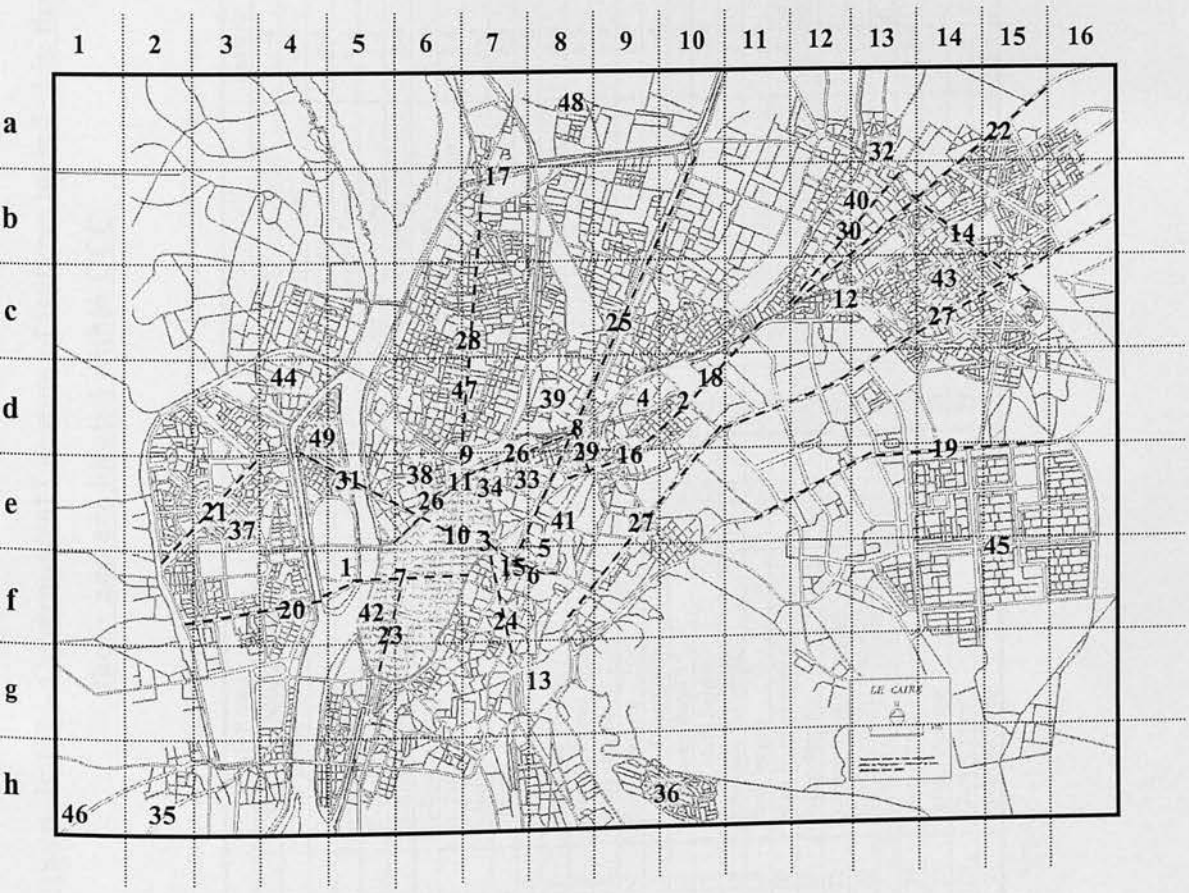
The next question is not obligatory, but if you have enough time, your answer of it would be very helpful for the research to cover most of the problem aspects

I would like you to draw a quick map of ***Cairo*** covering the main features distinguished to the whole city through your experience I don't expect an accurate drawing just a rough sketch

Appendix F.1 – Geographical Location of features included in the thesis and are located within CCC

