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Capturing the Essence of the Capital City:

Urban Form and Urban Life in the City Centre of Tripoli, Libya

By

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Declaration

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Abstract

The main aim of this research is to build a body of knowledge, which would lead to understand the relationship between socio-cultural practices and urban form within the city centre of Tripoli. The research analyses the urban form of Tripoli by comparing three areas of the city centre, which have different origin, history and layout, at the scale of the neighbourhood and urban block. The research firstly applies a quantitative approach to urban morphology through the use of two sets of indices that identify and calculate the patterns of street network and urban blocks. Secondly, the thesis investigates how the quality of street front affects social interaction in different urban patterns, based on street centrality. Finally, the research defines constitutedness, including building permeability and typological depth as well as street intervisibility, which define the relationship between public and private spaces.

Aspects of the investigation includes: the historical development of the city centre of Tripoli as well as the role of Islamic principles in shaping the social life and the built environment in the traditional urban form. The research proposes a methodology for the representation of Tripoli urban fabric. This method mirrors a structural approach to urban morphology, in that it selectively only represents those aspects of the urban form (spatial factors) that may result being connected by permanent spatial relationships. “Permanent”, in this context, means *recurrent* in space (geography) and time (history) within relatively large and defined geographical and historical domains. Supposed permanent relationships are therefore both extrapolated and tested by means of an evidence-based approach grounded on real case analysis. The case analysis is conducted at the street neighbourhood and block scale.

The research seeks to identify the process of transformation that has occurred in the evolution of the urban form through comparing three samples that typically represent different periods in the history of the city’s formation. These samples are; the traditional neighbourhood represented by the Old Town, and the colonial urban fabric including Italian and British neighbourhoods. The findings will show how the morphology of the traditional and colonial fabrics differ, how the differences modify recurrent spatial relationships and how such modification took place in history, leading to the transformation of two important urban elements; the urban block and street structures. This research argues that rather than extensive transplantation of foreign urban models, it is essential to understand local structural

principles and implement them into the design of future developments in order to maintain a sense of continuity and cultural identity while responding to contemporary life requirements.

Key Words: urban form, urban block, street network, street front quality, social intersection, constitutedness, Islamic built environment.

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Chapter One:
Introduction and Research Methodology

1.1 Introduction

Tripoli, having been the capital of Libya for centuries, represents an important cultural and central heritage site with an outstanding quality of urban form and architecture. Like many other great Mediterranean cities, Tripoli's history dated back to the Phoenician era. The uniqueness of its heritage provides the city centre of Tripoli with a rich architecture and urban form that evolved through several civilisations. Its urban form expresses the characteristics of the city culture that developed over centuries. Moreover, traditional urban spaces and buildings reflect the local social activities that have been performed in the city over centuries and represent the culture and tradition of previous generations.

Since the second half of the twentieth century, Tripoli underwent rapid change and transformations in its economic, environmental and physical structure. Its urban form was affected by mere functionalistic, stylistic, and materialistic aspects rather than sustainable developmental variables. The new developments did not take into account the cultural and historical values of the city and failed in gaining the respect and satisfaction of the local people. Currently, the urban fabric of Tripoli is suffering from an unbalanced situation between its traditional fabric that is developed over time, and the modern fabric that is based only on imported values of contemporary characteristics

It is, therefore, essential that all local authorities realize these problems and their shortcomings, in order to provide practical solutions that correspond to local culture and heritage. This research addresses the spirit of indigenous architecture and the original identity of Tripoli's urban fabric within rapid urbanised areas to promote strong evidence that globalisation can only succeed through the presence of local characteristics of urban context, where social life can be enhanced. Moreover, through the study of the Tripoli case, a wider approach will be sought for understanding how urban design as a discipline, can be informed by a deeper knowledge of the structural mechanisms of evolution and change in the built form.

1.2 Research Problem: Modernisation, Globalisation and Standardisation

During the second half of the twentieth century, Tripoli faced a major transformation process. The morphological aspects of the development followed the modern discourse, which failed to grasp the importance of original morphological patterns in preserving the essence and identity of the city. Following a modern Western planning ideology, the planning system of Tripoli adopted international modernist planning strategies, omitting the local and traditional principles in designing new neighbourhoods. The modern system has caused the creation of placeless urban environments in Tripoli. Like many countries around the world, Libyan cities were influenced by these planning strategies. Predominantly during the 1970s and 1980s, the nationalist discourse on planning and architecture adopted an internationalist style. Therefore, at present, the majority of Libyan cities carry identical traits of spatial organisation and building typology, where the local identity is lost in new development plans.

The contemporary process of designing urban fabrics is completely different from the local traditional process. While the former is directed by foreign instructed methods, the latter was formed by a method that respected the traditional environment and was developed in close relation to local life styles and activities. The main outcomes from the modern movement were built environments dominated by mobility, heterogeneity, and rapid urbanisation (Rapoport, 2000). Therefore, the rapid increase in mobility, population and the immigration into the city of Tripoli, in addition to the new technology and fast production systems, encouraged the construction of high-rise buildings and apartment blocks during the seventies and eighties. Consequently, the relationship between buildings and outdoor space was neglected in modern neighbourhoods (Azzuz, 2000).

Parallel to these concerns, in "*Urban Transformation: A history of Design Ideas*", Hanson (2000) states that the way of designing buildings has a direct impact on the way of producing cities, architecture and planning. Traditional urban morphology is replaced by modernist space, where buildings are separated from the public spaces in ways that diminish the relationship between the urban users and their surroundings, increase the users' alienation from society and generate what is called by Hanson (2000) the "*ruptured interfaces*" between the building and the street. With the physical disconnection of buildings, urban layouts changed from *"all neighbours"* to *"no neighbours"*, and the street was transformed into a separated domain (Hanson, 2000).

In the absence of local design guidelines, foreign firms began applying their own planning regulations and standards on the new development around the city of Tripoli. These guidelines, which were imported by German, Greek, Korean and Polish consultants, followed the modern movement of designing cities and introduced new schemes of urban development that treated buildings as isolated objects sited in the landscape. Due to the wide mixture of these imported standards, all attempts failed to create outstanding urban fabrics and the results were mainly collections of buildings that are completely incompatible with the local environment. In addition, Brolin (1976) argues that the ideology of modern architecture tended to focus on the way people should live rather than the way they do. Amos Rapoport (2000) states that due to adoption of the international style and rapid development, the current built environments became no more than a collection of characterless urban spaces.

Tripoli was influenced mainly by the planning approaches of Doxiadis and Poly Service, where the remarkable long and rich history of the city is excluded from taking part in new developments. These developments do not in any way express local social criteria, collective spaces or traditional principles. Therefore, today, the local identity of Tripoli is facing a great challenge, where high-rise buildings dominate the peripheral areas of the city through scattered non-contextual development plans. High-rise buildings with modern style were standardised and duplicated all over the city, although these buildings were culturally unsuitable and socially unacceptable by the local citizens (Azzuz, 2000). According to Nasr, (1978), the failure of the modern approach in developing urban forms is mainly caused by ignoring the socio-cultural practices and overlooking the local nature of the built environment.

1.3 Research Motivation: Traditional Urban Form and Sense of Community

As stated by Eriksen (2007), modern process of technology and economy initiated the creation of globalisation, de-localisation and standardisation. Due to these modern rapid developments, the place identity of the built environment was neglected and the social behaviour lost its cultural tradition. Therefore, placelessness of urban form has a negative impact on city life and its social activities. In that manner, Castells (1997) points out that the identity of places can be distinguished from each other only by their own characteristics, personality and locality, which are rooted in a space-time framework. The distinctiveness of a place is a production of cultural effects, religion disclosure, personal desires and environmental influences. The identity that is embodied in places is utterly significant in maintaining the sense of belonging between its residents and the surroundings (Watson & Bentley, 2007). The sense of affiliation strengthens the relationship between traditional urban forms and their users, as the built forms shape cultural patterns that are related to certain human expressions (Giddens, 1991). According to Kevin Lynch (1972) and Gauthier (2005), the sense of wellbeing of people originates from the stable references that preserve a sense of continuity and hold meanings to the local culture with the past forms. "*Historical cities, as the collages of time are the very references connecting past, present and future*" (Lynch, 1972, p235). The sense of territorial belonging and local culture are reflected through the characteristics of urban pattern and spatial aspects along with those who perceive the built environment (Serageldin et al., 2001).

During the seventies of the last century, a new movement known as the Postmodernism emerged as a counterpart to Modernism, which aimed to search for identity within urban built environment (Jenks, 1991). Modernism treated buildings in a way that is based on the unified architecture vocabularies regardless of cultural aspects and environmental conditions. Postmodernism's approach, on the other hand, was to enhance a sense of community, vernacularism and meanings in relation to the local urban form, which have a continuity with the past (Ellin, 1999). One of the outstanding architects of this movement was Gottfried Semper, whose work is considered to be a part of a continuous process of cultural progress and revitalisation to the historical architectural elements of Greek and Gothic architecture (Hvattum, 2004). When referring to Postmodernism; Robert Venturi represented what is known as *Contextualism,* which was defined as an architectural movement that responded to its surrounding context and "*re-establish the intimate and mutual comprehension between architects and clients to achieve plural coding*" (Connor, 1996, p82).

Moreover, Regionalism paid attention to such an approach not only to the surrounding context but also to the history of a place, which responds to regional factors (Ali, 1985). Regionalism, as defined by Kenneth Frampton in the late twentieth century, is an architectural style that presents an acceptable attitude and language to unify urban forms, dilute the cultural differences and respond effectively to the local climate, geography and traditions. Regionalism "*alerts us to the homogenising and often placeless nature of Modernity, while attempting to reinforce a contemporary and phenomenological-based authenticity which is more representative of places and local constraints*" (Kelbaugh, 2007, p183). Neo-rationalism is another method that pursuits a sense of a place in designing urban forms either through historical analysis or regional adaptation (Harvey, 2005).

Kevin Lynch (1981) states that imageability and legibility are directly relevant to the sense of place and identity of urban forms that reflects their social values and cultural meanings, which can be easily readable by the local users. On the one hand, imageability is an urban quality that potentially promotes people to build memories and nostalgia towards a certain place. It is formed by "*the intensity and singularity of their apparent movement, contour, size, shape, surface, quality and signs*" (Appleyard, 1969, p136). Legibility, on the other hand, is an urban quality that enhances peoples' understanding of the layout of a place and helps them in finding their way through it. Legibility can be obtained through Kevin Lynch's five urban elements; nodes, edges, paths, districts and landmarks, which play a major role in identifying the destinations around the city (Bentley et al., 1985).

Winston Churchill once said in a famous aphorism "*We shape our buildings, and afterwards our buildings shape us*" (Gibson, 2010, p15). There are many mutual relationships between inhabitants and their environment. Each one shapes, and is shaped by the other. For a long time people have depended on their survival on the quality and quantity of the elements, which make up their environment. Amos Rapoport (1981) states that cities in general gain their identity through a complex process in which culture always plays a dominant role. He adds that the sense of place, which makes each city unique, is defined by the culture that attributes different textures, form and meaning to its environment.

In summary, sense of place and social behaviour are closely connected. This notion paves the way to establish a foundation for studying the city centre of Tripoli and its evolution in order to find the distinctiveness of the local built environment in enhancing social behaviours and city life. Any future development should include a cultural approach that identifies the value system of local people and the meaning of place in their environment. If that is ignored, a destabilisation of local people's cultural heritage and a loss of their "identity" will occur (Rapoport, 1981). Tripoli, as a cultural artefact, reveals how people contribute to the community, transform the place they live in, respond to the limitations or potentials of their environment, and how all this is engraved into the landscape through spaces, blocks and buildings. In Tripoli's city centre, each urban component has its own story to tell of how the city came into being and what has been achieved as a morphology that still works and can be used for further developments.

1.4 Research Meaning: Defining the Research Methods

According to the Oxford English Dictionary, research is a careful study or investigation to discover facts or information. In general individuals or organisations research to explore things that they are interested in, or as a part of a required work. In order to interpret the relationship between the aspects of cultural behaviour and the pattern of built environment, Esterberg (2001) states that exploring the theoretical approaches is the best way to understand this relationship in reality. Theories are not the only method that provides a clear understanding of the connection between urban form and social activities. Observation, measurement and field investigation are all strategies that can help in understanding what is going on in the real world. The relationship between empirical world and the theoretical world has to be taken into account before beginning a research study (Esterberg, 2001).

Blaikie (2000) defines four research strategies that have constructed the relation between theory and reality, which are: *inductive, deductive, retroductive, and abductive*. The *Inductive* method is generally used in qualitative research in order to provide an explanation and set up a theory through observing certain phenomena. The *Deductive* method, on the other hand, is generally used in quantitative research that starts with a theory, which is then tested and developed through studying its real manifestation. The *Deductive strategy* evaluates the collected data with the theory and then supports the right ones and eliminates the false ones. *Retroductive strategy*, in a way, is similar to the deductive strategy, as both strategies include empirical studies and tend to examine “*what is thought to be known*” and extends “*what is known by common observation*” (Blaikie, 2000, p109). However, *retroductive strategy* constitutes a theoretical model to clarify the hidden mechanisms, mainly because these mechanisms are unavailable for observation. The *abductive method* is different from the others in the way it looks at the nature of the problem, as its origins and its approach aims towards finding adequate answers. In addition it describes activities and meanings and develops categories and concepts in order to understand the problem.

Lindsay Mack (2010) points out that using paradigms in the research process can be an effective method, as paradigms form the researcher’s methodological alternatives, which have an effect on the relationship between the theory and the collected date. These paradigms are identified by Creswell (2003) as *knowledge claims*, where they show philosophical assumption, epistemology, ontology or methodology.

Cherryholmes (1992) states that utilizing pragmatist knowledge is a main supporter of the research problem. He claims that pragmatic knowledge emerges from actions, situations, and consequences that focus on the problem and present the adopted alternative solutions of the literature review. However, Creswell mentions that pragmatism is not attached to one reality and it takes advantage of both *quantitative and qualitative methods*. It starts with the research problem and then, through taking a ‘pluralistic approach’, it structures knowledge. It provides more flexibility for researchers in choosing the methods, techniques and procedures for their research. Quantitative and qualitative methods are both used in order to find, understand and work out the research problem. Consequently, researchers believe that pragmatism encourages different views, methods, data collecting methodology and analysis (Creswell, 2003).

Creswell (2003) states that there are three strategies of mixed method design: *sequentia*l, *concurrent*, and *transformative*. In the *sequential procedure* a researcher can start with a qualitative method for investigation and then carry on with a quantitative approach for a large sample, or vice versa. In a *concurrent procedure*, the researcher combines both the quantitative and qualitative methods simultaneously with the purpose of dealing with the research problem extensively. The *transformative procedure* has a theoretical perspective that includes both quantitative and qualitative data, in order to conduct the research.

Along with a comparative case study, both qualitative and quantitative methods are used in this study as a mixed method approach. Through applying the Multiple Centrality Assessment (MCA) and qualitative and quantitative methods, this research tries to examine the urban pattern of Tripoli's city centre both subjectively and objectively. In this research comparative case studies are selected, in order to understand the relationship between urban form and social form.

1.5 Research Objectives and Methodology

This research sits in the debate of the urban form's contribution in meeting larger societal needs, which formed the discipline of Urban Design in the past two decades as part of the "place-making" agenda. In Islamic contexts, this debate touches the overarching cultural conflict between global trends of westernisation and the preservation of local identity in the "home environment" (Al-Naim, 2006a, b). In this sense, the Islamic vs. Western conflict can be reinterpreted more appropriately as a part of a wider conflict between Tradition and Modernisation, which is deeply present in the Western and the Islamic Countries alike. Traditional urban and street structures are, therefore, under a new wave of attention regarding their ability to "make places" that can adapt in time and demonstrate a higher capacity to support community identity, safety, equity, and accessibility to urban resources and efficient use of land. These objectives of urban sustainability represent a "counter-revolution" after the modernist age, which is considered to be "*one of the most significant reversals in urban design history*" (Marshall, 2005, p9).

The research is determined to study the transformation process of urban forms of the three case studies within the city centre of Tripoli in order to interpret the evolution of the local built environment alongside its interaction with social life. The objective is to identify and measure features of urban form that can play a role in the re-codification of new principles of urban design that are conducive to place-sensitive local solutions. It is, therefore, a research in Urban Morphology. The morphological approach focuses on the two main elements of urban form; street network and urban blocks, which will be studied in Chapter Six. In order to understand the street form in detail, the study is broken down further into three aspects, which are: street quality, street life and constitutedness. Each of these three aspects has its own sub-principles that will be analysed in-depth in Chapter Seven and eight.

When it comes to methodology, we find that the term is defined as a system of methods and ideology used in a particular order (McLeod, 1987). Frederic and Healy (2000) state that research methodology is the mechanism through which the research aims are accomplished. According to Berry (1983), research methodology is not about collecting data and representing the evidence of the analysis, but it is more about the nature of explanation and the means by which explanations are produced. Due to the fact that there is no single universally accepted methodology, a combination of methodological paradigms is used to form the methodology of the research undertaken.

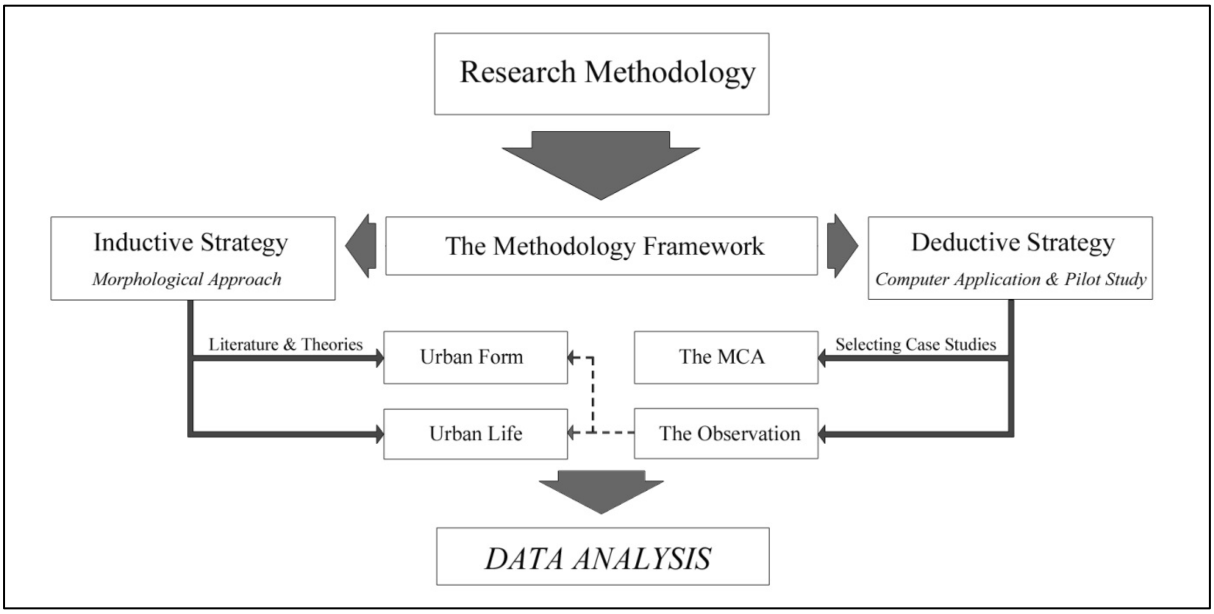


Figure 1.1: A flow chart of the research methodology

Using a combination of both quantitative and qualitative methods, and by understanding the patterns and relationships between the physical elements of urban form (i.e. street networks & urban blocks) and its liveability it is hoped that a more sustainable framework can be designed and developed to meet the needs of Tripoli's urban future.

This research starts with outlining a theoretical framework, drawing on a cross-section of the literature from various fields regarding urban form and socio-cultural practices. However, the main aim of this research is to build a body of knowledge that would lead to understand successfully the relationship between socio-cultural practices and urban form within the city centre of Tripoli. The field work investigates the contemporary perception of Tripoli's city centre and how people use the space in respect to their local culture. In doing so, the research methodology is based on the use of a systematic procedure, as illustrated in Figure (1.1).

In order to study the quality of social life and built environment, central places are identified as significant features, which relate directly to urban liveability (Porta & Latora 2008; Jacobs, 1961; Jacobs, 1993; Hillier, 1996; Hillier & Hanson, 1984 and Newman & Kenworthy, 1999). Porta et al. (2008, p450) state that "*A more central location commands a higher real estate value and is occupied by a more intensive land use*". Multiple Centrality Assessment in this study assists in finding the centrality in each case study's urban fabric, as a central location provides the potential environment to sustain social capital, increase the quality of streets and support the formation of urban "nodes" in time (Porta, et al., 2006a, b and Newman & Kenworthy, 1999).

As stated previously, Tripoli's city centre is made of three different types of urban fabric that express different stages of its historical, cultural, economical and political development. These three parts are: a) the Old Town which is considered the heart of the city, b) the Italian addition that is located south and east of the Old Town, dominating the most of the urban centre of the city, and is regarded as the second important part of the city, and c) finally the Garden City that was developed during the British government after the second world war.

This study uses a pragmatist approach and various methods through focusing on street network properties and urban block arrangements, which were developed in different periods. The research applies the MCA on the three cases and provides an in-depth qualitative study of a selection of their streets. Correlations are explored between the urban form and social life to understand the part-whole relationship, so that the three case studies can be compared in terms of their urban form measures and social interaction patterns. The research's process will be as follows:

Firstly, in Chapter Five, Multiple Centrality assessment (MCA) is used to analyse the connectivity and accessibility of the street network of Tripoli and identifies the most central parts of the city, which are then explored in depth. The MCA is also used in defining the hierarchical pattern of the street network in each case study. Boundaries of the case studies are defined by 400m edged squares based on the conventional distance of five minutes' walk.

Secondly, in Chapter Six, the study analyses each case study focusing on the street structure and the configuration of urban blocks. Street structure is measured by: density of streets and intersections, link/node ratio, internal and external connectivity, grid/pattern ratio and Ped-shed. The configuration of urban blocks is measured by: block density and area, block/street ratio and block perimeter.

Thirdly, in Chapter Seven, the study focuses on two issues: the first is the quality of the streetscape, while the second is the intensity and nature of street life represented by the amount and type of human activities in these spaces. The street form is analysed in terms of micro spatial structure represented by street front quality, which both are based on the centrality and the structure of street network. . Street front quality is measured by five indicators, which are: the number of units and doors (S), diversity of function (F), interfaces between in and outdoor spaces (O), modelling and condition of façades (M), and details and materials of street fronts (D). The measurements that are conducted to study the street life focuses on human presence and behaviour. The human presence is represented by the number of people who perform physical activities, such as: walking, standing and sitting; such activities are then grouped in necessary, optional and social. Observations as well as the MCA analysis are correlated with basic statistical tools. All the results are then integrated, compared and discussed in details. Constitutedness of street fronts are analysed in terms of permeability, topological depth and street intervisibility in Chapter Eight.

Consequently, the main research questions, based on the above, are: how the structure of street network and urban blocks affect connectivity, accessibility and permeability within the three neighbourhoods? What impact does the street structure have on city life? What street patterns characterize each urban form? Does the configuration of urban blocks have an influence on the social interaction between inhabitants? How do street qualities affect social activities in each neighbourhood? What is the relationship between street constitutedness and city life?

1.6 Research Structure

The first chapter of the research includes an introduction explaining the purpose of the research, its methodology and its structure. This chapter is followed by three chapters that relate to the theoretical framework, which are: Chapter Two, Three and Four. In Chapter Two a historical overview to the evolution of the urban form of Tripoli's city centre is represented, stating the different civilisations that occupied the city as well as their principles of architecture, urban design and social life. Chapter Three first reviews the Libyan traditional culture in Tripoli and then defines Islam, Islamic law or *Shari'ah*, as well as the Islamic principles on the social framework, represented in various degrees from an individual to a whole society, and the physical framework, which includes natural and urban environment.

Chapter Four discusses the background of urban morphology in terms of theories, schools and principles in the Western world. The concept of urban morphology is introduced through defining the urban form, morphology, historical development, and through presenting different morphological approaches. The chapter then introduces the approach used in this study, which is represented mainly by the Multiple Centrality Assessment. This chapter ends by reviewing in detail the two main elements of urban form, which are the street network and the urban block, as well as the relationship between built environment and social life through literature reviews.