Features are ordered alphabetically and according to Lynch's (1960) categories

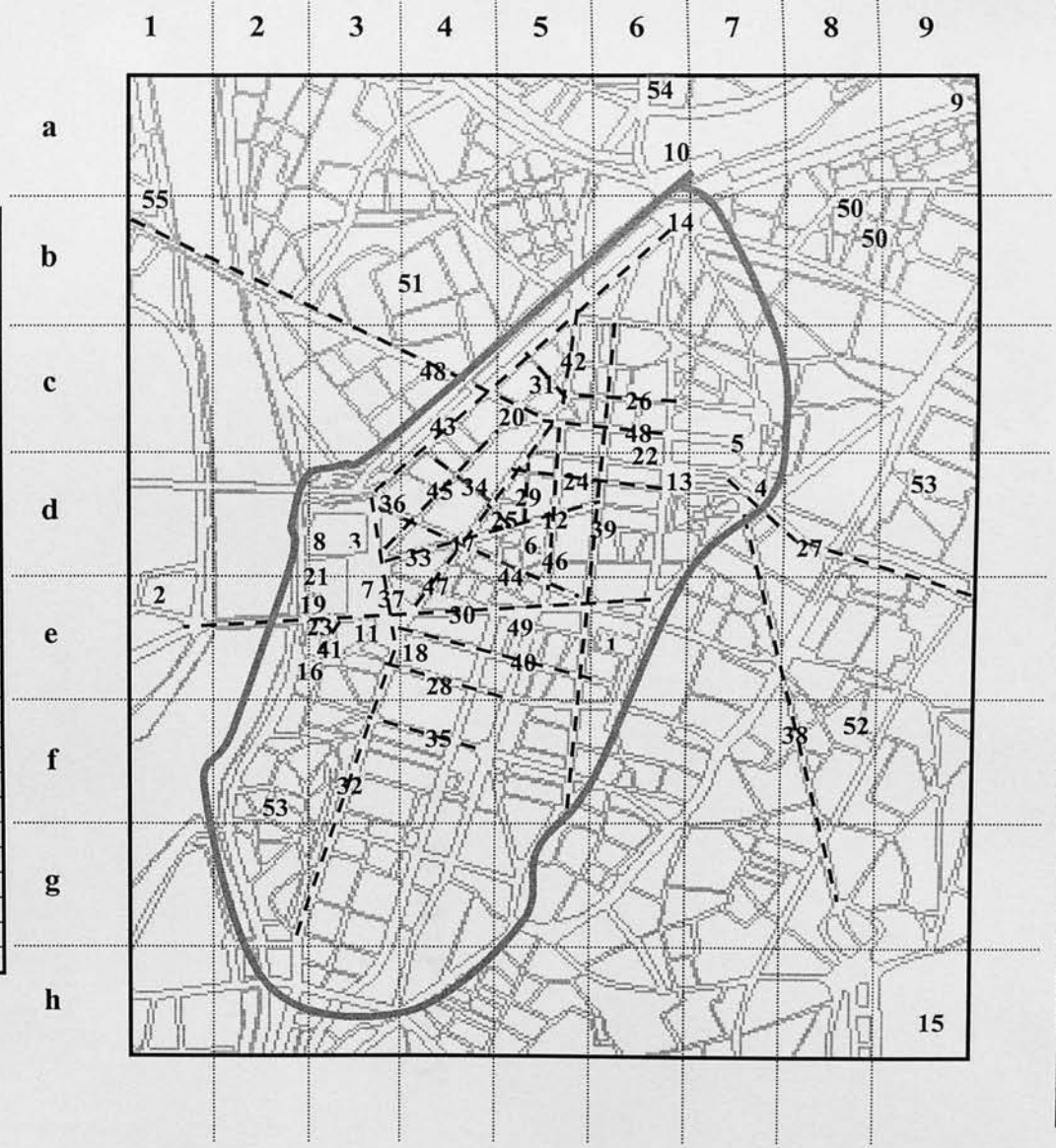
#	FEATURE NAME	Location	#	FEATURE NAME	Location
	NODES & LANDMARKS		25	Port Said Street	c-9
1	Cairo Tower	f-5	26	Ramsis street	e-6, 7
2	El-Abbasiah square	d-10	27	Salah Salem street	e-9, c-14
3	El-Ataba square	e-7	28	Shubra Street	c-7
4	El-Demerdash Hospital	d-9	29	Skakeny	e-8
5	El-Hossain square	f-8	30	Toman-bai	b-12
6	El-Azhar Mosque	f-8	31	26th of July street	e-5
7	El-Tahrir square	f-6		AREAS	
8	Ghamra	d-7	32	Ain Shams	a-13
9	Misr railway station	e-7	33	El-Dhaher	e-7, 8
10	Opera squares	e-6	34	El-Fajjalah	e-7
11	Ramsis Square	e-6	35	El-Haram	h-35
12	Roxy	c-12	36	El-Mokattam hill	h-10
13	Salah El-Deen Castle	g-8	37	El-Muhandeseen	e-3
	PATHS		38	El-Sabtiiah	e-6
14	Abo-Bakr	b-14	39	El-Sharrabia	d-8
15	El-Azhar street	f-7	40	El-Zaitoon	b-12, 13
16	El-Gaish street	e-9	41	Fatimid Cairo	e-8
17	El-Ismaeilia Canal	b-7	42	Garden city	f-5
18	El-Khalifa El-Ma'moun street	d-10	43	Heliopolis	c-14
19	El-Nasr street	e-14	44	Imbaba	d-4
20	El-Tahrir street	f-4	45	Nasr City	f-15
21	Game'at El-Dewal	e-3	46	Pyramids	h-1
22	Gesr El-Sues street	a-15	47	Shubra	d-6, 7
23	Kasr El-Ainy Streets	f-5	48	Shubra El-Kheema	a-8
24	Mohamed Ali	f-7	49	Zamalek	d-4