These theoretical chapters are then followed by four chapters that contain analytical study, which are Chapter Five, Six Seven and Eight. Chapter Five bridges the gap between the theoretical foundation and the field work. This chapter first introduces the selection of the three different urban patterns, which represent different stages of the historical development of Tripoli's city centre, and then applies the MCA to find the most central parts in each case study.

Section	Chapter No.	Chapter Title	Chapter Description
Section One: Introduction, Methodology and Literature Review	**Chapter (1)**	Introduction & Methodology	Presents the research introductions and the research problem, motivation, meaning, objectives and methodology.
	Chapter (2)	History of Urban Development in Tripoli	Presents a historical overview to the evolution of the urban form of Tripoli city centre.
	Chapter (3)	Libyan Culture & Islamic Principles	Reviews the Libyan traditional culture in Tripoli and then defines Islam, Islamic law or Shari'ah, as well as the Islamic principles on the social and physical framework.
	Chapter (4)	Urban Morphology	Discusses the background of urban morphology in terms of theories, schools and principles in the Western world, and then introduces Multi Centrality Assessment, which is used in this research to study the urban forms.
Section Two: Urban Form & Social Life: The Case of Tripoli, Libya	**Chapter (5)**	Characterizing the Urban Form of Tripoli's City Centre	Introduces the selection of the three different urban patterns of the case studies, and then applies the MCA to find the most central parts in each case study.
	Chapter (6)	Analyzing the Neighbourhood: Street & Block Structure	Defins a range of indicators to study the street network and urban blocks and then applyies these indicators to quantitatively compare the street network and urban blocks of the three urban forms.
	Chapter (7)	Analyzing the Street Front: Quality & Social Life	Presents and applies a range of indicators to analyse the street quality and street life of the selected case studies in order to find the relationship between the quality of street front and social life.
	Chapter (8)	Analyzing the Street Edge: Constitutedness & Social Life	Analyses the constitutedness of the street form and then combines the social life results obtained from chapter seven with the constitutedness results, in order to understand the relationship between social life and constitutedness.
Section Three: Research Findings & Conclusion	**Chapter (9)**	Comparing the Findings of the Case Studies	Compares the three case studies and presents the key findings from the field work survey in order to understand the relationship between the socio-cultural practices and urban form of the city centre of Tripoli.
	Chapter (10)	Research Conclusion	Presents the thesis conclusion, highlights the main contributions to knowledge, summarises the main aspects of the conflict between tradition and modernisation, and provides directions for further research.

Figure 1.2: The research organisation

Chapter Six starts with defining a range of indicators to study the street network and urban blocks and ends by applying these indicators to quantitatively compare the street network and urban blocks of the three urban forms.

Chapter Seven presents and applies a range of indicators to analyse the street quality and street life of the selected case studies within Tripoli's city centre. The analysis are carried out with snapshots in terms of the quality of the street front, observing the social life, and measuring the relationship between them, which are then used to make a quantitative correlation between the quality of street front and its social life.

Chapter Eight is divided into two sections. The first section focuses on the constitutedness of the street form, which is based on centrality and the structure of the street network. Constitutedness is analysed based on three variables, which are; permeability, topological depth and street intervisibility. The second section of this chapter compares and discusses in details the social life results obtained from chapter seven with the constitutedness results, in order to understand the relationship between social life and constitutedness.

The analytical study presented by Chapter Five, Six, Seven and Eight is then followed by chapter nine, which is the comparison chapter. This chapter compares the three case studies in terms of their urban structure and social aspects and presents the key findings from the field work survey, which provides a comprehensive understanding of the relationship between the socio-cultural practices and urban form of the city centre of Tripoli.

The final chapter of this research is Chapter Ten, which includes the thesis conclusion, highlights the main contributions to knowledge, summarises the main aspects of the conflict between tradition and modernisation, and provides directions for further research.

1.7 Case Study Approach

Prior to the middle twentieth century, Tripoli's urban form evolved mainly according to three different models that collectively constituted its city centre. These forms that mainly represent the historical evolution of Tripoli's city centre are known as the Old Town, which represent the original part of the centre, the Italian Quarter, which is its most dominant part and the Garden City, which represents the sub- centre of the city. The Old Town form is developed based on the traditional Islamic principles that have originated from the Islamic law or *Shariah,* which will be studied in Chapter Three. The Italian Quarter and the Garden

City forms, on the other hand, were realised according to the imported ideologies of North African colonialism, where the first was introduced to Tripoli after the Italian invasion in 1911 in form of a masterplan designed by engineer Luigi Luiggi in 1912, while the second was based on Ebenezer Howard's utopian Garden City, which was introduced to Tripoli during the British Military rule that started in 1945. This unique urban configuration of Tripoli's city centre offers an excellent opportunity to study the social-economic impacts of three different paradigms on the design and development of urban form. Three different neighbourhood patterns from the Old Town, the Italian Quarter and the Garden City are analysed as case studies in this research. These neighbourhoods are selected based on the Multiple Centrality Assessment measures. Each neighbourhood is different from the other in terms of their development periods and planning approaches.

Applying a case study research method in the research process within a "bounded system" is to discover, identify and understand the observable and non-observable structures as well as the mechanisms that generate perception, development and evolution. It is related to a certain place and time and it provides a systematic way of observing events, recording results, collecting data and analysing information. The analysis of the case study can either be a multi-site study or within-site study, which combines both qualitative and quantitative investigation (Maanen, 1979). As Creswell (1997) points out a case study might be single or collective, multi-sited or within-site as long as it provides an overview and background for the researchers. The context of the case can be a physical setting, a social, historical setting, or economic setting. The purpose is to follow a holistic analysis for the whole case as an issue, or a specific part of it in relation to other parts that associate with it. In architecture and urban design research, Groat and Wang (2002) and Yin (2003) suggest five strategies for the researchers: firstly, identifying the case's capacity in terms of the bounded system; secondly, choosing a single case study or multiple case studies in their real life context; thirdly, gathering data according to sampling strategy; fourthly, recording the detailed information, relying on multiple sources of evidence; and finally, defining the boundaries of the case study in order to make the researcher identify the case's issue effectively. Yin (2003) emphasises that case studies, which are drawn from multiple sources of data, are more productive than those with a single source.

In order to confirm the literature review's evidence related to urban form and urban life, this research seek to gain a rich understanding of the urban structure in the city centre of Tripoli as a case study in relation to socio-culture practices. Therefore, the case study is applied as a field work inquiry. The analysis includes qualitative and quantitative evidences that are based on multiple sources of data and benefits from the prior development of theoretical propositions.

1.8 Reasons of Selecting the Case Studies

The urban configuration of Tripoli's city centre offers a good opportunity to study how different planning ideologies have created substantial different urban structure with various implications on the social and the economic aspects of urban life. The spatial and social evolutions within cities affect the perception, identity, social interaction and meaning of specific places. This research uses a combination of quantitative and qualitative methods in order to analyse the physical structure of different urban fabrics within the city, examine the structure of the urban fabric and the interactions between the inhabitants and their surroundings. By defining the physical urban structure and how the organisation of street networks, urban blocks, and the liveability of streets affect the connectivity, accessibility, and social interactions in three different historical neighbourhoods in Tripoli's city centre, it is hoped that a more sustainable form of urban development can be achieved to meet the demands of future development. The research is an in-depth study of interrelationship between social behaviour and built environment in the city of Tripoli.

According to the historical evolution, there are three urban fabrics in Tripoli that are based on outstanding frameworks. These urban fabrics are all constructed before the middle of the nineteenth century, and they dominate the main character of Tripoli's city centre. As mentioned previously, these three urban fabrics are; the Old Town, the Italian Quarter and the Garden City.

After selecting the three urban fabrics based on the historical evolution, the MCA analysis is used to figure out the central parts of each urban fabric and understand the network hierarchy of the city centre. The MCA is then used to determine the street type within the three case study areas depending on their centrality measures in the global analysis.

1.9 Methods of Collecting and Presenting Data

A range of methods are used to collect data from the field work including personal observation, drawings (plans, sections and elevations) and photos. The idea of multiple-method research is to avoid any bias and shortcoming that may occur when working with a single method. The following sections describe the different research methods and justify the choice of these methods, which are used for collecting primary data that relate to the urban form of the city centre of Tripoli and its social practices.

1.9.1 The Multiple Centrality Assessment (MCA)

The Multiple Centrality Assessment (MCA), is an advanced computer-based modelling and mapping tool, which is used in this research firstly to find out the most central areas within different urban forms of the city centre of Tripoli, and secondly, to define the hierarchy of street network within the selected urban fabrics. This pragmatist approach uses a number of indices through focusing on street network properties and urban block arrangements, which are developed in different periods, in order to analyse the connectivity and accessibility of the city's network and to find the most central parts of the city. The results gained from the different modes of the MCA on the selected parts of the neighbourhoods are then explored in depth quantitatively.

1.9.2 Observation

The observation is conducted mostly in the urban public spaces, in order to investigate various social activities that take place along streets, with relation to the street hierarchy and quality front of the built environment. The systematic method of the observational technique used records the behavioural pattern in different urban forms within the city centre of Tripoli in various street levels, based on the outcome of the Multiple Centrality assessment (MCA) which are: main streets, connecting streets and cul-de-sacs. The interpretation of behaviour in a specific setting depends on the potential of the urban quality and the setting of the land use, as well as the number of options it provides. The observation of spatial behaviour is used in this research, as it can generate data about how the different urban forms of the city centre of Tripoli support or interfere with social activities that are taking place.

1.9.3 Digital Applications

Due to the lack of digital drawings related to the city of Tripoli, the study applied different computer applications to produce the drawings, with the aim of exploring the spatial findings of the city's urban form. The applications most extensively used are: AutoCAD, Sketch up, Photoshop and GIS-Arc.View. Drawings such as plans, sections, elevations and details were produced after measurements and surveys for the actual built environment were conducted. Although, the drawings related to the Old Town are collected from the Department of Antiquities of Tripoli, most of the drawings that relate to the other urban forms were produced by the author while the study was in progress. In many sections of the thesis, the drawings are applied as a visual research method to illustrate and support the research's argument. These drawings are actually used as supportive techniques in answering the research's questions such as what are the historical characteristics of the Tripoli's urban form, how it is developed in terms of urban blocks and street network, and how the urban form and its physical and spatial quality influence and interact with the local social life. Column, bar, line, box-plot and pie charts are used in this research to represent the quantitative information related to both the urban form and the urban life. The charts are produced by Microsoft Office Excel 2010.

1.10 Research Obstacles: Difficulties in Collecting the Research Data

There were some difficulties and obstacles that faced the author during the pilot study. The biggest constrain was finding digital drawings related to the city of Tripoli, which was overcome by using other alternative resources to find data and mainly producing the required drawings by the author. Although, these difficulties do not have any effect on the validity of the research, they consequently increased the time consumed in collecting the required data and producing the whole set of drawings. These obstacles can be briefly outline as follows:

- Converting the hard copy map drawings into digital ones, due to the fact that digital copies are considered as confidential resources by the Libyan authorities. The drawings took a long time to be produced digitally, as the hard copies do not fit into applicable software that has the ability to convert them into digital ones in a sophisticated way. Therefore, apart from the Old Town, all plans are produced step by step using Auto-CAD and Sketchup applications. All sections, elevations and details of all three case studies are produced by the author using the same applications.
- The upraise against the brutal regime in Libya, which took place in the whole country from February 2011 until November 2011, caused some delay in conducting the pilot study and consequently affected the research process and caused delays in the research schedule.
- In order to catch up the time of carrying out the study in the city centre of Tripoli, some friends participated in taking some measurements and records for two streets in the Italian Quarter. They also took photos for some other streets within the selected case studies during different time of a day, as the analysis recorded social activities at peak and off-peak times.
- In general, there is a shortage in the local literature in terms of the evolution of the Garden City, its urban designers and architects, the authorities that participated in producing such neighbourhood, as well as the way this urban fabric integrated into the existing urban context of Tripoli's city centre.

1.11 Research Questions: Main Questions the Research Tries to Answer

This study explores how centrality and the quality of urban form along with its spatial spaces affect social life. It also analyses how the absence of hierarchy, not only in the network structure but also within public and private spaces, may deteriorate social life. The hierarchy of space is significant in producing a good quality of urban environment and urban coherence, as well as supporting social interaction. This pattern of public space also has an important impact on the identity of urban form. If hierarchy in centrality becomes less constitutes, both the urban form and social cohesion might be negatively affected. Unlike the new urbanism approach, Marcus and Francis (1998) state that urban form and community conduct are not the only predictors of city life, as the way buildings interact with the surrounding public spaces has a significant impact on land use, pedestrian movement and social activities. However, the arrangement of urban spaces and constitutedness are influenced by urban evolution, regulations, political guidance, public and private responsibilities and architectural patterns. Culture, traditions, and habits of citizens are also very important factors that are embodied in this relationship.

Therefore, along with the research's main question, the study tries to answer and understand the questions below:

- What do the terms: connectivity, accessibility and permeability mean? Why are they important in the structure of the street network and the arrangement of urban blocks?
- How does the quality of the built environment affect city life and sense of community?
- How does constitutedness affect the relationship between private and public spaces?
- What are the characteristics of urban forms in different historical neighbourhoods of Tripoli's city centre?
- What contributions do the structure of street network and urban blocks have on developing the environmental quality and enhancing the city life?
- How does constitutedness affect the character and form of the city?
- How does the street hierarchy affect social interaction and vitality in public spaces?

1.12 Conclusion

The research methodology combines the theoretical study, which is an evidence based-approach, and the practical analysis, which is a survey based-approach, in order to understand the interaction between urban built environment and the socio-cultural practices within Tripoli's city centre. The research starts by demonstrating the historical development of the city of Tripoli, then explores the traditional Libyan culture and Islamic principles and their effect on the social life and the built environment. It shows how multiple sources of data are applied in the field survey. The methodology intends to fulfil the research objectives by formulating a framework that is based on attributes derived from both the literature review and field work in the city centre of Tripoli. Therefore, the methodology of this research follows deductive and inductive methods in order to understand the relationship between city life and urban city form within the city centre of Tripoli.

In conclusion, the MCA is chosen in order to provide a better understanding of complex spatial relationships and make comparisons between different urban patterns. However, it is not adequate enough on its own to analyse cities from multiple perspectives. Therefore, it has to be correlated and overlapped with other methods. Recently there is a clear trend to use mixed methods, as one method can make up for the deficiencies of the other. Moreover, through correlating observations (such as pedestrian movement, stationary activities, and moving activities) with the configuration of street network and urban blocks, which depends on connectivity, accessibility and permeability, this research aims to answer the research questions mentioned above.

Chapter Two:

Historical Urban Development of Tripoli

2.1 Introduction

It is almost impossible to understand the architecture of a city without reference to its particular historical urban development. Its development should be re-examined to rediscover the logic of its urban form. History is a mean to interpret the architecture of past generations and gives insights for present and future urban development. Therefore, this chapter re-examines briefly the history of the urban development of Tripoli's city centre. The historical study of the urban built environment of the city is not carried out for an academic interest only. Historical studies bear practical consequences as they can reveal some culturally determined patterns, which carry with them timeless elements of cultural identity.

Tripoli (*Trabulus*) is the capital of Libya and is presently considered the largest and busiest city in Libya. It is distinctively located on the western coast of Libya, where the Sahara Desert meets the Mediterranean Sea. Its uniqueness in having a large protected area of waterfront led it to be one of the most important trading ports in the southern Mediterranean Sea. Due to Tripoli's strategic location and mild climate, the city was ruled by different civilisations since the prehistory period (Haynes, 2003).

Tripoli has actively participated in the great human civilisations over time. Different civilisations, such as the Phoenician, the Roman, the Carthaginian and Muslims earned the city the hallmark of its special cultural characters. Through its long history, the city attracted diverse civilian replete with multi-cultural transformations, political trends and intellectual creativity, and by incorporating different cultures, arts and religions, it became a museum of originality and pedigree, in which the physical urban structures of the city represent varieties in transformations that express the different stages of historical, cultural, economical and political status (Metz, 2004).

2.2 The Prehistory Period of the West Coast of Libya

Originally the west coast of Libya, which was called later Tripolitania, was established and shaped thousands of years ago, dating back to the days of Palaeolithic man. According to the traces of prehistoric man in the province, the initial footprint showed that indigenous inhabitants occupied the region along the line of Al-Khoums, Tarhouna and the hills of

Gharian (Haynes, 2003). During the Palaeolithic, the Mesolithic and the Neolithic periods a gradual yet different evolution in building typology was produced traditionally, mainly due to the climatic variations in weather conditions between the coastal and mountain areas. These buildings were widespread all over the region presented in caves within the mountain area and dwellings made of rocks and tree logs for the residents of the coastal areas (Haynes, 1955).

Along their prehistory, Libyans never achieved large measurement of political unity, despite their linguistic and religious uniformity. The form of centralised authority was hindered by their division into a number of tribes. Therefore, their desire for independency and self-defeating provided their successive masters with the ability to hold them down during the greater part of ancient history by applying the method of *divide and rule*. However, they were never prepared to accept losing their freedom and their persistent attempts to regain the region are not the least important events of Tripolitania history (Haynes, 2003).

2.3 Tripolitania

From the thriving ports of Tyre and Sidon on the eastern coast of the Mediterranean Sea the Phoenician sailors started their adventures to the west coast of Libya. After a long period of sailing trips, trading, short visiting, discovering and building relationship with the indigenous inhabitants at the west coast of Libya, large number of Phoenicians residents settled in Tripolitania coast transforming the original trading stations of old Tripolitania into Phoenician cities at the end of the second millennium B.C. (Harden, 1962). Phoenicians established three main places as appropriate settlements for living: Leptis Magna (Al-Khoums), Uai'at or Oea (Tripoli) and Sabratha. These three places became the main cities of the Phoenician Empire, and the province carried its name after them (El-Barghuti, 1972). Meanwhile, Tripolitania was a new Phoenician power raised to lead the western colonies against the expanding maritime power of Greece. Under Phoenician control, Tripoli became an international port and the main shift point of the trading process between Europe and Africa. This fact significantly influenced its initial physical structure and generated the characteristic of the special cultural developments (Haynes, 2003) (Figure 2.1a, b).

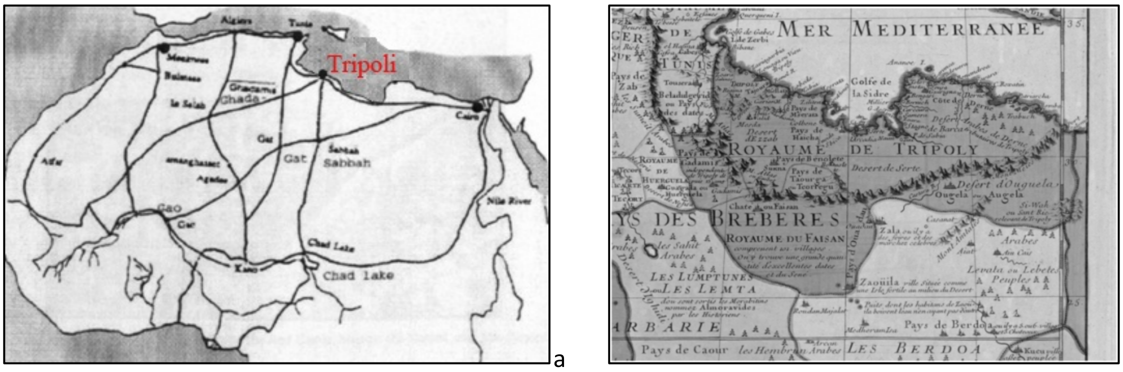


Figure 2.1: a) The location of Tripoli within the trading routes, b) Tripolitania - mapped by Guillaume Delisle, 1707 (The Planning Bureau of Libya)

In 520 B.C. and after a short-lived adventure, Dorieus, a Greek emperor, tried to combine the west part of the Libyan Coast to Cyrenaica. However, the emperor was defeated at Wadi Caam by the Carthaginians with the help of local Libyan tribes and the Greeks conquered Leptis Magna for three years only. From 517 B.C. onwards, Oea, Leptis Magna and Sabratha became part of Carthaginian Empire. The Carthaginian constitutions were inherited from the Phoenician cities, by which were by then founded, and there was no reason to alter them since they had been so sophisticated and comprehensible. The settlement remained in force until the middle of the second century B.C. where Tripolitania throughout this period witnessed peace and flourishing (Etlissi, 1985).

With the help of the Romans, Masinissa, a Numidian chief, gained control over Tripolitania around 150 B.C. The Numidian government was too far from being efficient and productive in terms of their daily life. However, they developed a good relationship with Rome and the Romans were their main supporters. The Romans paved the way for their intervention in the region by establishing a friendship and alliance treaty with Oea, Leptis Magna and Sabratha independently in 111 B.C. The Roman troops under the leadership of Caesar were stationed in Tripolitania for the first time in 46 B.C. after defeating the coalition of Juba I the King of Numidia and Pompeians at Thapsus. From then, Tripolitania constituted the new province of Africa Nova, under the name of Africa Vetus and the settlement witnessed amity and commercial success under the Roman custody. "*The old Phoenician towns were transformed into fashionable Roman cities with temples, theatres, market-places and dwelling houses built to Roman designs; comfortable villas and farms spread over the countryside*" (Haynes, 2003, p37) (Figures 2.2 & 2.3).

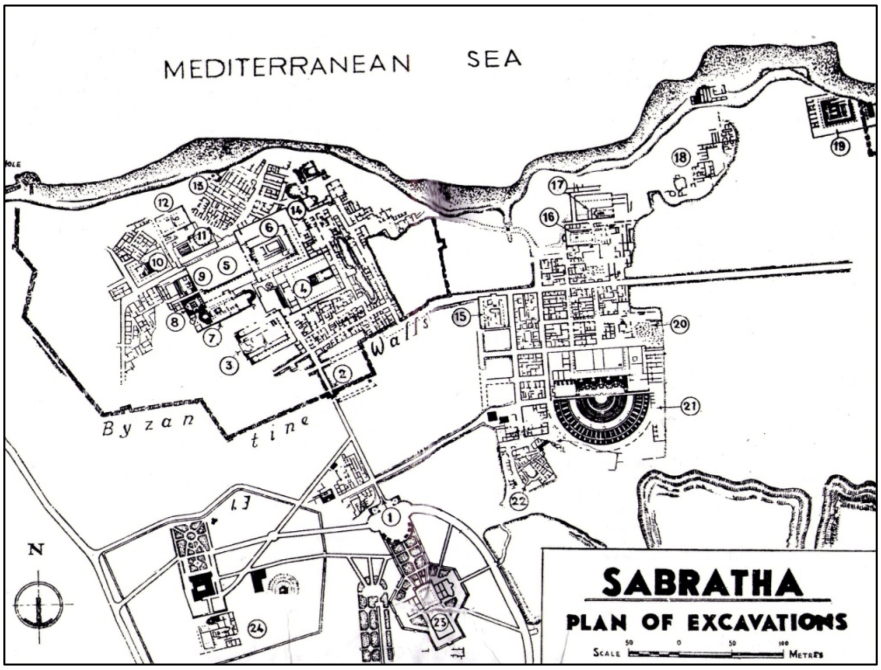


Figure 2.2: Sabratha during the Roman period (Haynes, 2003, p80)

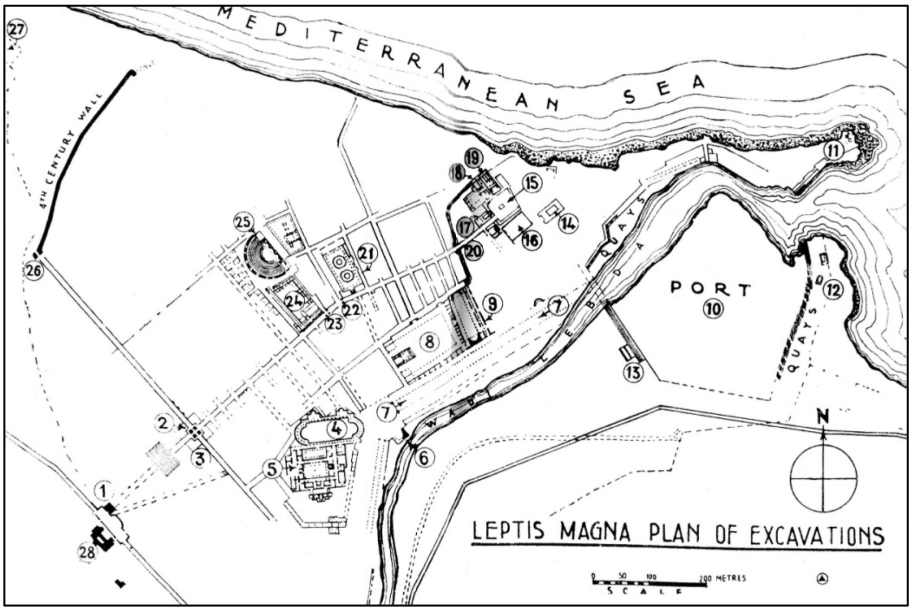


Figure 2.3: Leptis Magna during the Roman period (Haynes, 2003, p56)

It was stated by Ward (1996) that the Roman period in North Africa was generally identified as a model of reciprocal relationship with the indigenous people rather than a period of colonisation. From the beginning of the Roman period the local Libyans enjoyed all the rights and privileges of the Roman citizens, and the architecture monuments and urban forms were the most definite evidences of the prosperity of the Roman era. Perhaps the most outstanding Roman monuments that have survived to these days are the Great Baths of Leptis Magna, the theatre of Sabratha and the Arch of Marcus Aurelius in Oea, which all show the greatness of the Roman architectural achievements. El-Names and Abou Hamed (1978) point out that the importance of the Arch of Marcus Aurelius originates from its location as it was built at the crossing point of Cardo and Documanus on a central point of the Roman forum, where its composition contains the four-sided arches. Most likely these two arteries were surrounded by important public buildings, such as major residential dwellings, temples and public paths (Figure 2.4). Bertarelli (1929, p289) considered the Arch of Marcus Aurelius as "*the most admirable historic monument of the city, and perhaps the most beautiful of all honorary arches in Latin Africa, the Arch was raised at the intersection of a Cardo with Decumanus in 163 A.D*".

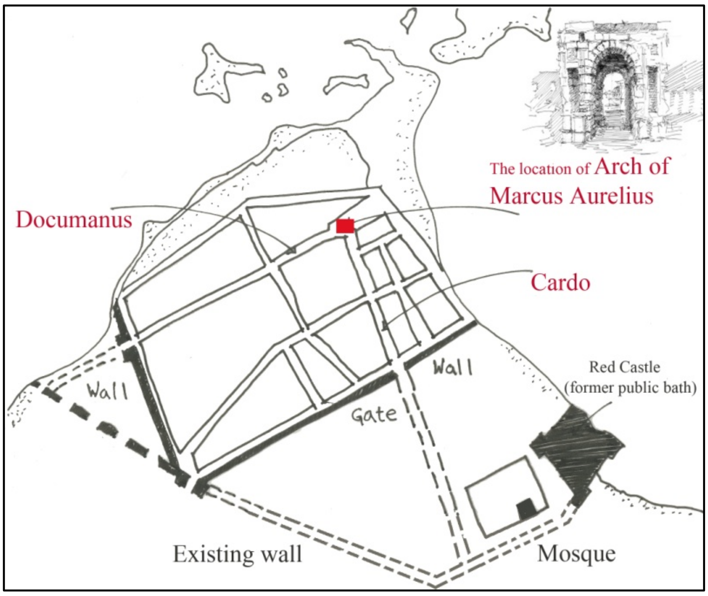


Figure 2.4: Tripoli during the Roman period (Messana, 1979)

During the second century A.D. and within the Roman era, Tripolitania's Economic became more prosperous and rich. Many economic aspects were developed as a part of the prosperity of this province such as agriculture, maritime commerce and trans-Saharan trade. During this period, the three major cities of Tripolitania were developed into well-urbanised places, where the characteristics of the Roman planning system played a major role in the formation of these cities (Dunbabin, 1978).

In 193 A.D Septimus Severus, who was a native of Tripolitania from Leptis Magna, became the first native to be an emperor of Rome and rule the Roman Empire. He was popular among the people of Rome as well as the people of his home area of Tripolitania. Due to Septimus Severus's connections to elites on both sides of the Mediterranean Sea Oea, as well as Sabratha and Leptis Magna, thrived and experienced what some historians refer to as an early golden age. After 297 A.D the name Tripolitania was shortened to Tripoli. Later, under the rule of the Augusti, Oea was given several privileges, which made it grow into an important centre. At the same time, the conditions in Leptis Magna and Sabratha slowly deteriorated. With this predominance of Oea over the other two neighbouring towns, eventually the name Tripoli started to refer to Oea alone. Around the fifth century A.D, Oea was called Tripoli and this name, with slight Arabic deviations, has remained the name of the city until today (Haynes, 1981).

In 423 A.D Boniface, the Roman general of Africa who was suspected of disloyalty by Rome, asked assistance from the Vandals in Spain. After he reconciled with Empress Placidia, however, the Vandals, once invited into the area, refused to leave. This marked a new era. The Roman Empire was in decline, and the Vandals took advantage of its fading power. After three decades of fighting, the Vandals finally defeated the Romans and took Tripoli in 455 A.D. They remained in control of the town until 533 A.D. The reign of the Vandals in Tripoli was marked with deterioration, where this town shared the fate of other nieghbouring towns, which dramatically declined under their rule. The economy and the people suffered severe hardships, and the population of Tripoli declined from approximately 30,000 to 7,000. The Byzantine army conquered the town in 533 A.D, but their rule did little to improve the situation of the people of Tripoli. Many Byzantine officials were Greek-speaking foreigners who had difficulties building good relations with the town residents. The harbor was also fortified. A few churches were built, more to serve the Byzantine garrisons than the people. In brief, there are no indications that Byzantine rule in Tripoli did anything to stop the deterioration of the city (Haynes, 2003).

2.4 The Islamic Era

The most significant stage of the city's history occurred in 642 AD when the Arab Muslims came to Libya. A new religion, cultural, language and a certain pattern of living were introduced to the city (Wright, 1969). Arab Muslims within generations continued to spread Islam from the Arabian peninsula into North Africa, which started when Amr ibn alAs, an Arab general under Caliph Umar I, conquered Tripoli. Libya then became a part of the Islamic world under the unity of the establishment of political and religious of the *caliphate* (the Prophet's successor) following the *Shariah* (the Islamic law). The *Shariah* was based primarily on the *Quran* (Muslim's Holy book) and S*unnah* (the Prophet's teachings). After the Arab conquered Tripoli as part of North Africa, it was governed by a succession of commanders, who were subordinate to the *caliph* in Damascus and, after 750 A.D, in Baghdad (Metz, 2004).

In 800 A.D the Arab Muslims repaired the neglected Roman irrigation system, rebuilding the region's prosperity and restoring the vitality of its cities and towns with the agricultural surplus that was produced. At the top of the political and social hierarchy there were the bureaucracy, the military caste, and Arab urban elite that included merchants, scholars and government officials, who had come to Tripoli from many parts of the Islamic world. The Arab Muslims contested control of the central Mediterranean with the Byzantine Empire and, after conquering Sicily, played an active role in the internal politics of Italy (Metz, 2004).

As stated by Helen Metz (2004) the Arab Muslims came to Libya as conquerors and missionaries and not as colonists, creating an urban settlement in North Africa. During the Islamic Era, the prosperity reached not only the urban walled city but also the coastal farming areas. During the Muslim rule, the city of Tripoli experienced both urban development and population growth. The indications of urban development were presented by the increase of houses, shops, *suqs* (markets), *masjeds*, hotels and public baths.

During the Islamic period, Tripoli showed a strong and clear picture in urban planning with simplicity of means. Every neighbourhood reflected simple and clear geometrical combination of urban elements including buildings (Shaiboub, 1979). The Islamic values of planning the city were originated from the interaction between social and environmental factors, which reflects the Muslim people and their way of life. Tripoli's community, during the Islamic period, can be seen as a group of people who live in a relatively well defined area and share certain local arrangements and facilities to support their particular requirements.

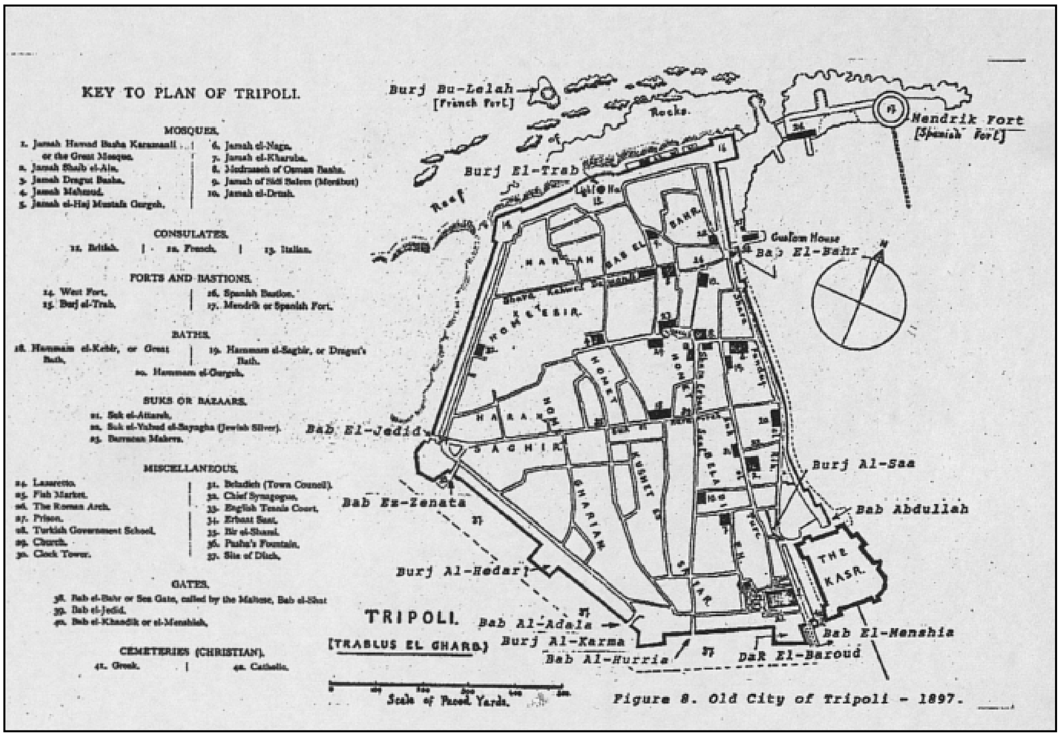


Figure 2.5: Tripoli city in 1897 (The Planning Bureau of Libya)

The traditional old Tripoli was constructed in a pentagonal shape (figure 2.5) and surrounded by walls. The city walls were re-strengthened and some gates were reinforced to protect the city from invaders. The city contained a significant number of memorable physical elements; mosques, markets and castle. The famous Arab Geographer El-Adrisi (in twelfth century) described the traditional city as follows: "*The city of Tripoli is a very protected, walled city. It is clean and white; it has beautiful streets and markets; it also has some industrial activities which usually are taken by merchants to other regions. The city had beautiful houses and many gardens of fruit, olive and date trees inside and outside its walls*" (Etlissi, 1985, p28).

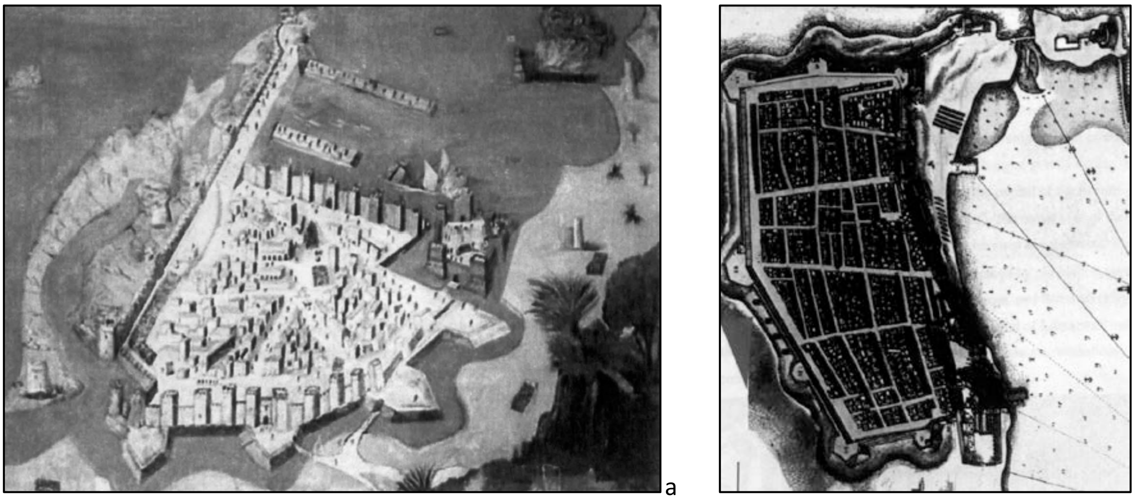
El-Bakri, the eleventh century Arab Geographer, described the city of Tripoli as simple in form, white in colour and surrounded by massive walls. Its mosques, especially their domes, had refined construction (Etlissi, 1985). All the houses, mosques, and markets were only one or two storeys high and were connected by hierarchal narrow streets two or three meters wide.

The city was a collection of compact courtyard buildings that were divided internally into six separated Homat (quarters): Hornet El-Baldia, Hornet Kushit Esafar, Homet Gherian, Hornet

Bab El-Bahar, Hornet El-Hara El-Kabira, and Hornet El-Hara Eskhera. As Islam encourages social interaction and discourages dispersal, the residential quarters were made up of clusters of households based on social ties and shared moral unity. The distribution of land uses in Tripoli, like many other Islamic cities, can be seen as a mixed-pattern emphasising social integration. Yet, there was a certain degree of separation between public and private places that reflects the Islamic concern for privacy in residential quarters (Abudib, 2011).

Guy Petherbridge (1987, p195) states in his study of the Islamic cities and society that: *"Islamic urban organisation is the physical manifestation of the equilibrium between social homogeneity and heterogeneity, in a social system requiring both segregation of domestic life and participation in the economic and religious life of the community."*

Under the Islamic rule, Tripoli became an increasingly important centre for the trans-Saharan caravan trade and attracted foreign interests in the city. However, as the Arab power was weakened, the city of Tripoli was conquered in 1146 A.D by the Normans from Sicily. In 1158 A.D the Arabs regained control over the city until 1509 A.D (Figure 2.6a) (Elzawi, 1963).



a b

Figure 2.6: a) Tripoli, mid-12th century, b) Tripoli, mid-16th century (The Planning Bureau of Libya)

Throughout the sixteenth century, the Hapsburg Spain and the Ottoman Turks were fighting for supremacy in the Mediterranean basin. Spanish forces had already occupied a number of other North African ports when in 1510 they captured Tripoli, destroyed the city and constructed a fortified naval base from the rubble. Tripoli was of a marginal importance to

Spain, however, in 1524 the King-Emperor Charles V entrusted its defence to the Maltese Knights of St. John of Jerusalem (Metz, 2004).

In 1551 the Ottomans came again to push the knights out of Tripoli, after being called by the local people of Tripoli, who saw the Ottomans as the strongest Islamic power at that time. The architecture of the Ottoman period extended beyond the walled city, as a number of monuments were situated outside the walled city such as; the School of Islamic Arts and Crafts, the mosque of Zawiyet el -Dahmani and the Karamanli graveyards. During the Italian period these monuments were integrated with the new palaces, piazzas, galleries, private villas and apartment buildings, which were constructed by the Italians in order to create a new urban fabric.

For about five centuries, from 1551 A.D until the beginning of the twentieth century, the city of Tripoli was part of the Ottoman Empire (Modern Turkey) (Figure 2.6b). Although Tripoli remained an important exchange centre during the 1830's and due to the decrease of the Sahara trade along with the drought and discrimination by the Ottoman Empire, Tripoli became a relatively poor region that depended mainly on traditional agriculture (Cachia, 1975).

2.5 The Italian Transformation of Tripoli's Urban Form

Based on a long-standing belief that the territory of Libya is a regional part of Italy's "historic destiny", as expressed frankly by Liberal Prime Minister Giovanni Giolitti, on October 1911 Italy invaded Libyan lands. The invasion of Libya was the last stage of the initial process that began after the unification of Italy in 1860. Through this invasion, Italy sought to achieve two main goals; the first was to gain colonies in Africa, which would represent an affirmation of the country's stature among the great powers of Europe, and the second was to provide a solution to its emigration problems. It is important to note that this step had almost thirty years of economic and cultural preparation prior to the initial invasion of Libya (McLaren, 2006).

In January 1912, a few months after the Italian invasion, a new plan was introduced to transform and develop the urban fabric of Tripoli (Figure 2.7), taking into consideration the Ottoman buildings that were located outside the walled city (the Old Town today). The engineer Luigi Luiggi was sent to the city to study the administrative structure of the public works and to identify a way to improve the infrastructure of the colony. Two months later, Luiggi documented a clear vision in terms of the development of Tripoli's urban context, which included: renewing the city's main port, introducing the system of water and sewage, instituting streets' regulations and constructing public and private buildings within and around the city (Marshall, 1982 and Luiggi, 1912).

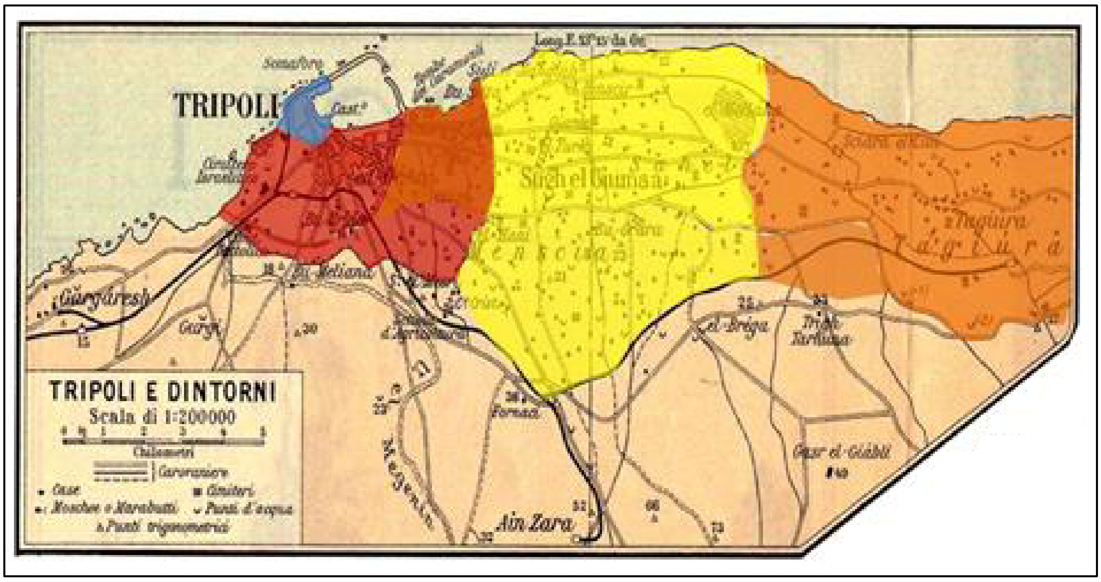


Figure 2.7: The city of Tripoli - 1913 (The Planning Bureau of Tripoli)

According to McLaren (2006), Luiggi proposed a master plan for the development of Tripoli with key components that were based on modern principles of urban planning. This approach followed the British and French programmes in designing a new urban fabric for the metropolitan populations in their colonies, which was separated from the Old Town. The new Tripoli was to be a garden city and an urban centre to the southeast of the Old Town and next to the Red Castle. The industrial land was located to the southwest of the Old Town, whereas the agriculture development was spread all over the remaining land (Figure 2.8). The new streets were based on the existing routes that spread out from the Red Castle, with additional primary distributor streets, an idea that was associated with the "Ring" in Vienna, the boulevards of Paris and the crescents of London.

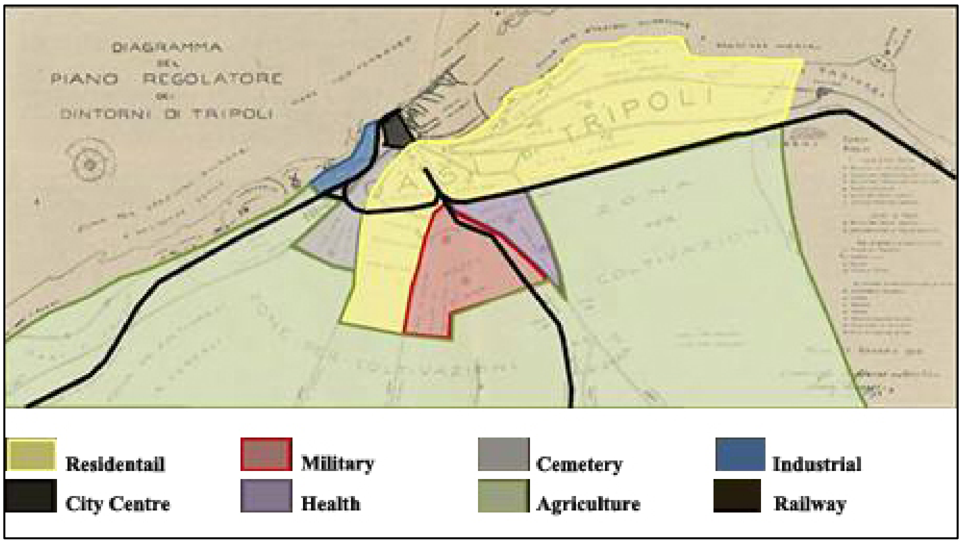


Figure 2.8: Land use of Tripoli - 1912 masterplan (The Planning Bureau of Tripoli)

A system of tramways was proposed beside the new street network to ease the movement between homes and works in a manner of other modern cities (McLaren, 2006). The objective was to modernise the whole region in order to be appropriate for a programme of demographic colonisation. Luiggi's scheme is filled with indications of metropolitan patterns, as a comparison was made between his scheme for the seafront of Tripoli and the Promenade des Anglaises in Nice. In January 1914, two years after its adoption, the masterplan of Tripoli has not been achieved largely due to political instability. However, there was partial achievement in terms of the water system work and the renovation of some main streets in the city and the region (Luiggi, 1912 and Bhabha, 1994).

The masterplan of Tripoli that was prepared by Luigi Luiggi in 1912 was the first official public document that accepted the value of the indigenous culture of Libya. His proposal was not only a motivation for the modernisation of this Italian city by reforming the port, redeveloping the public services and improving the street network, but was also a call to respect the existing built fabric of the Old Town and preserve its antiquity following the strategy of France and Britain in their colonies. However, the recovery of Roman monuments such as the Arch of Marcus Aurelius, which was erected during the second century A.D, was the main reason to preserve the Old Town (Fuller, 2000).

In addition a modern network of water and sanitary services were introduced to amenities in the city according to metropolitan standards and made a number of key actions that substantially influenced the public features of Tripoli. An interest in the hygienic condition of the Old Town found its planning system equivalent in the strategy of creating a strong separation between the Old Town and the new Italian built environment. The walls of the Old Town and the Red Castle were to be repaired, but isolated from the surrounding fabric through the construction of a wide, beautiful and magnificent promenade, embellished with the local aesthetical imprint of palm trees that would contrast with the narrow picturesque lanes of the Islamic Arab Town (Bhabha, 1994). Therefore, the key purpose of the 1912 masterplan was to shape the ongoing growth of the city, while leaving the Old Town intact. This premise remained unchallenged through the various later stages of the city's development, even during the increased attention that was paid to the Old Town in the early 1920s and the second stage of the masterplan that was drawn up in 1931-1933 (De Rage, 1934).

The benevolent image of Italians in Tripoli was clear evidence of the significant work that was related to restructuring the urban characteristics of the city, which was based mainly on the incomprehensive master plan of 1912. However, a series of important public works projects were achieved. Piazza Italia, a public open space, was created in front of the Red Castle and the main public route Sharah Azizia, and was the original footprint of the Corso Vittorio Emaunuele III (Figure 2.9). This new street, which had a comprehensible metropolitan quality, was defined by a number of major buildings, including a town hall, courthouse, cathedral, and a new governor's residence, and became the heart of community life (Cardella, 1926 and Ahmida, 1994).