Appendix F.2 – Geographical Location of features included in the thesis and are located within CCC

Features are ordered alphabetically and according to Lynch's (1960) categories

#	FEATURE NAME	Location	#	FEATURE NAME	Location
	NODES & LANDMARKS		28	El-Shaikh Reehan Street	e-4
1	Abdin square	e-6	29	El-Shawarby Street	d-5
2	Cairo Tower	e-1	30	El-Tahrir Street	e-4
3	Egyptian Museum	d-3	31	El-Tawfekiah Street	c-5
4	El-Ataba square	d-7	32	Kasr El-Ainy Streets	f-3
5	El-Azbakia fence & garden	c-7	33	Kasr El-Nil Street	d-4
6	El-Boursa area	d-5	34	Ma'arouf Street	d-4
7	El-Tahrir square	e-3	35	Magles El-Sha'ab Street	f-4
8	Faisal Bank	d-3	36	Mahmoud Basiuny Street	d-3
9	Ghamra	a-9	37	Merit Street	e-3
10	Misr railway station	a-6	38	Mohamed Ali Street	f-8
11	Mogamaa El-Tahrir	e-3	39	Mohamed Fareed Street	d-6
12	Mostafa Kamel squares	d-5	40	Mohamed Mahmoud Street	e-5
13	Opera squares	d-6	41	Omar Makram Street	e-3
14	Ramsis Square	b-6	42	Orabi Street	c-5
15	Salah El-Deen Castle	h-9	43	Ramsis Street	c-4
16	Semiramis Hotel	e-2	44	Sabri Abo-Alam Street	e-5
17	Talaat Harb Square	d-4	45	Shambelion Street	d-4
18	American University	e-4	46	Sherief Street	d-5
19	Arab league	e-3	47	Talaat Harb Street	e-4
20	High court of justice	c-5	48	26th of July Street	c-4, c-6
21	Hilton Hotel	e-3, d-3		AREAS	
22	Intercontinental Passage	d-6	49	Bab El-Louque	e-5
23	Ministry of Foreign Affairs	e-3	50	El-Fajjalah	b-8
	PATHS		51	El-Sabtiiah	b-3,4
24	Abdel-Khalek Tharwat Street	d-5	52	Fatimid Cairo	f-8
25	Behler Passage	d-5	53	Garden city	f-2
26	El-Alfy Street	c-6	54	Shubra	a-6
27	El-Azhar Street	d-8	55	Zamalek	b-1,2



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