Figure 2.9: Corso Vittorio Emanuele III - Tripoli 1925 (McLaren, 2006, p24)

The seafront of the city was formed by a series of waterfront boulevards that stretched from the western section of the Old Town along its northern border and past the Red Castle. The architect Armando Brasini made a great contribution by designing one of these arteries, called the Lungomare Conte Volpi, in order to create a unique character to the sea façade of Tripoli; the boulevard was wide lined with palm trees and was defined by a stone balustrade on the water's edge (McLaren, 2006) (Figure 2.10).

Figure 2.10: View of the Lungomare Conte Volpi in Tripoli 1922-1924 (McLaren, 2006, p25)

Along this artery the impression of Italian modern colonial power in North Africa was expressed by constructing a series of new public institutions including the Miramar Theater, the Bank of Italy, and The Grand Hotel. Volpi's legacy of modernisation programme was continued and expanded by Quadrumvir Emilio De Bono, who became the governor of Tripoli in July 1925. De Bono's administration took a major initiative to develop the city's economy by establishing the Tripoli Trade Fair in a manner that was similar to the Milan Trade Fair (Talamona, 1992 and Di Misurata, 1926).

The architectural vocabularies of Tripoli's trade fair (Figure 2.11) revealed the propagandistic purpose, which was emphasised by the architect Felice Nori, who designed more monumental buildings that took the shape of the Roman pavilion. During the governorship of De Bono about 600 projects were completed, which enhanced the public services and infrastructure of the city including the improvement of the port; the extension of water and sewer system; and the creation of a network of schools, post offices, hospitals, as well as government and military offices (McLaren, 2006).

Figure 2.11: The Tripoli trade fair 1927 (McLaren, 2006, p30)

During the governorship of Emilio De Bono, the most important event was the nomination of Maurizio Rava to be the general secretary of Tripoli in March 1927. Being the father of the Rationalist architect Carli Enrico Rava, Maurizio Rava had a great knowledge of the current trends in architecture and planning. It was Maurizio Rava who a year later appointed the architect Alessardro Limongelli to became the art consultant to the City of Tripoli. Limongelli took the planning of the city in a new direction as can be seen in Piazza Italia in Tripoli in 1931. Despite the fact that he studied in a Roman school, his designs were characterised by nonfigurative modernist compositions with clear integration to the environmental requirements and qualities of local architecture (McLaren, 2006).

The proposal of Alessardro Limongelli for the reforming of Piazza Italian in Tripoli was based on the abstract modernist aesthetic of the Classical form (Figure 2.12). His work was to modify the urban space into a more integrated place with the surrounding environment as he used the local architecture elements, such as minarets and colonnades in the buildings that were located at the perimeter of the urban space. Applying the local architecture elements in designing buildings within the Italian Quarter became a common method between Italian architects for a while. However, only a few buildings such as The Grand Hotel, The Wadan

Hotel and Theatre of Mira Mari followed this method in design process, as this direction was replaced by the so-called “Italian Style” for political reasons (McLaren, 2006).

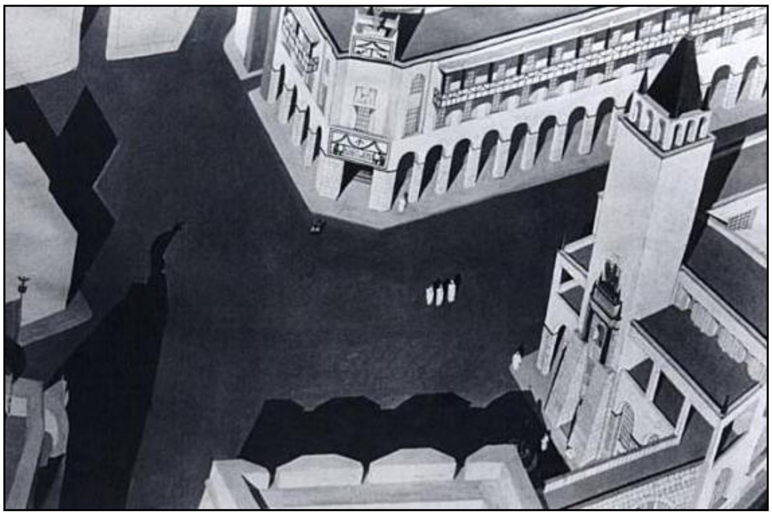


Figure 2.12: Alessandro Limongelli's 1931 proposal for the rearrangement of Piazza Italian in Tripoli (McLaren, 2006, p28)

Ottavio Cabitati (1936) criticised the use of the local style and requested expressing the Fascist philosophy and identity in deigning buildings. He emphasised the need for the architecture style to symbolise the Italian administration, reflect the image and culture of Italian society in North Africa and reduce the presence of local culture and society as a main approach to represent the colonial characteristics. The use of colonial architecture can be seen in many buildings, such as the Catholic Cathedral. In addition, most of the buildings that are located along the street of the Corso Vittorio Emaunuele III reflect the Fascist requirements in developing the city.

During Badoglio’s governorship, the military power led to settle the entire region, where substantial planning consideration was given to other major cities in Libya. The Milanese architects, Alberto Alpago Novello, Ottavio Cabiati and Guido Ferrazza, were involved to set up a new masterplan for Tripoli and Benghazi. Tripoli’s masterplan was completed in 1933 and its concept was based on developing the basic principles of the original plan of 1912. The proposal was to expand the city structure to double the prior size and to accommodate about 80,000 inhabitants. Moreover, the basic radial pattern of the main street network of the new city was provided with a series of transverse arteries in order to make the system of communication more effective and differentiate in each single district within the city (Figure 2.13). Selecting radial pattern for the main thorough fares over the gridiron allows greater variety of space and flexibility, which made it possible to integrate extra streets to the existing network (De Rege, 1934).

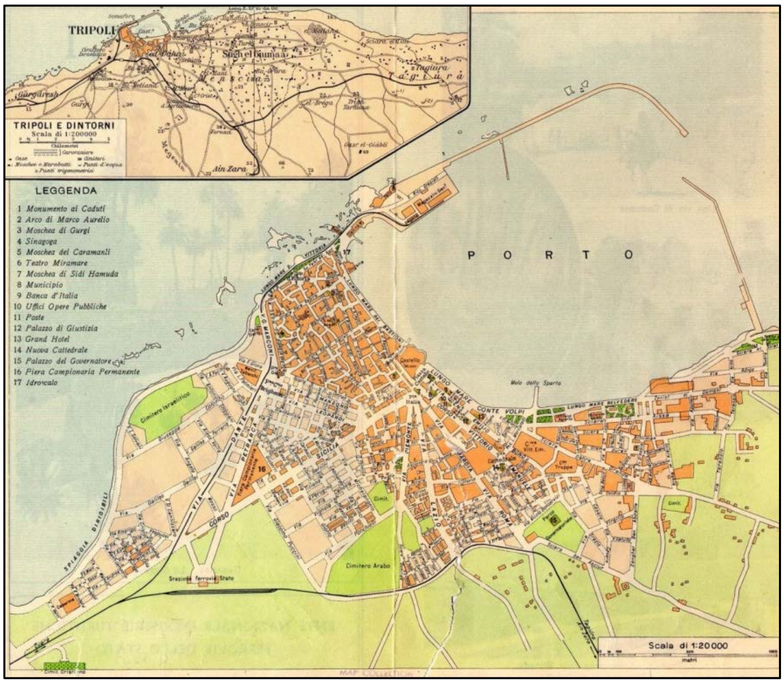


Figure 2.13: Masterplan of Tripoli by Milanese architects - 1933 (The Planning Bureau of Libya)

The process that was approached by the Milanese architects in regard to the new master plan of Tripoli did not add much uniqueness to the Italian context, but in fact was identical to the Henri Prost's proposal of 1914 for the city of Casablanca, where the concept was based on techno-cosmopolitanism and rationalised the order of the city into functional zones (Rabinow, 1992). However, the proposed plan of Tripoli was distinguished by offering a complex scale of planning through the creation of a sequence of separate centres that were designed to decentralise the city and provide local facilities. This structure of Tripoli's city was to work as an equitable balance between built environment and greenery areas and to make a gradual separation between high density areas of the waterfront district and low density areas that were located on the periphery of the city. The 1933 masterplan was a document of the modernisation of the city according to a set of technical considerations; this proposal applied the decentralised model for the settlement of the indigenous population, which was used to arrange the new areas of the city. By this means, the indigenous residential areas outside the walls of the Old Town were scattered all over the plan rather than being located in one district, which was different from Prost's plan of Casablanca 1914 (Figure 2.14) (Picciolio, 1937 and De Rege, 1934).

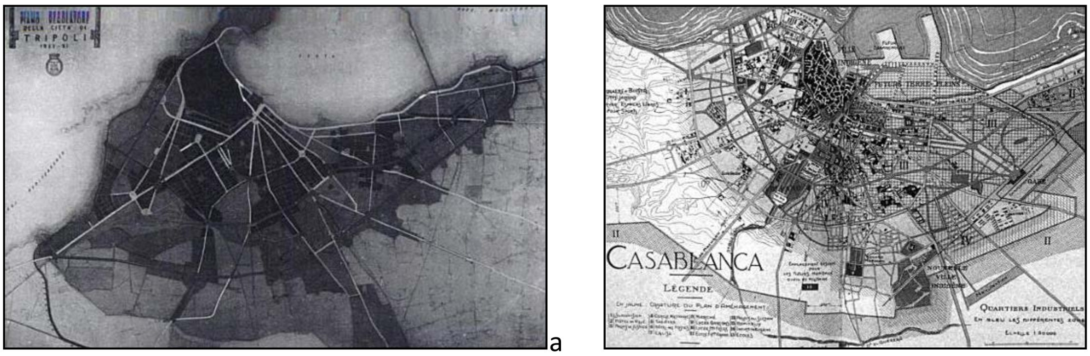


Figure 2.14: a) Masterplan of Tripoli 1933, b) Masterplan of Casablanca by Henri Prost 1914 (McLaren, 2006, p29 & 30)

The aim of the Milanese group was to make the combination of this new structure more orderly by restricting building height and density. This proposal was ultimately adapted by the Municipality of Tripoli in May of 1934 after a long period of assessment (De Rege, 1934). Although the Italian strategy in developing the city was generally based on a dichotomy approach, General Secretary of Tripoli, Maurizio Rava, called for careful programme to respect the character of Tripoli's architecture by introducing new structures that would be in harmony with the existing environment. This approach had a substantial influence on the masterplan of Tripoli that was prepared by Milanese architects. By the end of the governorship of Marshall Pietro Badoglio, Tripoli was starting to resemble the modern colony that was envisioned initially by the engineer Luigi Luiggi in 1912's master plan (Rava, 1929).

The architect Florestano Di Fausto, who graduated from the Academy of Fine Arts in Rome, was another character to be assigned as an architectural consultant for the Municipality of Tripoli during the Badoglio period and became a successor of the architect Alessandro Limongelli in 1932. He worked with the Technical Office of the Ministry of Foreign Affairs before arriving in Libya. His task was to construct and transform several embassies and cultural institutes in Europe and Africa, including Belgrade, Cairo, Algiers, Ankara and Tunis. In 1932, Di Fausto was engaged in studying various proposals related to the ongoing masterplan of Tripoli. Di Fausto was also positive in considering the link between the new development areas and the Old Town as can be seen by a number of projects that were designed within the new urban form. In that manner, his 1932 proposal for redesigning the Suq al-Mushir was an example of a clear consistency between the historic context and the new construction, which was based on the demands of integration and attraction. The principles of the masterplan of Tripoli prepared by Alpago Novello, Cabiati and Ferrazza were to create a new modern infrastructure of roads and public services that would preserve the existing character of the Old Town and the surrounding context (Figure 2.15) (Von Henneberg, 1996 and McLaren, 2006).

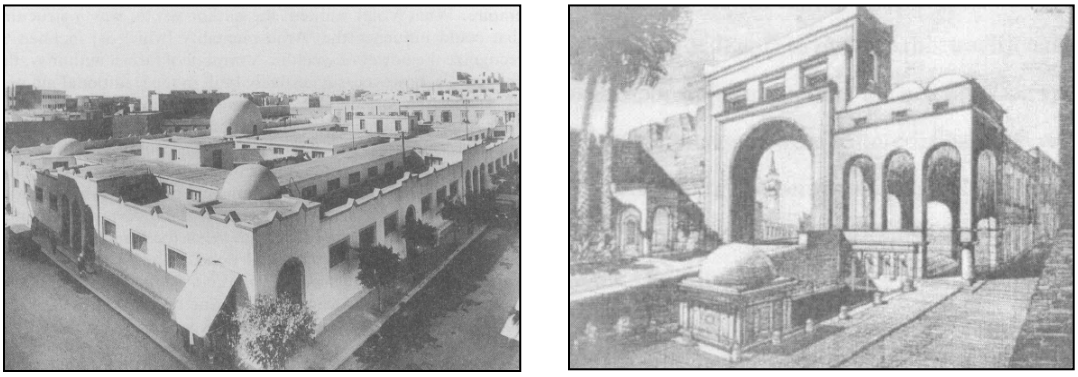


Figure 2.15: Florestano Di Fausto's 1932 proposal for restricting Suq Al-Mushir, Tripoli (Von Henneberg, 1996, p386)

In addition, Aldobrandino Malvezzi (1933) stated that during the governorship of Italo Balbo, the Political dimension of the Italian Colonial Policy towards the Libyans was given a considerable emphasis, as a compromising solution was addressed to combine the local traditions and the standards of modern Italian society. Malvezzi (1933, p347) pointed out that "*creating a condition for the local populations that permits the evolution of a new civilisation, resulting from an adequate combination of living and dynamic elements of both their tradition and ours*". Despite the fact that the Libyan people were permissible to practice their traditional life within the confines of Islam and the family, all other larger forms of social and political organisation were conceived according to the dictates of the colonial administration (Malvezzi, 1933).

a

b

Figure 2.16: a) Galleria De Bono, b) Piazza Della Cattedrale (The Planning Bureau of Libya)

Following this manner, Piazza Della Cattedrale, where the Roman Catholic Cathedral is located, and Galleria De Bono are ideal Italian residential compositions that have strong reference to the colonial urban development in Tripoli (Figure 2.16).

The religious institutions such as the Shariah tribunals practiced their rights under a considerable Italian supervision. The Italian approach to structuring indigenous political institutions had a reflective control that related mainly to the preservation of religious buildings. The Italian administration under the leadership of Italo Balbo created a provincial Council for the Administration of Waqf to supervise this traditional Muslim charitable endowment, which was responsible for funding the construction and preservation of the religious buildings including Masjeds. This method of developing and restoring the Islamic building gave manifest in new constructions and increased the interests of the Islamic architecture, not only between Italian architects but also for tourist field where some buildings were classified as national monuments (Von Henneberg, 1996 and Turba, 1934).

Adrian Pelt (1970, p30) wrote that "*the Italian colonial policy was to push the Libyan off the land; no political rights, no economic benefits, no social programmes were ever considered for the indigenous population*". Consequently, and during the governorship of Italo Balbo, a concept of gated cities was applied by constructing a wall around the Italian urban development that was seven kilometres long, one meter thick and three metres high. The commitment of this paradigm was to build multi-story residential buildings within this wall and around the Old Town in order to accommodate the Italian community and to serve the Italian families. On the other hand, as stated by Ben-Swessi (1996), Libyans were forced to live in camps outside the Italian wall and became a housing estate for the local poor people. This social-political change had a great impact on the development of the city and raised a conflict between the two societies (Shawesh, 2000).

2.6 The British Period

After the defeat of the Fascist powers in World War II, Tripolitania, with Tripoli at its core, became a British protectorate. When the British arrived in Tripoli the Old Town and the Italian Quarter were already two complete urban forms that accommodated residential, commercial and service buildings. The British found these two neighbourhoods very busy and full of different activities, which lacked calm and quietness. This condition led the British to think about providing new neighbourhoods with large residential individual units and less density. The basic idea adopted by the British was a simpler form of Ebenezer Howard's original concept, where the land ownership is unified providing a generous living space with natural qualities. The neighbourhood of the Garden City in Tripoli was holistically planned as a new settlement, which enhanced the public and private natural environment, provided high quality dwellings and locally accessible jobs (Figure 2.17).

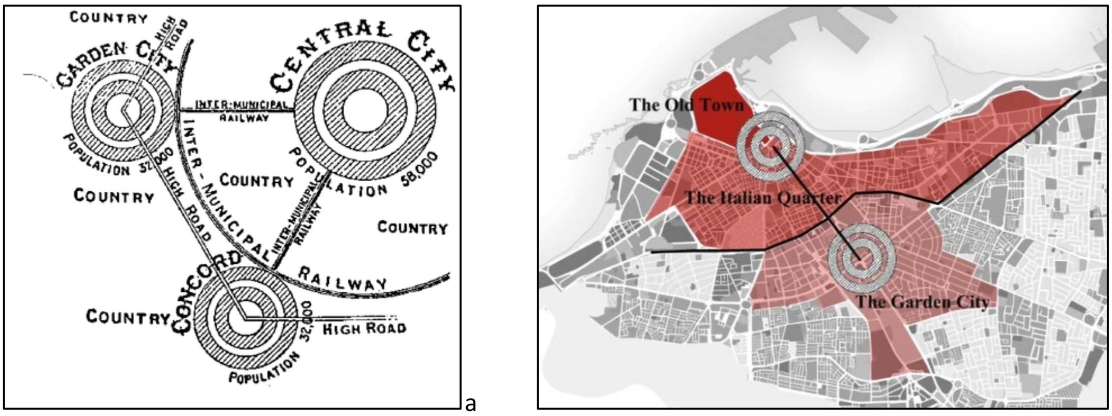


Figure 2.17: The original concept of the Garden City (Abudib, 2011, p54), b) Garden City model in Tripoli (By the Author)

2.7 The Independence Period

The victorious Allies finally agreed to bring Tripolitania and Cyrenaica together into a new federated state, and Libya became independent in December 1951. Under King Idris, as he was known, Libya became a constitutional monarchy with Tripoli as its capital, although his preference was for the Cyrenaican city of al-Bayda. At that time the new state had very little financial resources and was among the poorest countries in the world. Tripoli did not start to thrive until after the discovery of oil in 1958. Then education and health care became more accessible to most of the people and construction projects within the city began to increase (Wright, 1982).

2.8 Planning System in Libya

Between the independence in 1951 and the discovery of oil in 1958, there was no clear evidence that Libya had any sort of large development projects, as Libya was the one of the world's poorest and underdeveloped countries, as characterised by the United Nations (FRDLC, 1988-1999). After the discovery of oil and until the beginning of 1970s a rapid change and development were addressed in the form of a project-based approach. Since then onward the strategic planning approach became popular and was influenced by the western planning systems, which were represented mainly in the work of Doxiadis and Poly Service planning offices in Libya. James Steele (1992, p17) in his analysis of similar cities, wrote that "*The architectural heritage of long established cities has continued to decay rapidly since most of this heritage has either fallen into disuse or not been adapted to a new use that will continue to prolong its life*". The lack of strategic planning and the random actions and visions of the decision makers was applied in developing Libyan cities mainly to achieve separated target-oriented proposals. In Libya the planning system is still a long way behind the strategic planning approach. It is based mainly on separated development plans, which do not unify the urban and strategic plans of the whole region and is mostly in relation to bottom-up than top-down planning strategy. Individual development plans usually focus on the end-state plan rather than the process, as these plans are of a static nature, which is inflexible and mostly prevents the possibility of urban change (Azzuz, 2000).

Commonly, the planning system is a procedure that relates to regulatory, procedural, and socio-political aspects. However, these aspects in Libya function differently. Firstly, the regulatory of Libyan planning system omits the plot- based approach as a design process in producing the characteristics of an urban form. Secondly, instead of being a series of active interaction of stages and revision processes, in Libya the procedural phase is more about the bureaucratisation of a controlling mechanism. Finally, the socio-political aspect is more about taking into consideration the individual decisions instead of following a coordinated process in pattern making (Azzuz, 2000).

The most effective master's programmes in urbanism have three characteristics: (a) future-oriented while in Libya it is all about repeating outdated ways of thinking, (b) interdisciplinary, whereas the Libyan planning system emphasizes only on one discipline, and (c) collaborative, whereas the Libya approach of planning shows unilateral decision-making and the solitary expert. Development planning system in Libya is considered to be unsuccessful in terms of creating an integrated urban form, which generates monotonous built environments without identity and character due to its economical and practical features. As a consequence, Libyan cities have lost the quality of urban space and public realm through separated development plans, random regulations and poor planning systems.

In addition to regulatory problems, there are also institutional problems in Libya, such as the lack of cooperation between institutions. Since the 1980s there has been an increase in the number of institutions commissioned with planning, which caused general conflicts in the decision making. For instance, local councils do not consider the planning decisions made by the central government for the large-scale plans. Besides, district municipalities usually prepare small-scale plans without respecting the master plans of the metropolitan municipalities. There is an ambiguity in development and planning authorities between central and local governments (IAU, 2008). In terms of planning problems in Libya, as mentioned previously, there is a prominent incremental rather than strategic planning (IAU, 2008). In the Libyan planning system, large-scale plans do not include the settlement's regional development tendencies; social, cultural, natural and economical sources, and identity. Development plans should be carried out and referenced based on a master plan decisions. Yet random strategies force urban transformation to be used under different land uses and density decisions, where the macro form diminishes (IAU, 2008).

2.9 Recent Planning Experience within the City of Tripoli

Vast urban and economic transformations have been taking place in the city of Tripoli since the 1950's. Due to the powerful wave of urbanisation, the theories and practices of Modern urban planning were applied in the peripheral areas of the city to accommodate the rapid growth in population. The city had thus become a tangible symbol of economic dynamism, founded on the utilisation of the petroleum income and based on modern development.

Urban management in Libya has been heavily controlled by the central government, aided by an urban planning practice in each city's municipality. The municipality of Tripoli for example, which derives its financing and authority from governmental institutions, retains substantial control of urban development over the entire city despite the explosive growth over the last 50 years. The municipality prepares and approves subdivisions at an ever increasing pace based on an enlargement of an outdated super-grid road network, which was prepared by consulting firms such as Doxiadis Associates and Poly Service during the 1970s and 1980s.

The main production can be classified into three types of developments, where the traditional urban models and the original spirit of the city core were omitted. These developments have different approach of planning and designing from those originally exist in the city centre of Tripoli. The first type came in the form of altered courtyard houses, which is a building typology implemented by private sector after having a permission form the government. The second is formal governmental projects, represented in medium-rise and high-rise apartment buildings, while the third is an informal growth implement by private state-enterprise to overcome the shortage of housing development, which mostly occupied the surrounding areas of the city.

2.9.1 The Altered Courtyard Houses

The first development was presented by what is known as altered courtyard houses. During the 1960s and early 1970s urban developments, especially in the housing sector, were dominated by private state enterprise. The procedures of implementing these settlements required a planning permission from the main planning bureau. Afterwards, the landowners divided their land into small residential plots according to a singular prototype housing design. This building typology was the first and only attempt to recreate the traditional urban form of the Old Town outside its boundary (Figure 2.18).

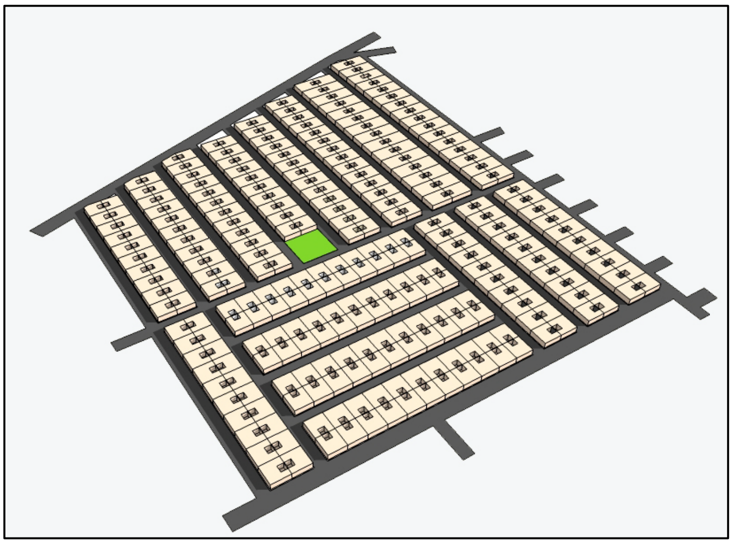


Figure 2. 18: The general idea of the Altered Courtyard Houses(Abudib, 2010, p86)

Apart from providing each residential unit with an internal courtyard, the planning essence of the Old Town was completely lost in this type of housing. The unit's privacy was negatively affected by windows located at the ground floor of each unit. This housing typology was duplicated in about twenty two neighbourhoods spread all over the city of Tripoli. Street network within these neighbourhoods do not have a hierarchal system, beside the lack of cul-de-sacs, which are main elements in the network structure of the traditional Old Town. The residential units are seen as abstract objects lined together to accommodate low class families, creating unattractive and unsustainable urban neighbourhoods. Most of these settlements lack the basic standards of urban design principles. Plots and buildings footprints are identical with a lack of local services. Most of mixed uses are located along the main thoroughfares, which are mainly designed for vehicle movement (Figure 2.19).

Figure 2. 19: One of the existing neighbourhoods of the Altered Courtyard Houses (IAU, 2008, p35)

2.9.2 The Medium and High-rise Buildings

Medium-rise and high-rise apartment buildings represent the most formal developments under the supervision of the government. This type of building typology usually thrown up with little relation to their surrounding built environment or context. In addition, some of these developments are built as gated communities in order to gain more security and peculiarity. However, this separation from the surrounding characterised these neighbourhoods by extreme inequalities to the adjacent built environment (Figure 2.20).

Medium-rise Apartments High-rise Apartments

Figure 2. 20: The characteristics of medium and high-rise buildings (IAU, 2008, p54, 56)

The buildings in these developments are based on modern planning strategies and have poor architectural quality. Due to the absence of the responsibilities of the three parties (ownership, control and use), which was applied within the traditional built environment, the buildings themselves as well as the surrounding open spaces were deteriraated.

2.9.3 The Domination of Informal Development

In Tripoli, most of the informal developments on the peripheries are based on illegal land divisions or planned invasions of public land by different private originations or state enterprise investments. The resulting development tends to take chaotic forms of blocks and plot subdivision, where the whole land is built forming a continuous frontage of inappropriate shapes and dimensions of network streets. Such settlements, given the limitations of their suburban location, are barely planned along mainstream urban lines. Most of these neighbourhoods have been created in deserted areas around the city of Tripoli, with no basic services or infrastructures. These settlements do not only accommodate the low-income households but also the middle and upper classes, who are able to buy large pieces of land for a singular residential unit or several houses shared by one family.

Figure 2. 21: The general characteristics of the informal developments (IAU, 2008, p32, 33)

These peripheral informal settlements take the form of very low-density randomly scattered dwellings, with small-scale farming. This type of development, which consumes huge amounts of often valuable agricultural land, is particularly expensive to service and is not subject to the traditional or modern principles of urban design. The only way that this type of development could be contained and directed is through the imposition of planning controls that currently do not exist (Figure 2.21).

These peripheral developments were characterised by the domination of motorised traffic, by scattered, low-density peri-urban development, which forms a patchwork of land uses with elements of agriculture/horticulture and industry/shed development. These developments destroyed the greenery areas that have not only been a formation of a natural woods and farms between cities but also an outlet for the residents who live in the city centre of Tripoli. The result is a poor urban morphology, less densities and more extensive urban sprawl. These neighbourhoods failed to develop effective forms of development control that imposes order on the urban chaos, which lacked the corporation of the urban design guidance. Consequently, the urban development occurring on the fringe of the city of Tripoli was along the lines of peri-urban development and was outside the remit of proper urban design principles.

In conclusion, the original urban form of the city centre of Tripoli was characterised by two mainstreams of urban design principles, the first is the Islamic traditional principles within the Old Town, while the second is the colonial reproduction in the Italian Quarter and the Garden City. The principles of the traditional Islamic urban form, which is illustrated in details in Chapter Three, shows two main aspects; the first is the compact urban form based on narrow and organic street patterns, and the second is the building typology represented by the courtyard buildings. The evolution of the colonial neighbourhoods, which is described earlier in this chapter, shows that these urban forms are mainly based on European typologies, applying traditional architectural elements only in building façades. Although both colonial urban forms are based on the grid street patterns, the Italian Quarter is a dense commercial downtown areas with high density, while the Garden City a collection of scattered residential units with low density. Consequently, particular urban morphology reflects the period in which the formative development occurred. In general, the majority of the city centre of Tripoli reflects a unique period of the city's history, which gives the city its unique character. However, the later developments only created meaningless places that do not add anything to the city's rich identity.

2.10 Conclusion

As stated previously the history of Tripoli started during the seventh century B.C. when the Phoenicians arrived and occupied the western cost of Libya. In 46 BC Tripoli was captured by the Romans who developed the city and built many temples, markets and public baths surrounded by residential buildings, where the city became the capital of the Tripolitania region. The city of Tripoli was originally built in a pentagonal form and is surrounded by strong walls of solid masonry with magnificent gates.

The historical features in the city stand out as a national monument and provide a clear example of organic growth, where the Islamic principles are reflected in its built form. When the Muslim Arabs came to Libya a new religion, culture, language and a certain pattern of living was introduced to Tripoli and was reflected in its urban form. The spaces within the city are well defined and organised with attention to privacy, community, and public interests as well as religious values and principles. Throughout history the city's ancient designers recognised its inhabitants' cultural and social needs. In addition to its distinctive architectural values, the city has a high spiritual and symbolic significance based upon its long history, which provide the city with a sense of place and continuity through time.

The Italian occupation of Tripoli (1911-1943) represents one of the most important stages of Tripoli's historical urban development. It represents the transformation of the city from an Ottoman town with several characteristics of a pre-industrial Islamic city to a colonial city with certain characteristics of both traditional and Italian design. The Italian period was the beginning of the modem movement in Libya, but this movement, due to its military nature, had different modes and attitudes. It was an exercise of military power reflected in architecture and planning forms as well as in the social environment. During the Italian colonisation, the city of Tripoli was transformed completely from a vernacular style to a western Mediterranean style incorporating a number of different urban forms and building types.

Italian treatment of the Old Town seems somewhat more balanced, and certainly less intensive than the various French approaches in their colonies. In this regard, Fuller (2000) argues that "*It would be facile to claim that Italians were therefore better planners, or more attuned to the locals, than the French. Instead, we must ask ourselves if the Italian stance was any less noxious, in its premises if not its effects, than the French one*" (Fuller, 2000, p140). Italian architects and urban designers acted upon their arrival in Tripoli with the same urban concerns that were troubling them at home - namely, how to balance the conservation of the Old Town with the accommodation of the new urban development.

The Garden City, which was constructed during the British era, is a model of peripheral development that extended beyond the existing urban fabrics of the Old Town and the Italian Quarter. Its approach was based strongly on avoiding the attitude of high density and applying less dense urban fabric, where people did not only distance themselves from the city core but also from each other. Residential units are set within landscaped ground with high walls to be hidden from the street and from neighbours. Its approach echoes an early suburbia, which can still be seen in the modern suburbs these days. The implementation of the Garden City led to the reversal of the polarity of the city, as the neighbourhood became an appropriate place for wealthy people. As a result, the richer and more successful people started to measure their status not by how close they lived to the city centre but by the distance they have from the centre.

Many researchers including Ben-Swessi (1996), Azzuz (2000) and Belgasem (2007) argue that the rapid urbanisation in Tripoli has been typified mainly by an adaptation of immediate alien solutions to solve urban crises. In this regard, Khan Fazlur (1978) states that modern technology was so responsive in finding quick construction solutions on the scale and in the volume required that there has hardly been any time to modify it to the local culture and tradition. In Libya, like many other countries, there were hardly any attempts to transform and translate the experience of the West into a relevant planning and architecture basis. Consequently, such practice has created urban forms that do not take into consideration inherited culture and the social needs of inhabitants. On the other hand western practice has generally put great pressure on traditional cities, and has resulted in the transformation and disruption of a heritage that took many centuries to evolve (Fazlur, 1978).

Chapter Three:
Libyan Culture and Islamic Principles

3.1 Introduction

Historically, every community in the world has its own principles that are reflected in the building design and urban layout. These principles are rooted in the prevailing factors of living, such as: culture, economic and political situation, and natural climate. However, traditional spiritual values and beliefs play a major role in manipulating man-made experience to create specialised urban fabrics. As stated by Bianca (2000, p22), any urban form is "*simply an outcome of traditions and daily practices which correspond to certain spiritual principles*". Over time people's traditional attitudes and customs make a coherent balance with the surrounding environment, the distinctive religious values guide these social human activities and create an obvious interaction between what people build and what they believe (Bianca, 2000). As expressed in the Qur'an (5:48) "*To each of you we prescribed a law and a method*".

Tripoli is considered as an Islamic and Arabic city, where it has been occupied by Muslims for a long time. However, the different ideologies that were applied in the process of the city's development show a range of characteristics in its urban structures. Although the Italian Quarter is considered to be the most powerful urban fabric within Tripoli's city centre, the Old Town represents the early Muslim urban pattern within the city. The town's physical structure corresponded effectively to the tradition of Islam and its principles of social behaviour, which created a clear homogeneity between social and built environment (Ottman, 1978). Many values of social organisation and behaviour in Islam are rooted to its tradition. These values have been founded by this tradition in order to make the life of believers match their goals and consideration (Akbar, 1992).

The urban developments that took place during the last four decades in Libya in general and in Tripoli in particular, were in a form that is very strange to the original traditional Islamic characteristics. This form of extrinsic design principles is leading to the loss of the local identity and is causing social problems, as many of the social traditions have been lost, which affects negatively the local people's interactions. Therefore, there is a great need today to re-evaluate the essence of Islamic urban fabrics with the filtration of modern urban structure through Islamic philosophy in order to create urban forms that are relevant to the indigenous culture and traditions.

3.2 The Notion of Culture

The word "culture" originally comes from the Latin *cultur*, stems from *colere*, meaning "to cultivate". The notion of culture is rooted in the study of anthropology and sociology and has attracted researchers from different disciplines of the built environment such as urban design and architecture. Culture is a complex theme and is open to a wide diversity of interpretations. Amos Rapoport (1980) argued that culture is an abstract and is a theoretical construct. Culture is something that cannot be seen, it is only its effects and products that will be seen and observed. Rapoport (1980) defines three alternative definitions in a very broad sense. The first is that culture is a way of life typical of a group. The second one is that culture is a system of symbols meaning and schema transmitted through symbolic codes. The third definition is that culture is a set of strategies adapted by people to live and survive based on the surrounding resources and ecology.

A clearer definition of the notion of culture should however include three main features. The first refers to the intellectual cultivation of mind and spirit, which is constructed by belief, ideologies and knowledge. The second feature comprises the aesthetic and artistic attributes that identify or characterize a culture. This includes popular culture, media, and performing arts. The third feature is the accompanying of anthropological perspective, which includes the way of life and epitomises the social aspects of human behaviour (Rapoport, 1969 and Schusky & Culbert, 1987).

Barati (1997) argues that cultures all over the world are unique because they have their own historical background. Each one is a result of a long-term engagement of people with their physical and social environment. Each community developed their own tools, dialects, myths, arts, architecture and similar manifestations of interaction with place, and each one of these continued the history of the culture and the direction of its development. It is extremely unlikely to find any two different societies with completely similar historical perspective.

The value of the built environment comes from the capability of this environment to inspire people to think, feel and express their sense of being. There are three different layers of these values. The first layer contains religion, law, and common sense, which separate right from wrong and can be easily identified by individuals. The second layer holds the hidden values, which explain why long-standing beliefs, attitudes and traditions exist in an organisation or a society. The last layer contains the deep values that define reality such as the worldviews of mould strategists and the structure of leader/ follower relationships (Cowan & Todorovic, 2000).

It can be argued that urban form is not simply the result of physical forces such as climatic technology or any single causal factors, but is also the consequence of a range of socio-cultural factors. Thus, traditional urban form is the result of "selectionism" of an evolutionary process, whereby a built environment gradually become congruent with activity systems, lifestyles, meaning and values by applying rules, which are often unwritten, as in most cultural landscapes. The recognizable nature of cultural background and the architectural style are both a result of the systematic and consistent application of recognised systems of rules. Although the traditional urban form of Tripoli uses unwritten rules, there might be some rules that are formalised with legality in certain conditions. By a process of selection, urban form approximates cultural form. In simple words, culture has a shape, where some unwritten rules are embedded. By applying these rules, urban form becomes closer and closer to cultural form.

3.3 The Libyan Culture and Islam

The Libyan culture through history shows diversity in characteristics, and presents relative differences from one place to another within the country. However, this diversity in culture meets common principles of consensus, which are represented in the Islamic principles and values. The Libyan society is an example of unique integrated communities, where the vast majority of the Libyan people are Muslims. Islam, which is a way of living as well as a faith, is the main factor that defines the social organisation and sustains the social order in Libya. The Libyan culture generally accepts the Islamic values that are mainly based on the *Qur'an*, Muslim's holy book, and *Sunnah*, Prophet Mohammad's guidance. Although the Libyan social values are shaped by religious aspects, they are influenced by other foreign cultures of the people who lived in the country during different historical periods (Abudib, 2011).

The Libyan society is characterised by strong relationships and family ties, as kinship forms the backbone of social principles. The Libyan social structure is seen as a homogeneous

Islamic community, which is structured around the nuclear family, then the extended family and the community. Social life in Libya is based primarily on the traditional role of the family, whether it is of the nuclear or extended type, with a strong sense of belonging. The authority of the father or grandfather over the whole family is well respected. It is still quite common for grandparents, parents and their children to live together in the same house. In many cases such households include relatives who need to be looked after. Sons and daughters stay in their parents' house (*hosh i1ela*) until getting married. In such a pattern, blood loyalties are quite strong and the kinship ties are continually reinforced by social institutions and economic considerations. The family remains as a core amongst social institutions that determine a style of life in terms of social activities and child rearing practices (Ben-Swessi, 1996).

Beyond the family, the community organisation remains an important factor of local culture. The need for people to feel that they are part of the community is another common characteristic of the Libyans. The bond of kinship between people in Tripoli’s Old Town is very strong. Neighbours help each other in many aspects of life such as economic assistance, and support in cases of crises. The field work reveals that kinship obligations make people keep their house's main door open for those who need help including social and economical support. Traditionally, more than one family may live in the same courtyard house and share social responsibilities, happiness and sadness. They live together through generations and when sons get married they may reside in the same house. This pattern of life is reflected in the design of Tripoli courtyard houses (Abudib, 2011).

The inner core of the Muslim family consists of the husband, his wife and their children. It also consists of the grandparents, who traditionally spend the latter part of their lives with one of their married sons. The inner core of the Muslim family includes all the family members living together under the same roof, which in many cases include the married sons with their wives and children (Mortada, 2003).

Traditionally Libyan people, particularly urban dwellers, have a strong desire for privacy, which has played such an important part in shaping the character of Tripoli Old Town and is carried over to the present day. In most cases it is a prerequisite feature of the house, due to the reluctance to compromise the privacy and intimacy of family life. Socio-cultural practices are conducted in four separate spheres: male and female, public and private.

Family and social obligations are very important and the sense of belonging to the family, kin and neighbourhood is fairly strong. The social structure and the strong bonds of family relationships significantly influence the building typology and urban morphology. The family concept of privacy, social status, religious and social customs and entertainment are also essential considerations in the form of dwelling and its relative location. The relationship between the family members, whether nuclear or extended, is seen in Islam as an enduring and spiritual relation that generates and sustains love, kindness, mercy and mutual confidence. All the family members are expected to make serious efforts to maintain a strong family relation and to play a successful role in building the society (Mortada, 2003).

The traditional community is a structured society, where social respect status and prestige are associated with the degree of retention of social and religious rites. The family and social obligations have a significant influence on daily life, not only on the individual, but on the house hold as a whole. Despite the significant changes in the urban development, certain societal aspects such as religion and social functions, the role of the family and women's status have undergone very little, if any, changes within the urban society in Tripoli.

Under the Islamic principles Muslims should reject divisive distinction of race and social class and work towards a strong bonds of brotherhood and solidarity. In the Libyan community, like many other Islamic communities, Muslims are advised to achieve the basic social unit presented in a strong relationship between the husband, his wife and their children, in order to create a strong primary unit in the community structure. The family is always seen as the main base of the social life, providing its members with a strong sense of belonging

Caring and helping family members and people in need is stated in many parts of the Qur'an: "*Serve Allah and join not any partners with him; and do good to parents, kinsfolk, orphans, those in need" (Qur'an 4:36).* The children are expected to love and respect their parents, and are responsible for supporting and providing them with a comfortable and pleasant life when they are no longer capable of staying independent: *"Thy Lord hath decreed that ye worship none but Him, and that ye be kind to parents. Whether one or both of them attain old age in thy life, say not to them a word of contempt, nor repel them, but address them in terms of honor. And, out of kindness, lower to them the wing of humility, and say: "My Lord! Bestow on them thy Mercy even as they cherished me in childhood" (Qur'an 17:23-24).*

Beyond the family, the community organisation remains an important factor of local culture. In the Libyan society maintaining a strong relationship between the community members is reinforced by Islamic religion as well as the traditional local system.

As stated earlier, Islamic values and principles have a significant effect on both the Libyan culture as well as the traditional urban structure. These values, along with their effects, are studied in details in the next parts of this chapter.

3.4 The Traditional Urban Setting of Tripoli

It is worth mentioning that the traditional Old Town is mainly characterised by the Islamic Ottoman architecture that took place during the 15th until the early 20th centuries. From an urban design point of view, it has been stated that the town shows both spontaneous and planned urban pattern. The former is related to the growth of urban blocks and their plot subdivisions, while the latter is related to the main routes of traffic. Although the traditional urban fabric contains a complex aggregated structure based on the juxtaposition of self-contained community quarters of different ethnicity, the meaning of wholeness and social integration between these quarters were accomplished in complete harmony. This urban structure admittedly represents a late Islamic stage in the evolution of urban form, stretching over five centuries, and yet it reflects perennial principles and attitudes firmly rooted in the traditional community life, which can be traced back to the “Khittat” or district system as practiced in the first centuries of Islam. In such an urban structure everything seems to be under one roof and therefore the town can be compared to a spacious coherent single mansion.

The traditional urban form reflects the organic growth process where its growth is conditioned by incremental decisions at grass-root level rather than obeying imposed external system. Therefore, the initially Roman orthogonal grid system was replaced by a more vernacular pattern, which was based on the common transformation of public space by the various social groups. This resulted in an overlay of often tortuous residential access lanes and cul-de-sacs reflecting the prevalent spontaneous urbanisation mode completely different from the original Roman grid pattern. This model of urbanism produced an internalised access system with private corridors and dead-end lanes branched on semi-public residential alleyways, which in turn provided connections with the main public thoroughfares (Abudib, 2011).

The original part of Tripoli's city centre was deep-rooted in Islamic urban pattern, which gave birth to a unique built environment. This part of Tripoli reveals certain planning patterns, which are time-resistant and contain the seed to form both the traditional Libyan culture and the built environment. It can be seen that Islamic values have significantly participated in producing the traditional urban fabric of the initial part of Tripoli. These values with their effects are studied in the next part of this chapter, which illustrates the Islamic principles on social and physical frame works.

3.5 The Islamic Laws or *Shari'ah*

Shari'ah, in itself, is more than a religious or an ordinary legal system. "It is simultaneously religious law, natural and positive law. It relates man to God. Its origin is divine, its objective is human. It deals with the present and the hereafter, encompassing all aspects of human action, whether latent or manifest, open or hidden. It is at once universal and particular, absolute and relative, general and specific, strict and flexible. It tempers formal justice with equity, guarantees liberty, encourages excellence and fights abuse" (Abd alAti, 1984, p162)

Principles obtained from Prophet Mohammed's teaching can be used as a base for urban design and planning principles for any community as his guidance combine the necessity of social life and the built environment. However, it is important to note that Shari'ah covers two major aspects of the Muslim's life. The former is known as Ibadat, which relates to religious observances and regulates the relationship between people and their creator "Allah". The built environment for Muslims is a space where individuals and societies orient their life to worship Allah and where human activities are guided by Islamic law. Therefore, Ibadat does not have a direct impact on societies if they are non-Muslims or non-believers. The latter is known as Muamallat, which relates to the relationships among people and addresses matters and conflicts arising from their interaction. This second aspect of Shari'ah can easily be adaptedby any community, regardless of their religious background. This is because the main goal of Muamallat is to strengthen the relationship between individuals and harmoniously create unified communities. In this sense, we can see some similarities between the Islamic and European traditional built environment at the scale of neighbourhood, where people share the same human requirements at a certain level regardless of their religion.

Hisham Mortada (2003) states that Islam is not just a set of rules but a tradition of values. He adds that Islam is not just imposing a legislative body of regulations, but in fact it is a combination between religious perception and social principles and their reflection in the formation of the built environment. "*While Islam did not prescribe formal architectural concepts, it moulded the whole way of life by providing a matrix of behavioural archetypes which by necessity generated correlated physical patterns*" (Bianca, 2000, p22 & 23). The main general objective of this discussion is to pursue a clear understanding of Islam and to explore the tradition of Islam criteria, which was applied in forming Muslim societies with their living environment.

Shari'ah is considered to be the main Islamic laws that cover all aspects of Muslim life, which is based on the Qur'an and the Prophet Sunnah or tradition. The characteristics of the built environment will be the main subject of this study. This approach is an attempt to help towards understanding the relationship between Islamic traditional principles and the production of urban fabrics. It also explores the principles that Islam set up for producing urban tissues in order to extract the main urban elements, which can be used later as constructive components for future development in Tripoli. Understanding these principles can also give the opportunity to re-apply these rules in modern planning codes and urban design terms for the city of Tripoli, or even for the whole country.

The general meaning of the word Islam in Arabic is "silm" meaning peace and harmony. It also means the total surrender of the believer to Allah "God" and his order during the spiritual performance (Maududi, 2001). Accordingly, the whole Muslim life should be subservient to the will of Allah and encourage the Muslim community to preserve and accomplish the law of Allah. All aspects of Muslim life including political strategies, social affairs and economic guidelines should be consistent with the basic guidance of the Qur'an and the tradition of Prophet Mohammad. These Qur'anic regulations are known as "Shari'ah" or Islamic law (Cone, 2003).

Shari'ah includes a set of principles laid by Islam in order to standardize all aspects of Muslim's life, both individually and collectively, which motivate a range of human activities such as; "*religious ritual, personal behaviour, morality, habits, family relationships, social and economic affairs, administration, the rights and duties of citizens, the judicial system, the laws of war and peace and international relations*" (Mortada, 2003, p3). Shari'ah was founded to clarify and save Islamic principles from human misunderstanding and to provide Muslims with a guide that shows what Islam permits and prohibits. Accordingly, the holy Qur'an and blessed Sunnah are the main source of the Shari'ah as Allah says "*O you, who have believed, obey Allah and obey the Messenger and those in authority among you. And if you disagree over anything, refer it to Allah and the Messenger, if you should believe in Allah and the Last Day. That is the best [way] and best in result*" (Qur'an, 4:59).

During the late 8th and the beginning of the 9th century the constitution of more formalised compendium of Islamic law "Shari'ah" was founded based on the Qur'an and the Sunnah, although its establishment started from the day that Prophet Mohammad migrated from Makkah to Madinah, where a new Muslim community and government came into organism (Bianca, 2000). The foundation of Islamic law became the tool for maintaining the Islamic identity, which was required to preserve the combination between the religious and cultural coherence, as large masses of non-Arab populations had converted to Islam asking about the rights to keep their own cultural matters without conflicting with the Islamic principles (Ottman, 1978).

Stefano Bianca (2000), points out that Islamic law differs considerably from the Roman law, which served as a central for the majority of European official systems. He states that the Roman law is a secular compendium of prescriptions, established from abstract principles and its main concern was to settle economic and social controversies and define an inflexible penal code. Islamic law, on the other hand, is a constitution that was based on religion and extracted from the life experience of the model community to promote an ideal pattern of individual and collective human behaviour. The consequential body of religious and social customs produce instruments to shape and maintain the social identity within the whole Muslim community.

In order to value and understand the Islamic urban forms and its social and physical principles, it is significant to analyse the legal system of Islam or Islamic law (Shari'ah). The purpose of this law is to manipulate the interactions between groups and communities and make a clear path for the economic and social organisations. Shari'ah classifies, categorises and administers the Islamic principles in order to be instituted. Islamic law contains a holistic outlook on life, where it conceives the earth as a single 'city' or a 'global village' with diversity in residents and presents a theoretical model, which if followed provides safety and protection for the public (Bhala, 2011). "*The Shariah is never closed, for it is based not on a core of concepts, but rather on an ensemble of precepts which is at times general, at times precise, and which expands to include the totality of human acts through induction, analogy, extension, commentary, and interpretation*" (Roy, 1994, p10).

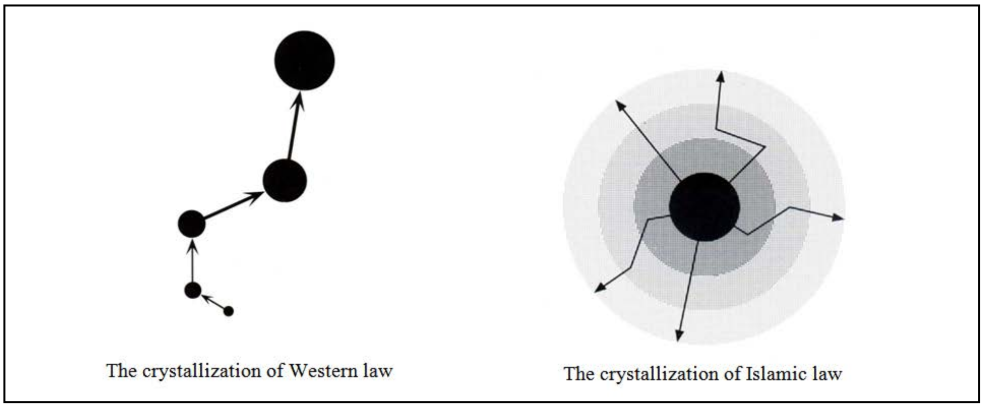


Figure 3.1: A comparison of crystallisation between Western and Islamic law
(Akbar, 1992, p111)

The uniqueness of Islamic policy comes from its ability to absorb all differences in traditions and cultures and unify these differences under a crystallised Islamic law, which is different from the Western law (Akbar, 1992) (Figure 3.1). Shariah is established on the philosophy that the members of the public depend on each other. Thus, Islamic law cannot be supported by individualism, but it needs incorporation between the people to maintain the unity of the society. Under the Islamic law, perfection is a production of a society not individuality. In this sense people's perfection can only be achieved through their interaction with each other, which in turns generates the refinement for the entire society. Islamic law enhances human welfare, which is based on the completion of necessities, requirements, and relieves (Maududi, 2001).

The legislation of the Islamic law is based on the general concept of Islam for both major and minor issues. The Shari'ah explains the exact meanings of certain language usages and styles, the context of certain verses and Ahadith (Prophet Mohammad's sayings), as well as how the Qur’an relates to the Sunnah. With Shari’ah Muslims can truly understand the Qur’an and Sunnah without any complications or misunderstanding. Observing the rules of how laws are supported will most certainly protect the Muslim people from being misled by superficial understanding of the religion (Ottman, 1978).

3.5.1 The Holy Qur’an

The holy Qur’an is the Last and Final Word of Allah Almighty to all of mankind and the main source of Islamic experience and doctrine. The Quran was revealed to Prophet Muhammad through revelation and by inspiration over a period of 23 years. “*We (Allah) inspire thee (Muhammad) as We inspired Noah and the prophets after him, as We inspired Abraham and Ishmael and Isaac and Jacob and the tribes, and Jesus and Job and Jonah and Aaron and Solomon, and as we imparted unto David the psalms; And messengers We have mentioned unto thee before and messengers We have nor mentioned unto thee; and Allah spoke directly unto Moses; messengers of good cheer and off warning, in order that mankind might have no argument against Allah after the messengers. Allah was ever Mighty, Wise*” (Holy Qur’an; 04: 163 &165).

Literally, the source of Arabic word of “al-Qur’an” is “eqra” or “read” and the holy Qur’an means “the book to be read”, which is considered as the religious revelation of the will or laws of Allah. It is Allah’s message to all humankind regardless to their background and ethnic origins. The book displays information about the creator “Allah”, his prophets and messengers, and the creation and creatures. The holy Qur’an also contains prescriptive and informative commands, which take the form of prohibitions or permissions.

The holy book is arranged in the form of a single volume, divided into one hundred and fourteen “Surahs” or chapters. The chief jurisprudence in the Qur’an is that there is only one God, all will undergo final judgment, and God sent prophets to those turned from truth to show them the right path. The Quran is the primary source of every Muslim’s faith and practice. It deals with all the subjects that concern human beings: wisdom, doctrine, worship, relations, transactions and law. Although it provides guidelines and detailed teachings about human conduct for individuals or societies, its basic theme is the relationship between Allah and mankind.

Much of the Qur'an was revealed through actual events encountered by the Prophet, and questions asked and answered by him. The Prophet also used the Qur'an as a basis of his own teaching and adjudication Nevertheless, the Qur'an is neither a legal nor a constitutional document as only a small portion of its text contains legal materials; less than three percent of the text. The legal contents of the Qur'an were mainly revealed following the Prophet's migration from Mecca to Medina, where he embodied these contents as legislations on social and governmental issues (Roy, 1994).

3.5.2 The Sunnah

The second most significant source of authority for Muslims is the Sunnah. This refers to the practices, customs and traditions of Prophet Muhammad, who represents the ideal example of a true Muslim. During Prophet Muhammad's life some of his followers memorised his teachings and wrote them down, where later they were collected to be used as references. These collections comprise the Prophet's deeds, words and commandments and show how Muslims should perform their religious practise and relate to their social and natural environments based on the way Prophet Muhammad did (Ottman, 1978).

The authority of Sunnah as a source of Shari'ah originates from the Qur'anic statement, which says, "*So take what the Messenger assigns to you and deny yourselves that which he withholds from you*" (Qur'an, 59:7). The Qur'an revealed that the Prophet's life consisted of practical examples for guiding Muslims in all aspects of life. It says, "*There has certainly been for you in the Messenger of Allah an excellent pattern for anyone whose hope is in Allah and the Last Day and [who] remembers Allah often*" (Qur'an, 33:21). And "*Those who follow the Messenger, the unlettered prophet, whom they find written in what they have of the Torah and the Gospel, who enjoins upon them what is right and forbids them what is wrong and makes lawful for them the good things and prohibits for them the evil and relieves them of their burden and the shackles which were upon them. So they who have believed in him, honoured him, supported him and followed the light which was sent down with him - it is those who will be the successful*" (Qur'an, 7:157).

These holy words are an expression of the perfection of the prophet's mission and character by saying "*And indeed, you are of a great moral character*" (Qur'an, 68:4). Accordingly the Qur'an is the main source of Islamic law "Shari'ah", and the Sunnah comes after. Allah in the Qur'an orders Muslims to obey the Prophet and makes this obedience a duty of the believers to surrender to his judgement and his authority without question. As monition in Qur'an: "*Whoever obeys the Messenger verily obeys God*" (4:80) and "*Whatever the Messenger gives you, take it and whatever he forbids you, avoid it*" (59:7).

As a source of the Shari'ah, the Sunnah depends on three capacities to pass its rulings; firstly, it may simply repeat and confirm a ruling, which originates in the Qur'an. Secondly, the Sunnah may consist of an explanation or clarification of the Qur'an as it may clarify the ambivalent, qualify the absolute, or specify the general of the Qur'an. Thirdly, the Sunnah may consist of rulings that were not revealed in the Qur'an, where the ruling in this case is originated from the Sunnah itself (Maududi, 2001).

3.6 The Social Framework

The principles of the Islamic social framework are obligations and tasks which should be performed in the everyday life of Muslims and which combines the foundation of Islamic concepts and the traditional life. As Prophet Muhammad says: "*Allah has prescribed certain obligations for you, so do not neglect them; He has defined certain limits so do not transgress them; He prohibited certain things so do not do them; and He has kept silent concerning other things out of mercy for you and not because of forgetfulness, so do not ask question concerning them*" (Imam Muslim).

According to Islam the principles of its social framework should be accepted as faith and an expression of action. As faith and action are inseparable in Islam, the main purpose of the Islamic principles is to make the life of the human being meaningful. Therefore, the spirit of these principles is an internal commitment that is underpinned by an external manifestation (Mortada, 2003 and Bianca, 2000). The social framework principles are very integrated with each other in such a way that it is not possible to separate them. As stated by Rahmaan (2011) and Mortada (2003), the principles of social framework are represented in values and rules, which are applied in four social scales; society, neighbourhood, family and individual.

3.6.1 The Society

"*The foundations of the social system of Islam rest on the belief that all human beings are equal and constitute one single fraternity*" (Maududi, 2001, p12). Orientation towards a community interaction is the core tradition of Islam, where Allah ordered Muslims to aim for social solidity. This concept is a divine demand and a definite obligation assigned by Allah as he says in Qur'an "*And let there be arising from you a nation inviting to all that is good, enjoining what is right and forbidding what is wrong, and those will be the successful*" (Qur'an, 3:104). The unity and harmony of Muslims is collectively accomplished when the behaviour of the community members are manipulated by certain social principles and values.

These principles are shaped by Shari'ah where the main objective is to promote the social interaction and justice within the society. Shari'ah provides natural manifestation of spiritual values, where people's behaviour in Islamic society is balanced by these values and their desire for immoral or criminal acts are eliminated or reduced. Islam realises that human beings live better with strong social intercourse, so Islam enhances and promotes these social relationships in order to provide people with a sense of belonging and safety. By this means, Islam considers the social relationships between Muslims as collaboration, where caring for others, benefiting each other and avoiding harming others are part of this interaction; as the Qur'anic verse says" *And hold firmly to the rope of Allah all together and do not become divided. And remember the favour of Allah upon you - when you were enemies and He brought your hearts together and you became, by His favour, brothers*" (Qur'an, 3:103). Allah mentions in anther verse "*And cooperate in righteousness and piety, but do not cooperate in sin and aggression*" (Qur'an, 5:2). He also says, "*The believers are but brothers, so make settlement between your brothers. And fear Allah that you may receive mercy*" (Qur'an, 49:10).

Islam indicates that all the members of the society gain their solidarity by establishing a link of unity between them. The Prophet Mohammad underlined the social quality of brotherhood and regards it as a central core of Islamic social life. He says, "*A believer is like a brick for another believer, the one supporting the other*" (Imam Muslim). Also says "*you Muslims are like the body of human being, when part of it suffers, the other parts will share with it the pain and the suffering*" (Al-Bukhari). This verifies the fact that socio-religious relationship aims to increase homogeneity in Islamic society through strong public interactions at all communal levels.

Among the goals of Islam is for people to show compassion and good character towards others in order to build strong social integration. Kindness, truthfulness and goodness have to be embedded in the social interaction between people within the community, as Allah says " *Indeed, Allah orders justice and good conduct and giving to relatives and forbids immorality and bad conduct and oppression*" (Qur'an, 16:90). Al-Ghazali states that giving other Muslims priority over private needs, forgiveness of mistakes and failings, loyalty, honesty and self-sacrifice are an expression of kindness (Holand, 2007 and Ibn Taymiyah, 2007).

Strong social interaction between Muslims should be also maintained by avoiding any action that could harm other Muslims as Allah says: "*And do not insult one another and do not call each other by offensive nicknames*" also says "*O you who have believed, avoid much negative assumption. Indeed, some assumption is sin. And do not spy or backbite each other*" (Qur'an, 49:11&12). The Qur'an also clarifies that acting negatively within the community causes damage to the relationships between people: "*And those who harm believing men and believing women for something other than what they have earned have certainly born upon themselves a slander and manifest sin*" (Qur'an, 33:58). He adds "*Kind speech and forgiveness are better than charity followed by injury. And Allah is Free of need and Forbearing*" (Qur'an, 263:2).

Islamic Shari'ah recognises that each member of the society was born without any sins, each has the same chances to attain excellence and each is equally committed to society and responsible for his success. Allah tells us: "*We have made you a nation justly balanced*" (Qur'an, 2:143). The Prophet Mohammad says, "*Those whom subscribe to our belief and adopt the Islamic way of life have the same rights and the same obligations as we have*". He also says "*There is no distinction between an Arab and a non-Arab. There is no superiority for a black over a white nor a white over a black except by piety and good action, all from Adam, and Adam from the dust*" (Imam Muslim).

In addition, Islam ensures that all members, including non-Muslims, are equal in rights and social responsibilities and there is no difference between them. This is mainly derived from the fact that Islam is open to all people regardless of their race or faith. The Qur'an says" *O* *you who have believed, be persistently standing firm for Allah , witnesses in justice, and do not let the hatred of a people prevent you from being just. Be just; that is nearer to righteousness. And fear Allah; indeed, Allah is acquainted with what you do*" (Qur'an, 5:8).

3.6.2 The Neighbourhood

From Islam's point of view neighbourhood is the backbone of society, where a set of moral values promote neighbourliness. Mortada (2003) emphasises two main principles in maintaining these moral values; the former is strong neighbourly relationships while the latter is the preservation of neighbour's rights. Allah in the Qur'an underlines that all neighbours deserve sympathy, affection, kindness and fair treatment. Islam also asks all neighbours to be affectionate, courteous, innocent and cooperative and to share each other's sorrows and joys in order to establish a strong social closeness (Mortada, 2003). In this matter the Qur'an says "*and do good to parents, and to relatives, orphans, the needy, the near neighbour, the neighbour farther away, the companion at your side, the traveller, and those whom your right hands possess. Indeed, Allah does not like those who are self-deluding and boastful*" (Qur'an, 4:36).

In addition, Prophet Mohammad looks at exchanging visits between neighbours, especially on major occasions, as a foundation of amicable relations, not only between adjacent neighbours but also between those who are further away. The Prophet's guidance enhances the bone between neighbours. He says "*help him if he asks your help, give him relief if he seeks your relief, lend him if he needs loans, show him concern if he is distressed, nurse him when he is ill, congratulate him when he meets any good, sympathise him when any calamity befalls him, and attend his funeral when he dies*". Moreover, in Islamic ideology, a neighbour is not just a person who lives next-door or in the same neighborhood, but is a person who has priorities and rights. The Prophet says, "*the person who satisfies himself, while his immediate neighbours go hungry is not a true believer*" (Al-Bukhari).

Muslims also need to refrain from causing any form of physical harassment or emotional stress to neighbours. "*No one can be a true believer unless his neighbors feel safe from his hands and tongue*", warned the noble Prophet. There is no difference between a Muslim and a non-Muslim in terms of providing human needs and rights of neighbours.

The institution of the public supervision as administrative device is organised in Muslim neighbourhoods and society, in order to witness that individual and public conduct meet moral and legal principles of Islam. The administrator, who is responsible for this task, has three main sets of functions: to observe if there are proper facilities for the society as a whole to worship, to ensure that public law and order is maintained within the neighborhood or community, and finally to supervise various municipal services like sewage conditions, rubbish elimination, water supply and building laws.

3.6.3 The Family

Islam considers the family as a fundamental element of Muslim society, which represents the foundation of the whole socio-cultural organisation and a self-sufficient entity. The family is "*the cradle of the individual and the vital source of the reinforcement of society*" which "*ensures ideological and cultural stability over the entire spectrum of society*" (Mortada, 2003, p30). In Khurshid's book (1987) "*Family Life in Islam*", he shows that the objectives and functions of the family as stated in the *Qur'an* and *Sunnah* are the conservation and permanence of human being, the protection of ethical, social and economic aspects, widening the family horizon and producing social cohesion and motivation for effort and sacrifice.

The family is the most basic social institution in Islam, as it does not only play a very vital role in the development of culture but also makes the whole nation stronger (Figure 3.2). That is why Islam dedicates much attention to identify the tasks and rights of each family member and to emphasise the importance of the family as well as taking all consideration to promote this institution in a well physical and social surroundings. The intimate relationship within a family, as stated by the Islamic principles, is not merely a utilitarian relationship, but also it is a holy relationship that maintains and generates affection, kindness, forgiveness, compassion, mutual confidence and assistance (Maududi, 2001).

Islam wants all those who are related through common parents, common brothers and sisters or marriage to be cooperative and helpful to each other. It is the duty of each member of the family to care for the other members. Parents are responsible to bear and bring up their children in a loving and caring environment. In return children are responsible for supporting and helping their parents when they are older. As a matter of fact it is an absolute religious duty to behave kindly towards parents and try to make their lives as comfortable as possible.

The Qur'an says: "*And We have enjoined upon man care for his parents. His mother carried him, increasing her in weakness upon weakness, and his weaning is in two years. Be grateful to Me and to your parents; to Me is the final destination*" (Qur'an, 31:14).

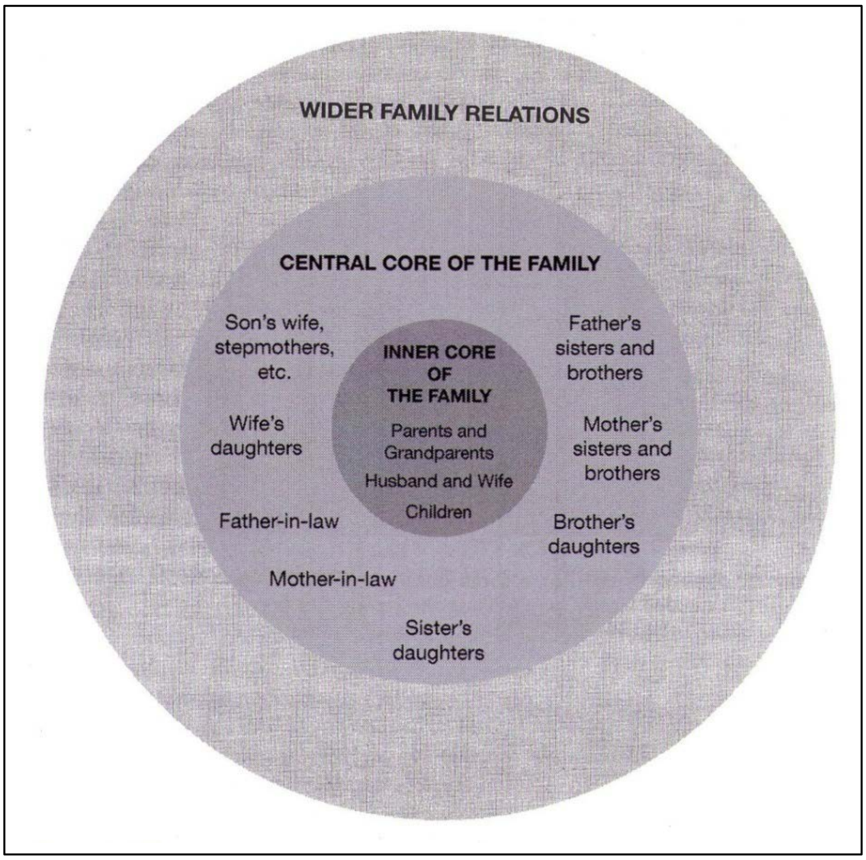


Figure 3.2: The structure of the Muslim family (Mortada, 2003, p38)

The Muslim family is usually looked at as an extended family, where three or four generations are covered under its umbrella. In Islam all members of the extended family have their own rights and obligations that are greatly respected. Islam views breaking family ties, including the extended family, as a punishable act. The Prophet Mohammad warns from cutting ties between the members of the extended family by saying "*the person who severs the bond of kinship would not enter Paradise*" (Al-Bukhari), as breaking the ties of kith and kin means severing the relation and consequently weakens the society. This explains why the extended family has been the fundamental social entity throughout Islamic history (Bianca, 2000 and Mortada, 2003).

3.6.4 The Individual

In Islam, every individual is considered like a building block and therefore has a role to play in building the Islamic society. The concept of brotherhood in Islam makes it imperative for every Muslim to take care of other Muslims. It encourages this behaviour to the extent of making it obligatory in the participation of every individual's life. For instance, according to Islamic principles, every Muslim is not only obliged to act righteously but also has to ensure that righteousness is prevailed in the society (Rahmaan, 2011).

Islam asks individuals to establish strong and warm relations with the other members of their society in order to respond to the main aim of Islamic principles and achieve a harmony and cooperation within the community. Strong relations between individuals in an Islamic community can be established when the relationship between Allah and an individual is fulfilled and when positive behaviour is demonstrated by all members of the community (Mortada, 2003).

Reuben Levy (2011) on "the social structure of Islam" declared that the main duty of the Muslim is to show the finest qualities of behaviour including kindness in intercourse, making peace, being a good neighbour, honouring the aged people, feeding the poor, visiting the sick, restraining the anger, greeting others and accepting invitations. These characteristics prove that Islam is not in favour of an individualistic lifestyle as stated by the Prophet's saying "*None of you truly believes until a person loves for his brother what this person loves for himself*" (Imam Muslim). The word brother on the Prophet's talk does not mean sibling but it means the other Muslim, as all Muslims are brothers according to Islam.

While Islam asks kind behaviour to support the relationship between the individuals within the society, it condemns negative or uncontrolled behaviour that lead to breaking or diminishing this relationship. The Prophetic statement points out that **"***A Muslim is the brother of a Muslim: he neither oppresses him nor does he fail him, he neither lies to him nor does he hold him in contempt*" also add," *All of the Muslim is sacred for another Muslim: his wealth, his honour, and his life"* **(**Al-Bukhari**).**

At the scale of the urban fabric which serves the whole community, Prophet Muhammad set certain rules that are based on social groupings sharing the same blood, ethnic origin and cultural perspectives. Consequently, the general idea of developing the Islamic cities or towns was planned towards meeting social needs in terms of kinship, solidarity, defence, social order and religious practices. Following the district subdivision in Medina by Prophet Muhammad, most of Islamic urban fabrics adopted the idea of quarters or districts, where each district belongs to certain ethnic or religious grouping. Prophet Muhammad believes that Muslims collectively are required to observe these principles and avoid any communal actions that diminish them.

At the scale of a neighbourhood, Islam looks at the neighbourliness as the backbone of the whole community “ummah”, where each individual deserves sympathy, affection, kindness and fair treatment by those who resident close or around him. Therefore, based on the Prophetic hadiths “Sunnah”, the Muslims should avoid causing any form of material and physical harm to neighbours. The Prophet considers raising a building height that might block light and ventilation or changing a property’s land use without the promotion of neighbours as an offending action. The Sunnah emphasises on having the neighbours’ permission before taking any sort of physical transformation of a property within the urban fabric. Accordingly, one can easily note the homogeneity in buildings’ height and usability within each district of an Islamic building environment.

At the family scale, a house - *as the most consistent and the most formalised courtyard typology of domestic Islamic architecture* - is considered a basic unit of urban fabric, which provides privacy to its residents within their interior spaces and at the same time edges the public spaces. The family house reflects Islamic principles, not only in terms of providing privacy to internal spaces from the surrounding buildings, but also in reflecting the humbleness of the outside (less ornaments) and richness of the inside (decorations and architectural elements that show the residents’ interests). As stated by Prophet Muhammad Muslim should behave with others in a courteous and a humble way while seeking richness inside through faith, knowledge and respectfulness.

Historically, the majority of Islamic urban forms were never designed at a metropolitan scale or based on regional planning strategies. The Islamic urban principles were mainly applied at a smaller scale (town / village) to provide the essential requirements of the Muslim community. The most outstanding principles within the Islamic urban form are privacy, street hierarchy and whether the neighbourhood has diversity in land use or is dominated by singular use, such as commercial hubs and residential quarters. Applying these principles at larger scale would be the real challenge for world urban designers.

3.7 The Physical Framework

After knowing the impact of the prominent social structure in the formation of urban fabrics in the Muslim community, the physical structure is conceived the second most important element in producing an Islamic built environment. The living environment should be holistically regarded as a dynamic framework, instead of being explored merely as a physical linkage between building mass and its surrounding urban open space. The Islamic law, Shari'ah, pays a great attention to the natural and urban environments of Muslims in order to promote the social traditional principles. The major part of these principles is obviously originated from the basic sources of Qur'an and Sunnh, while the minor part is produced according to the traditional and local aspects of Muslims. "*This environment represents the application of what Islam has provided in the way of social and physical principles*" (Mortada, 2003, p47).

3.7.1 The Natural Environment

According to Islam caring for the environment is considered as an integral part of faith. The significance of the environment in Islam is manifested in different forms and patterns of behaviour not by mankind only but by other natural elements and creatures. Earth is considered to be one prolific resource that produces different varieties in offspring, fruits and vegetables which resonates the power of its creator (Izzi Dien, 2000). Allah says in the Qur'an "*We have not created the heavens and earth and all that is between them carelessly. We have not created them but for truth*" (Qur'an, 44:38 & 39). He also says "*And within the land are neighbouring plots and gardens of grapevines and crops and palm trees, growing several from a root or otherwise, watered with one water; but We make some of them better quality than others. Indeed in that are signs for a people who reason*" (Qur'an, 13:4).

Since the birth of Islam, the natural environment is a basic resource that Allah created for a human being "inheritor or vicegerent" on earth, to be used in a sustainable and responsible manner. In this manner, the Qur'an says "*it is He who has made you (His) agents, inheritors* *of the earth and has raised some of you above others in degrees [of rank] that He may try you through what He has given you*" (Qur'an, 6:165). The natural environment within the conception of Islam consists of reserved areas like woodlands and urban greenery areas including gardens, green open spaces and small farms. In other words, flora and fauna are regarded as the natural environment and environment's implicit constituents, where their natural affect in space continually form and modify the natural environment (Rahmaan, 2011). As states by the Qur'an "*And He gave you from all you asked of Him. And if you should count the favour of Allah, you could not enumerate them*" (Qur'an, 14:34).

In relation to Islamic law, the utilisation and sustainable development of nature is the right and privilege of each single person. However this can reach the point of obligation at certain conditions. The principles of the Qur'an and the guidance of the Prophet Mohammad show how to utilise this natural environment; for instance the Prophet Mohammad admonished that wastage of resources is forbidden, whether in case of scarcity or abundance. The objective of the utilisation of natural resources is to improve the quality of environment by setting desirable standards of aesthetics and cleanliness, attaining a peaceful and tranquil atmosphere, and requiring judicious utilisation (Ba Kader et al., 1983).

Since many verses in the Qur'an describe paradise as a place of green areas, beautiful gardens that are full of fruit trees with flowing water streams (Qur'an, 2:25, 3:15, 3:136, 9:72 & 16:31), the greenery and flowing water (*Flora*) have always been important elements that are applied in producing the physical characteristics of Islamic urban fabrics. The Old Islamic cities and towns such as Fez, Baghdad, Damascus and Istanbul are examples of this ambition. In addition to the Qur'anic description of a desirable physical environment, the Sunnah also promotes planting trees and prohibits the devastation of crops and orchards. As prophet Muhammad says "*if any Muslim plants a tree or sows a field, and a human, bird or animal eats from it, it shall be reckoned as charity from him*" (Al-Bukhari).

Allah created the *fauna* for the service of human beings, where according to Islamic principles it is an obligation to protect their environment and avoid bringing any pollution or harmfulness. Moreover, the rights of both domestic and wild animals to humane conduct are thoroughly described in the Sunnah (Llewellyn, 1984). Along with these principles, human being is morally obliged to provide proper care for any needy animal. The Prophet prohibited the taking of life of any creature just for entertaining or without any proper reason. The oldest Islamic reserved area was declared by the Prophet himself in Medina in which the area of six square miles was mainly dedicated to be a grazing ground for army horses, hunting any animal was forbidden within another four square miles and the damaging woody vegetation was prohibited within an additional twelve square miles (Al-Mawardi, 1996).

The living things presented in nature are therefore viewed in Islam as partners to man in existence and they deserve respect. Even though the human beings are a superior creature, their life would not be possible without other living creatures. As the Qur'an says "*there is not an animal lives on the earth, nor a being that flies with its wings except that they are nations like you. We have neglected nothing in the book. Then unto their Lord they will be gathered*" (Qur'an, 6:385).

According to Islam the responsibility of a man on the earth could be represented in the utilisation of natural resources and preservation of natural balance, where Muslims are encouraged not to think for their time but also to care for future generations as the Prophet says "*act in your life as though you are living forever and act for Hereafter as if you are dying tomorrow*" (Imam Muslim).

In conclusion and form the Islamic point of view, protection, conservation and development of the environment and natural resources are a compulsory responsibility that should be assigned to every single Muslim as well as to administrative and municipal agencies and organisations. As the Qur'an says *"cause not corruption upon the earth after its reformation"* (Qur'an 7:56) and adds *"But Allah does not like corruption"* (Qur'an 2:205). Also, the Sunnah says "*according to Islamic principles, the person who does not care about the others would not be one of them*" (Imam Muslim). The performance of the environment depends all the time on the form of legislation, where an appropriate legislation becomes more effective and useful when it originates from a nation's faith and represents the nation's cultural and intellectual heritage. This strong relationship between the effectiveness of legislation and the strength of its cultural roots appears to be essential when the environment issues become mankind's main concern.

3.7.2 The Built Environment

Historically, every single community in the world has its own principles in producing architecture and urban form. These principles are a natural expression of prevailing factors of living such as traditional values and beliefs, economical and political factors as well as natural environment. The local architecture and urban form are simply an outcome of traditions and daily practices that are based on certain spiritual philosophy. Traditionally, there is a close interaction between what people build and what they believe. This equation states that in the traditional societies, people were guided by certain values in building their environment in which these distinctive spiritual values succeeded in permeating the whole built environment and producing a harmonic interaction between them over time (Khan, 1978, Akbar, 1992 and Bianca, 2000).

Tradition as stated by Stefano Bianca (2000) is a combination of revealed truth, wisdom and knowledge that are transformed and passed on from one generation to another. Tradition connects different consecutive stages of temporal existence that originally derived from the indigenous actuality. Islam, as one of these spiritual traditions, aims toward materialising and manifesting its own perception of understanding the surrounding environment. When compared to other religious traditions, Islam has produced an integrated and comprehensive cultural system that is based on both individual and community daily religious practice. Despite the fact that Islam does not define certain architectural or urban concepts, it forms the whole way of life by giving several behavioural models that generate physical patterns.

The religious and social order of Islam maintains a unique simplicity, which is represented in the first nucleus of the Muslim community in Medina. The way of Muslim life is mainly based on the human behaviour that originated from the teachings of Prophet Muhammad. This cultural pattern was preserved by many generations through centuries in a number of societies all over the Islamic world until the last two decades, when the cultural pattern started to be affected by Western way of life (Hakim, 2008a).

In origin and substance, Islam is mostly an urban religion that reshaped the urban structures of Islamic cities. In addition, the character of the Qur'an is predominantly urban and anti-nomadic, as the primary components of the Qur'anic civil law are only appropriate for settled society (Benet, 1963). As the necessity of urban life in Islam contains the pillars of Islam, the concentration on performing these pillars requires a fixed settlement or sedentary community (Mortada, 2003). Although there is no indication or mention in Qur'an or Sunnah of precise urban planning codes that could be applied in the planning and designing of a Muslim urban environment, through Shariah, Islam sets up specific values that mould the Muslim's way of life within the urban environment and in turn the environment itself (Grabar, 1979).

Oleg Grabar (1979, p100) States in his study of the traditional urban environment of Muslims, "*it is Islam which gave resilience to the Muslim city and to its bourgeoisie, not because it was necessarily aware of all urban problems but because it had the abstract form in which all of them could be resolved*". The abstract form here refers to Shariah, which not only regulates the relationship between people but also between people and their surrounding environment. Hisham Mortada (2003) indicates that the Islamic urban environment is not about how to arrange buildings and streets per se, but also it is a manifestation of Islamic social values. That is why the traditional conditions of urban characteristics within the Muslim cities have a great resemblance, where they differ from the modern urban regulations. The Islamic traditional characteristics do not constrain the creativity, individuality or response to the people's requirements, which are generated from the restraint of the self, whereas the modern regulations oblige people to perform in accordance with pre-determined plans, which are generated from the restraint of the law. However, Islam is not against the western planning concept in improving the quality of life, but it is not in favour of how the planning goals are achieved. A profound notion into Islamic principles on the urban environment can be obtained by studying the Islamic response towards two issues: urban planning and regulation, and the techniques of implementing this planning.

Idrus (1978) states that the general rule of planning and regulating a Muslim built environment is to fulfil the necessities of Islam as disclosed in the Qur'an and Sunnah. Once these requirements are fulfilled, a broad range of flexible alternatives in planning and design becomes achievable. Mohamed T. Idrus (1978, p64) notes in his paper on the Islamic ideals of town planning that "*Islam asks Muslim planners to gear their planning towards the achievements of this ultimate purpose by using Islamic ideals and commandments as the main guiding principles*".

Medina, in Saudi Arabia, is considered to be the perfect example of the Islamic urban built environment, as it is the first settlement in Islam that was founded by Prophet Muhammad himself in 662 AD (Figure 3.3). The Prophet started his planning by locating a masjed in the centre, which was attached latter to a small building where the meetings of Prophet with his companions took place (political-place). The commercial activities (market-place) were places around this centre and surrounded by residential quarters, which were based on social groupings. Farms of palm trees and vegetables circled the residential quarters, while all other land uses that are not appropriate to be within residential quarters were moved to the peripheral areas. These uses included army camps, dyeing works and animal stables.

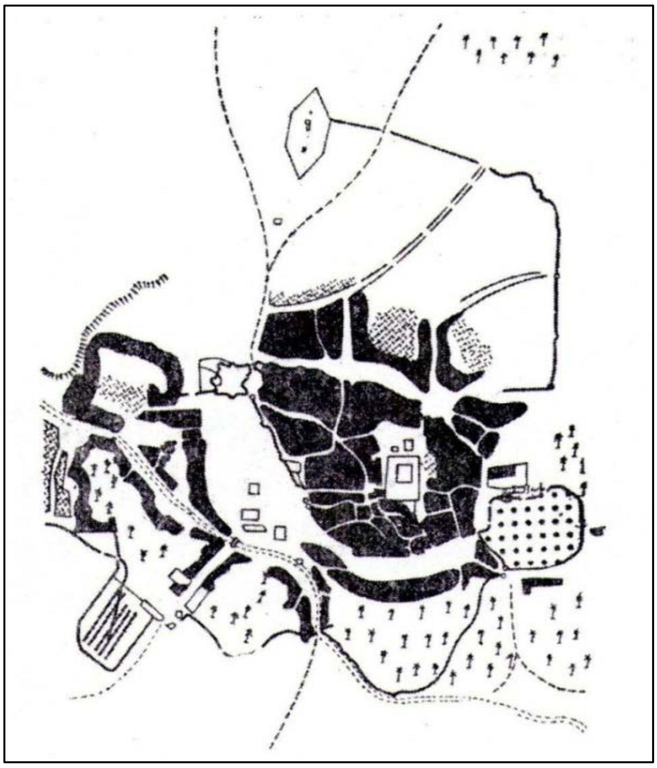


Figure 3.3: The Medina's urban fabric - beginning of 19th century (Mortada, 2003, p20)

Although the main market is situated at the centre of Medina other smaller shops penetrate the residential quarters providing residences with their daily needs within short walking distances. Such distribution of commercial facilities made it easy for residents to acquire their shopping needs. As Muslims perform praying five times a day in the masjed, the Prophet located the main market near the masjed for two reasons: to provide the merchants with a close place for praying and to make it possible for customers to do their shopping on their way to or from the masjed.

3.7.2.1 The Enhancement of the Application of Shari'ah

Hisham Mortada (2003) indicates that the use of Qur'an and Sunnah in planning and regulating the Muslim environment is obvious within the majority of the traditional Muslim cities. As evidence Llewellyn (1980) states that cities such as Medina exhibited how Shari'ah rules are so relevant to the physical environment. The process of urban development in these cities was the production of the mechanism that interprets and implements Shari'ah. These examples state that the traditional Islamic environment was an interaction between Islamic law and the planning process and show that the primary sources (Qur'an and Sunnah) were essential for employing the Islamic values into the design and planning system (Figure 3.4).

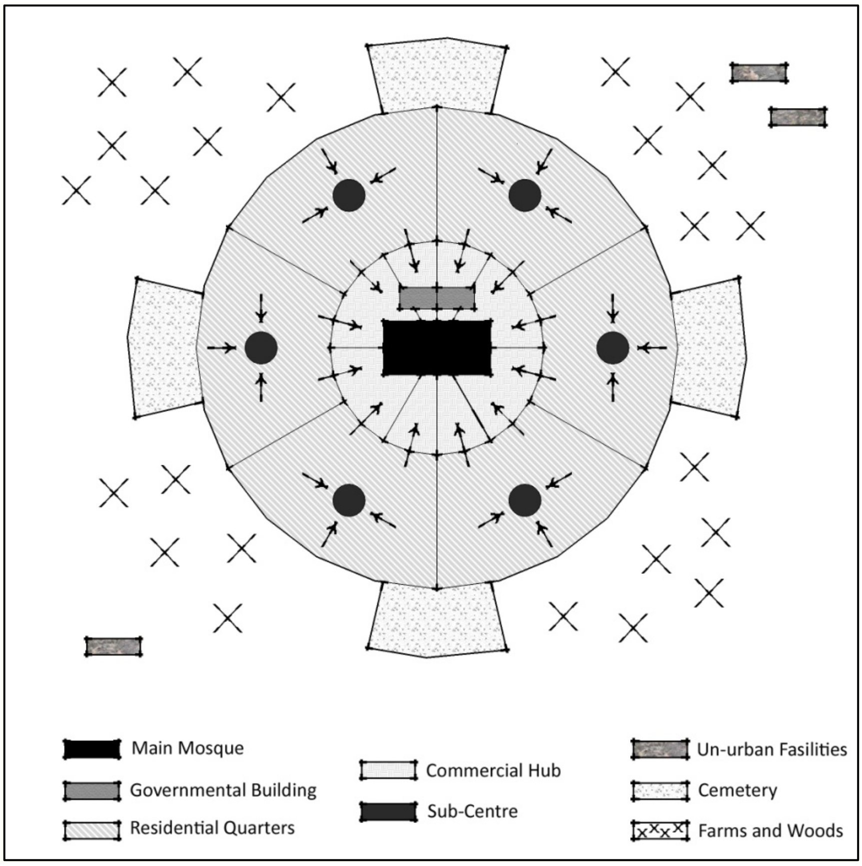


Figure 3.4: The Prophet's initial distribution of land-use in Medina (By the Author)

3.7.2.2 The Reflection of the Concept of Social Solidarity

Hakim (2008b) and Al-Naim (2006a & 2006b) state that the Islamic built environment is socially oriented and that it improves the social relationships and interaction, as one of the essential principles of planning and regulating a Muslim built environment is mirroring the notion of social solidarity among people. However, Stefano Bianca (2000) states that the traditional Islamic built environments provide informal schemes, which have no advanced picture of forthcoming development. Allah ordered in the Qur'an that Muslims should behave with modesty when they are in public or outside their houses: "*Say to the believing men that they should lower their gaze and guard their modesty: that will make for greater purity for them: and Allah is well acquainted with all that they do*" (Qur'an, 24:30).

3.7.2.3 The Prevention of Harming Public Rights

According to the Qur'anic verses and Prophetic hadith, it is prohibited to harm other people's rights or properties, which is mainly derived from the concept of "*there would be neither harming nor reciprocating harm, or there is no injury or return of injury*" (Motada, 2003, p63). This concept is widely applied in planning and building matters within the traditional Muslim environment. It was a planning and design policy interpreted in that environment, which decreased the transgression and generated the principle of respect within a community in regarding to building and planning process. Therefore, one might plan, regulate or modify the built environment as long as no harm is inflicted on others (Motada, 2003 and Llewellyn, 1980).

Basim Hakim (2008b, p19) defines the avoidance of harming the public as, "*the essence is that one should exercise one's full right in what is rightfully his own providing the decision / action will not generate harm to others. Likewise, others should exercise their full rights in what is rightfully theirs providing their decision / action will not harm others*". According to Ibn Tymiyah (2007) in the traditional Muslim environment people have the right to raise their dwellings. Yet, this right is not granted if it causes harm to neighbours such as obstructing the natural light or air. In addition, it was not tolerable that someone install a flour mill or a leather-tanning factory in residential areas as it could be a source of pollution.

In "The Muqaddimah: An Introduction to History", Ibn Khaldun (2004), a maghrebi philosopher of the 14th century AD, believes that it is essential for destructive actions to be kept away from the Muslim's built environment and to protect Muslims from infringements. He adds that it is part of Muslim's requirements to provide the means in maintaining people's privileges within the public spaces. Therefore, the planning authorities should not ignore people's rights, as their authority is regarded as a trust from Allah to facilitate the well-being of the society. When it comes to planting or building in a public road, these actions are forbidden if they cause damage and harm to passers-by and any disputable elements have to be eliminated and avoided.

In regard to the relationship between S*hari'ah* and the planning and design values, Llewellyn (1980) identifies the significant purpose of urban planning based on Islamic view, which is seen as a process that is oriented towards enhancing welfare and prosperity on earth and earning the credit of eternal peace through complete submission to Allah. These objectives cannot be accomplished without the recognition of the public needs, which themselves are rights. According to S*hari'ah* all acts, including planning and design, are evaluated in terms of social benefits (*masalih*) and social evils (*mafasid*). Although, these Muslim social needs are hierarchically ordered as absolute necessities such as; religion and morality as well as life matters and property, they should be oriented towards the facilitation of public benefits and interests. Also, the larger scale service of the entire society has to be given a priority over the smaller scale service of a sub-group or a small number of individuals (Figure 3.5).

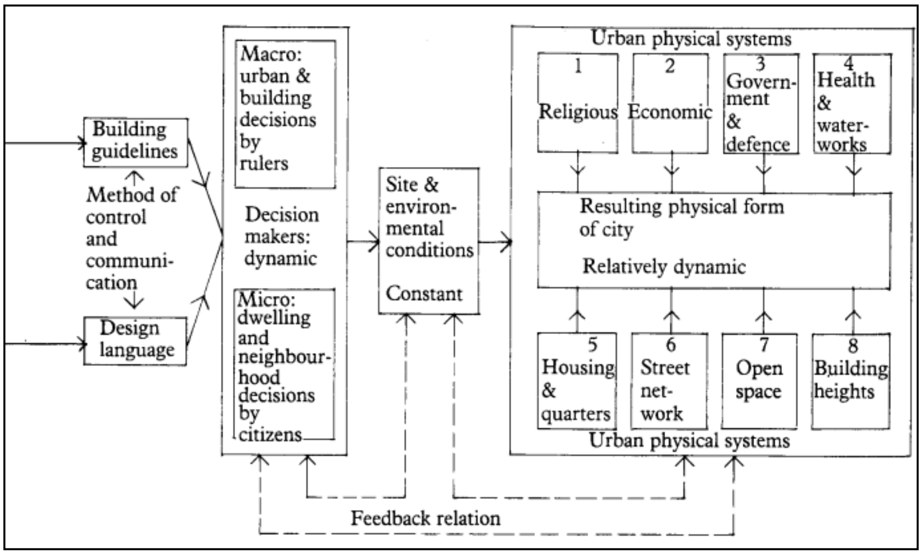


Figure 3.5: Micro urban decisions by citizens (Hakim, 2008, p19)

Following this matte and during the early years of Islam, Prophet Muhammad instructed governors to strive in making ease rather than hardship for the people by providing better services of public facilities such as infrastructure. Moreover, by avoiding the creation of disputable elements and addressing successful planning ideas that takes into account the Islamic principles, the damaging of public rights can be easily preventable. Adopting any planning policy or building regulation that is not based on the social interaction and may lead to disputes between Muslims is in complete contradiction with Shari'ah as one of the main goals of Islamic values is to maintain the conception of social solidarity and boost social justice (Mortada, 2003).

The Polish orientalist Bozena Strzyzewska (1980) states that the regulations of planning and design of the Muslim built environment are not produced by ordinary people's desires but are made by professionals, who have a deep knowledge of the Islamic principles, people requirements, and building and urban regulations in order to guarantee their competence. However, if planner and designers are not religiously knowledgeable they should seek the opinion and suggestion of religious scholars (*Ulamma*). Strzyzewska (1980) points out that in different Islamic periods the decisions regarding the location of a new town and the positions of a masjed, a governor's residence or market-place were all subject to the advice of local religious scholars (*Ulamma*).

In such environment, there was no reason to seek precise formal building and planning codes in order to regulate the Islamic built environment because every Muslim was aware of his obligation, responsibility and his role in the community. Applying such principles along with the Islamic social framework led to systematic and consistent alternatives for both architectural and urban concepts. Therefore, people's Islamic beliefs and practices are the standards and self-policing of their settlement. In fact, they were the managers and the mechanism that formed the traditional Islamic environment not the other way around (Saoud, 2002 and Benet, 1963).

The concept of social solidarity predominantly played a major role in the morphological development of most Islamic cities. Therefore the Islamic social framework, unity and harmony as well as environmental factor, anchor the creation of urban compactness, not only within the residential quarters but also spread all over the traditional urban form. The result was an environment that contains courtyards and lanes engraved in a solid built volume, which are represented in attached buildings and close clusters (Brown, 1986).

According to Kanbar (1984) the Islamic urban compactness reduces the distances between residential units and between the houses and other facilities such as religious, educational and commercial buildings. In this case walking became the main method of travelling and moving within the city, which itself has more advantages in terms of social and economical aspects. In addition urban compactness responds effectively to hot climate, decreases the amount and cost of infrastructure and guarantees low overall urban development costs. Islamic urban compactness in many cases reflects Shari'ah principles in the moderating of wealth consumption, the safeguarding of public rights and the preservation of natural balance (Nasr, 1978 and Kanbar, 1984).

3.7.2.4 Streets and Functional Width

According to the Muslim jurists, the width of streets comes under one of the Shari'ah concepts, which is the notion of social benefits (masalih). Looking for the public demands along streets is important in providing a good quality of life, maintaining people's rights and eliminating nuisance. Therefore, the street width is subject to its function and location within the whole network. Initially, the Prophet suggested that there should be a hierarchal system in the structuring streets of an urban environment with main streets being at least 3.2 meters in width. The main streets in Medina were 4.0 meters wide, while the secondary roads and alleyways did not exceeded 2.0 meters. Although the street width has to be convenient for its use and serve the community, its width should be determined by its function and intensity of flow and use (Figure 3.6) (Hakim, 2008a).

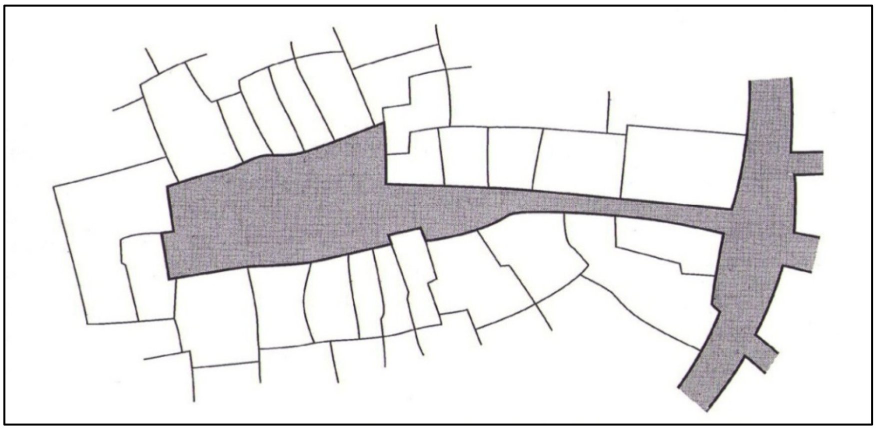


Figure 3.6: Cul-de-sacs in the Old Medina are used as semi-private spaces (Hakim, 1982, p82)

These measurements were made functionally to suit the people's way of life and transportation system at the time of the Prophet, where the public main streets were wide enough for two backed camels to pass (Figure 3.7). Alleyways and cul-de-sacs were not meant to be as wide as the main streets because they were considered as private properties for those living in them (Hakim, 1982).

It is stated by Jamel Akbar (1990) that the hierarchal system of streets' width and their relation to their function was first established in Medina and was later implemented in many Islamic cities such as Fustat and Baghdad. Other Islamic cities also implemented the hierarchal system of streets' width like in Kufah, for example, where roads were categorised according to their uses into four measurements; main roads (20 metres), secondary (10 metres), local roads (6 meters) and alleyways (3.5 meters). Shaping the road width by its function maintains urban compactness, responds to the local climate and at the same time supports the principle of strong social interaction.

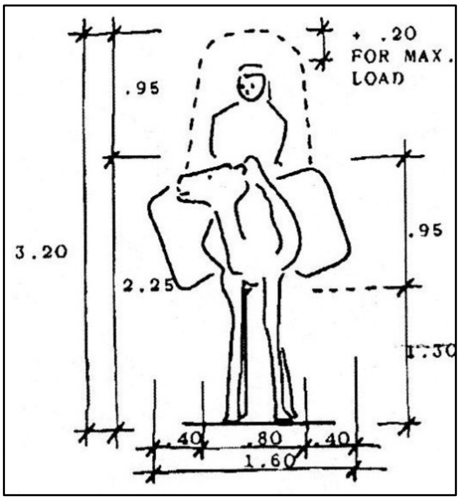


Figure 3.7: Dimensions of a packed camel (Hakim, 1982, p82)

In order to obtain a great value of privacy and make a clear distinction between private and public life, the Prophet recommended his companions to avoid sitting on thoroughfares. However, if sitting in public spaces is inevitable as a part of social life they should pay some respect to rights of thoroughfares. The Prophet laid down specific conditions for doing so by saying: "*avoid staring, do not create harm, salute back to those who salute you, bid to honour and forbid dishonour*" (Hakim, 2008b, p103). Creating a comprehensible separation between private and public spaces is one of the main social characteristics of Islamic culture.

In the attempt to reflect Islamic religious principle on everyday life, both neighbourhoods and houses should maintain the privacy of individuals and families. This goal was productively accomplished in the traditional built environment, where streets were arranged in a hierarchical integrated form and order. Main streets usually started from the hub of the traditional city, where the highest level of public life occurred, and ended in residential quarters. Their characteristics were gradually transformed in size, form and function, from public to semi-public and eventually semi-private (cul-de-sac). This spatial configuration is generated often by sabats, arches and pergolas separating the degree of streets as well as land uses.

3.7.2.5 Masjids and Islamic Urban Form

The masjid is seen as the most important building within the Islamic built environment, whose function aims to generate harmony not only between individuals and Allah but also between individuals themselves as part of a community. The masjid is not only a place of worshipping Allah but is a multi-purpose space that is usually used for congregation, education, political meetings and social interactions. It is a place where Muslims perform a congregational prayer five times a day as well as a community centre. This use reflects what the Islamic society has been practicing since Prophet Muhammad’s time in Medina (Figure 3.8).

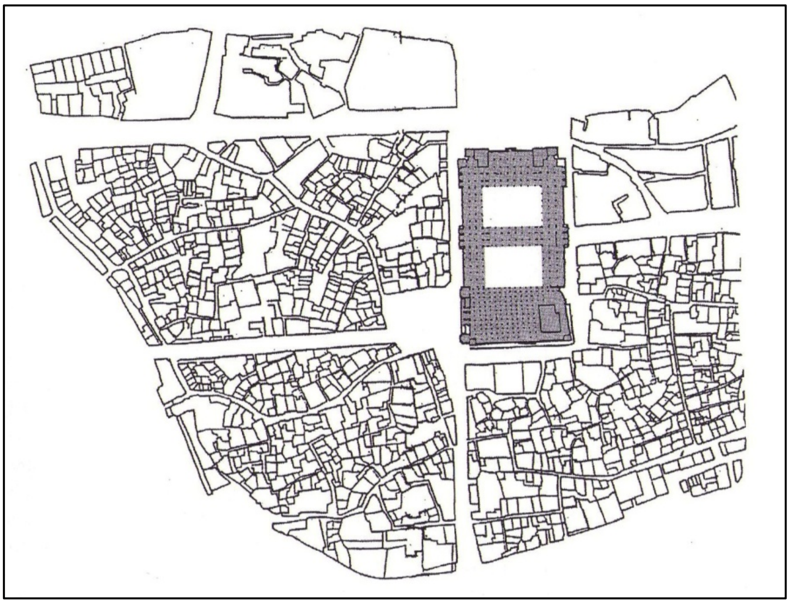


Figure 3.8: The domination of the Prophet's masjid in the traditional built environment of Medina (Mortada, 2003, p88)

Mortada (2003) points out that according to Muslim jurists, each residential area should be provided by a masjid in order to ease performing religious and socio-religious commitments. Therefore, the masjids' locations should be distributed equally in proportional distances to provide inhabitants an appropriate access to the nearest masjid. Hisham Mortada (2003) adds that during the Prophet's time, there were nine masjids in Medina apart from the Prophetic masjid, which is used to perform full day prayers. As stated by Ghosh (1985) traditional masjids were positioned almost at fixed distances from each other and within a functional hierarchy. Figure (3.9) shows the hierarchy of masjid in response to its distance, location and service zone, as suggested by the Arab Urban Development Institute. This hierarchy meets the required walking distance between the house and daily masjid, which is encouraged by Islamic teachings (Mortada, 2003).

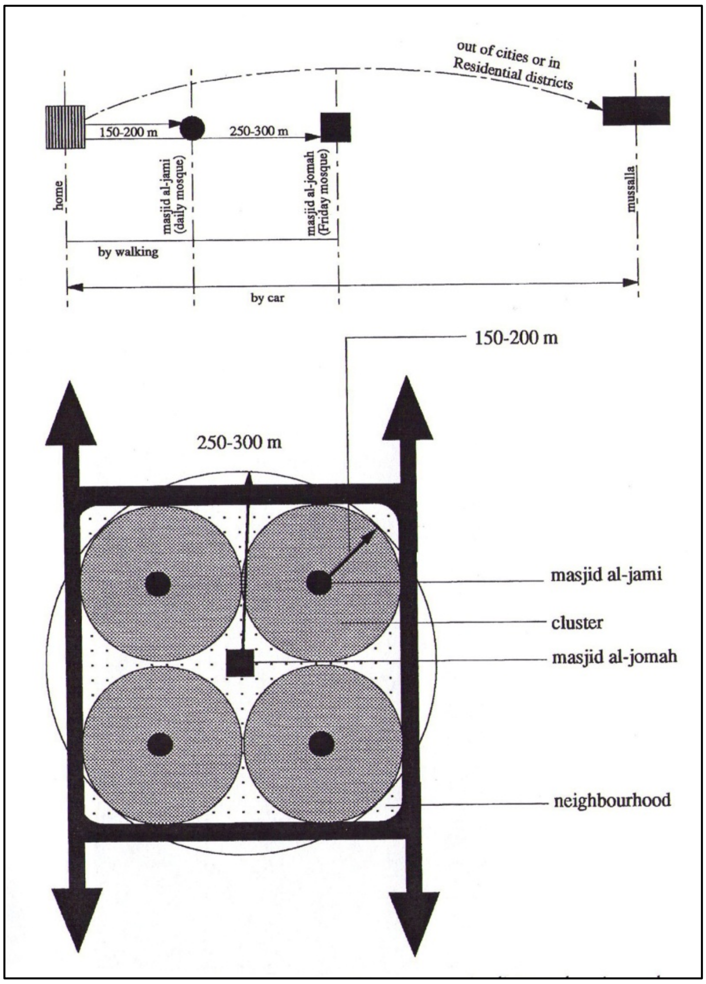


Figure 3.9: AUDI criteria of the masjid's location & distance (Mortada, 2003, p90)

The reason that Islam prefers Muslims to pray in a masjid is not just to perform prayer, which can be conducted in their house or individually, but to gather under the essence of Islamic belief rich and poor, young and old as well as educated and non-educated without any distinction. This in turn intensifies the social relationships between many people who assemble more than once a day in the masjid. That is why the Prophet stressed that the location of a masjid should be within walking distance to make it easy for people to perform congregational prayers (Binaca, 2000).

3.7.2.6 Educational Buildings and Islamic Urban Form

Islam encourages people to improve their level of knowledge and education at any stage of life. Such encouragement is greatly underpinned in the Qur'an and Sunnah. The structure of Islamic built form plays a vital role in fulfilling this obligation, as the distances and relative allocations of the educational facilities must be considered (Figure 3.10). One should put in consideration that the access to these facilities is affected by the population density and requirements.

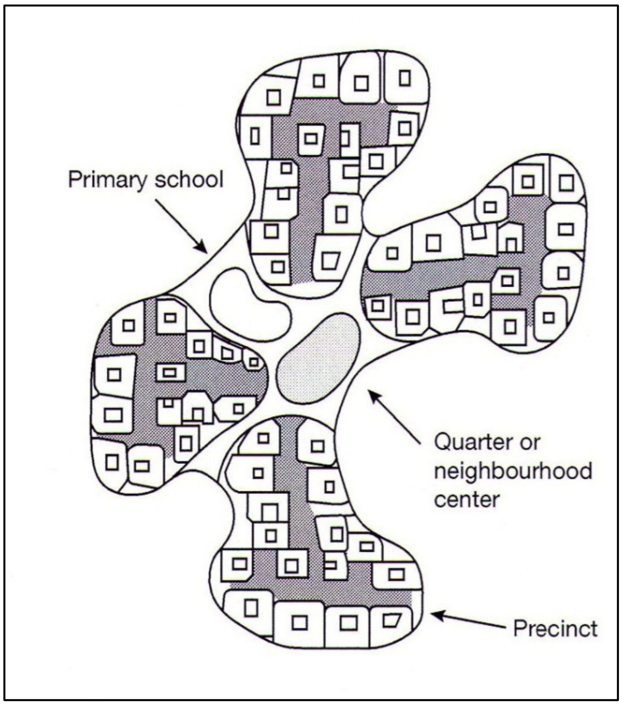
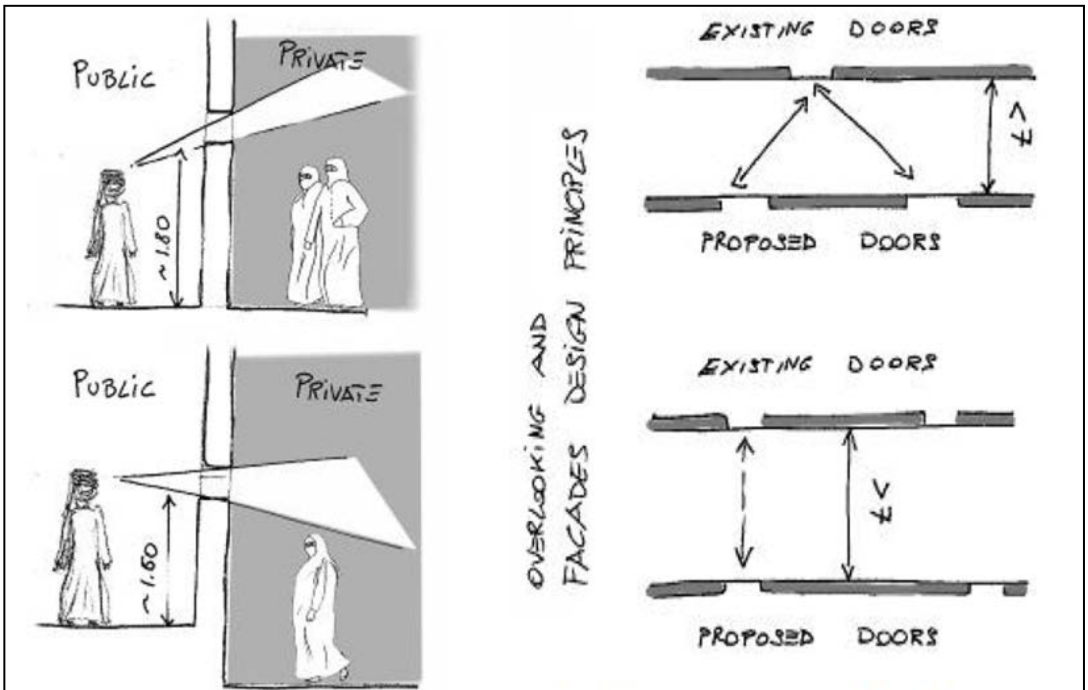


Figure 3.10: Location of schools in relation to residential quarter
(Mortada, 2003, p92)

During the early years of Islam, the teaching system was mainly related to religious subjects conducted by religious scholars (ulamma) and taking place in a masjid. Afterwards a small building was set beside the masejid (local mosque) for learning purpose. In the later periods an educational building, called el-madrasa, emerged to perform as a separated school system. Traditionally, attaching a school (el-madrasa) to adjacent masjid is not merely to promote the religious and social role of education, but also to make a direct relationship between the proportional locations of religious and educational buildings (Nashabi, 1980).

3.7.2.7 The Privacy

According to Muslim jurists, any house within the Islamic urban form should be prevented from the outside visual intrusion. The residential unit should be kept away from the passers-by and the architectural elevation elements of the other buildings such as main doors, windows or balconies. The placement of a dwelling’s main door should pursue the principle of sustaining and respecting privacy and guarantee that no offence is caused to the neighbours’ privacy. Therefore, Muslim jurists suggested that the dwellings’ main doors should be offset from each other in order to prevent any direct visual relationships between the opposite or adjacent neighbours’ doors (Figure 3.11).



Vertical windows positioning and privacy   The relations between streets width and privacy

Figure 3.11: The relation between a dwelling and a street according to Muslim jurists (Balbo, 2006, p3)

In addition, the early Muslim jurists stated that the placement of the main door is related to the width and function of a street. They considered entrance doors that are in front of each other in a street less than 7 cubits of width (less than 3.5 meters) as an intrusion into other people's lives. Therefore any door should not be located exactly opposite to another door in order to prevent looking into the entry hall of the opposite house. However, doors could be placed opposite to each other if the street is more than 7 cubits (more than 3.5 meters) and its traffic flow is heavy (Balbo, 2006).

From the rulings of the traditional Muslim jurists, the suitable position of the ground floor windows is above the human sight level on the street side (Figure 3.11). Yet, these rules are inapplicable when installing any type of ground floor window, which provides a visual contact into the privacy of a house on the opposite side of the street, even if its position is higher than eye level on the street (Hakim, 1990, 1994, 2007, 2008c; Balbo, 2006; Akbar, 1988 and Mortada, 2003).

3.7.2.8 Preventing Damaging Public Life

The Qur'an says "*It is And Allah who made your habitations homes of rest and quite for you; and made for you out of the hides of the animals tents (dwellings) which you find light and handy on your day of travel and your day of encampment; and from their wool, fur and hair, rich stuff for furnishing and enjoyment for a time*" (Qur'an, 16: 80). Therefore, Jamel Akbar (1992) indicates that a house, according to the Qur'anic verses, is a source of peacefulness to the Muslim individual's life. The Qur'an emphasises that this private building should not be a source of physical or mental offence to the neighbours or community. If the house becomes a source of uneasiness and discomfort in the built environment, it is impossible to establish a peaceful public atmosphere within the built environment.

For that reason the Qur'an disallows certain activities by saying "*And do not eat up your property among yourselves for vanities, nor use it as bait for the judges, with intent that may eat up wrongfully and knowingly a little of other people's property*" (Qur'an, 2: 188). The Prophet says, in regard to prohibiting a person from causing offence to others, "*There is no legal validity in any action that brings excessive injury to oneself or others*" (Imam Muslim). Islamic rules protect the rights of both private and public ownership. Yet whenever there is a conflict between private and public advantage, a priority is always given to public rights and benefit (Mortada, 2003). In addition, avoiding the house-related damage to others is not a restriction to someone's freedom in his own house, but it is a part of Shari'ah to maintain unhurt feelings between the members of the society and to prevent the disintegration of public life within the built environment (Mortada, 2003 and Safak, 1980).

Shari'ah clarifies the ownership of public and private properties, in order to look after the rights of both the private and the public owners. Private ownership is related to the property that belongs to one owner only, who has the right to occupy and use it. It might be a property that is owned collectively by several Muslims and it is not a part of a street, square, or any public buildings. In contrast, public properties belong to the governed authority that rules in the built environment and does not belong to private individuals, groups or even the civil authority (Mortada, 2003 and Hakim, 2009).

The disallowance against exploitation of public spaces by private individuals does not intend merely to save the presence of public rights on civic spaces, but also to avoid confusion in the ownership and the use of such spaces in future. In fact, utilising a public space for the private use, in the long run, would encourage the private owner not only to occupy that space but also to extend his property beyond it. Also, this mis-usability might lead to construct house-related damage to the public space itself and its function, which generates offence for potential usability. Changing the house function or part of it is forbidden by the Muslim jurists even if there is no harm from such action in the short run. The non-permittivity was based on the fact that such modifications would generate a dispute such as obstructing the street or hindering traffic in the distant future (Akbar, 1992 and Hakim, 1994).

3.7.2.9 Later Islamic Built Environment

Bianca (2000) points out that despite the fact that the outer condition of Muslim community has changed considerably during the last two decades, most Muslim societies never completely believed in the progress of modern Western societies. Bianca believes that the development of Islamic culture proceeded along circular and spiral patterns in preserving a permanent relation to its spiritual resource. Conversely, European civilisation after the "*Renaissance*" followed a linear path of evolution, which was determined by the underlying utopia of man-made progress towards "*the best of all possible worlds*". Therefore, the contradictory way of life produced different modes of architectural expression and urban form, as both attitudes were built on their own set of criteria.

In general some architectural and urban forms were accepted due to their convenience with the Islamic principles, whereas others were indeed modified to suit the Islamic law. For example, most of the Roman models had a significant participation in the new civilisation of Islam. However, the layouts of Roman cities' were modified to suit the main principles of Islam (Figure 3.12). *"Early Muslims accepted and adopted architecture and urban concepts of other cultures because it was impossible for them to discard everything from the past and start with new styles of buildings and towns"* (Mortada, 2003, p140).

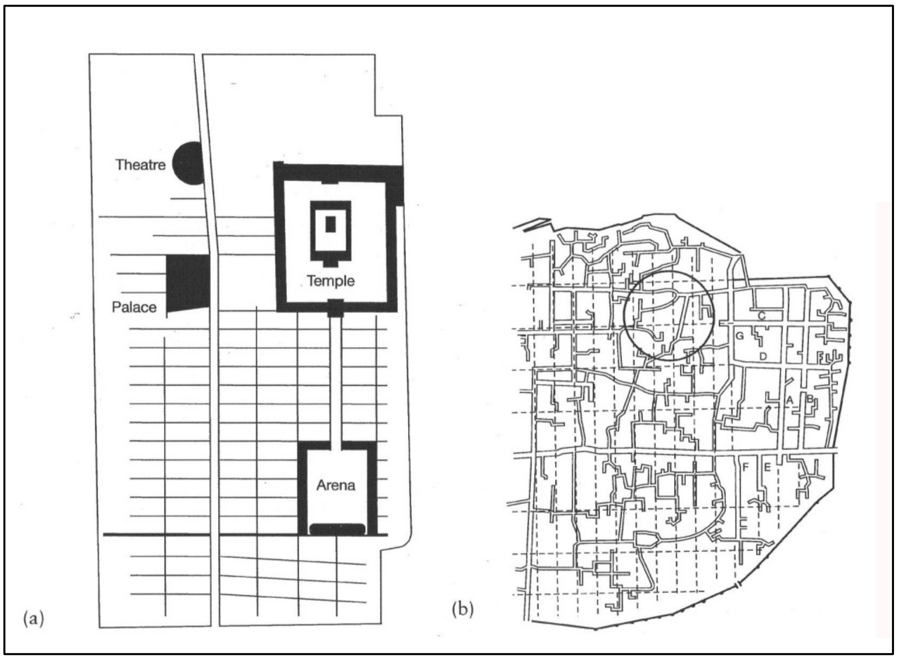


Figure 3.12: Transformation of Damascus from (a) Roman gridiron pattern to (b) Organic compact form (Mortada, 2003 p141)

As stated by Stefano Bianca (2000), this integrated process was in its peak during the 8th and 9th centuries AD, which was joined with the formation of Islamic law. Both processes responded to the motivation of the Muslim community to pave the way for a framework of life that is in harmony with its main beliefs. A number of modern Western philosophers reached a conclusion that later Islamic built environment is a merely mechanical repetition of the existing models, but in fact, the Islamic models of buildings and urban forms were produced according to the distinct spiritual meaning and the interpretation of timeless expression.

When comparing Islamic constitutions to the Roman, which is the base of most European legal systems, one can find that the character of Islamic resources and objectives are significantly different from that of the Roman. The Islamic law is based constitutionally on a religious basis, which is mainly originated from live experience of an ideal society that aims to enhance an exemplary pattern of individual and collective human behaviour. Stefano

While the growth of Roman cities generated by the cultural heritage of Rome brought a new set of parameters, the Islamic urban civilisation was always related to the identity of the local society (Bianca, 2000). Ibn Khaldun in his fundamental book (The Muqaddimah: An Introduction to History) (2004) , stated that the cultural history of Islam, nomad and urban ways of life are realised as different styles of the same existential statues, where one is more “liquid” and the other is more “crystallised” in its consistency. He emphasises that nomad and urban societies are closely interrelated and even interdependent, as they are two elements of a natural growth and shrinkage process, which promotes and enhances urban civilisation.

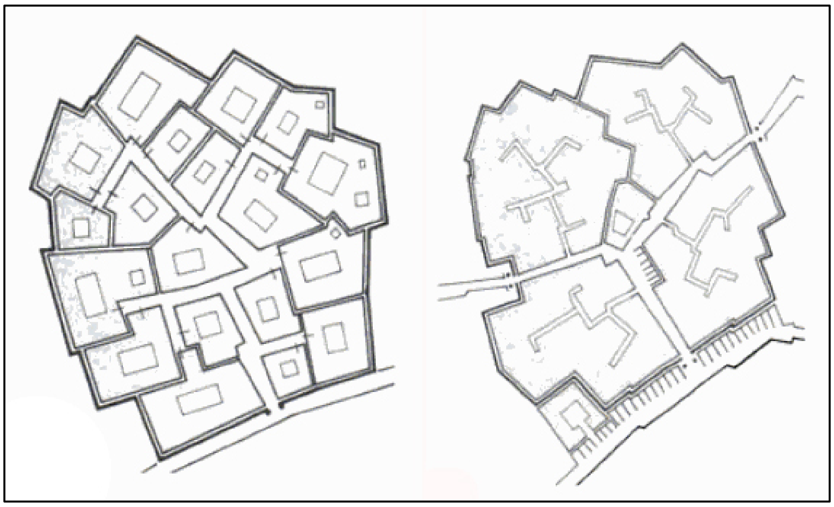


Figure 3.13: Typical structure of a cluster of courtyard houses in North Africa (Bianca, 2000, p38)

The structure of the Islamic city and its buildings was mainly based on the gradual recognition of “interior” courtyards from “exterior” spaces, where the idea of interior and exterior become relative values contained by a large spatial spectrum, which extended from the small private room to the complete urban structure. Thus the cellular structure of the Islamic city was based on the notion of the “wholeness” of each self-sufficient unit, despite its relative position in the urban system. The result is a model of multi-focal pattern characterised by a large amount of “centres” represented by buildings’ courtyards instead of applying a rational grid of streets and squares. Yet, the morphological homogeneity of the Islamic city pattern provided principles that allowed the multiple individual forms to create an extremely distinct architectural unity (Bianca, 2000) (Figure 3.13).

Islam creates a special concept of sacred space, as its approach combines religious and social institutions to the community structure and family clan. The meaning of scared in the Islamic city does not relate to a specific isolated form but it spreads all over the urban fabric. This urban fabric is considered to be a combination of religious, public and private buildings as well as a collection of monuments, which together produce a series of self-contained cellular compartments, and where every building or cell has its own internal characteristics (Nasr, 1978).

The religious building “masjed” is fully integrated into both the social life as well as the urban fabric of the town fulfilling the comprehensive civic functions. The private house obtains a degree of sacredness, which is a unique feature in comparison with other civilisations. The sacredness within the Islamic built environment spreads all over the whole urban form, which avoids the creation of concentrated or isolated forms. This urban structure allows the private or sacred character of individual space to be protected where and when required, as it provides a clear internal differentiation within a series of self-sufficient units. Therefore, the public spaces have flexibility in their layout and are highly formalised institutions allowing a high degree of interaction between various social activities (Ottman, 1978).

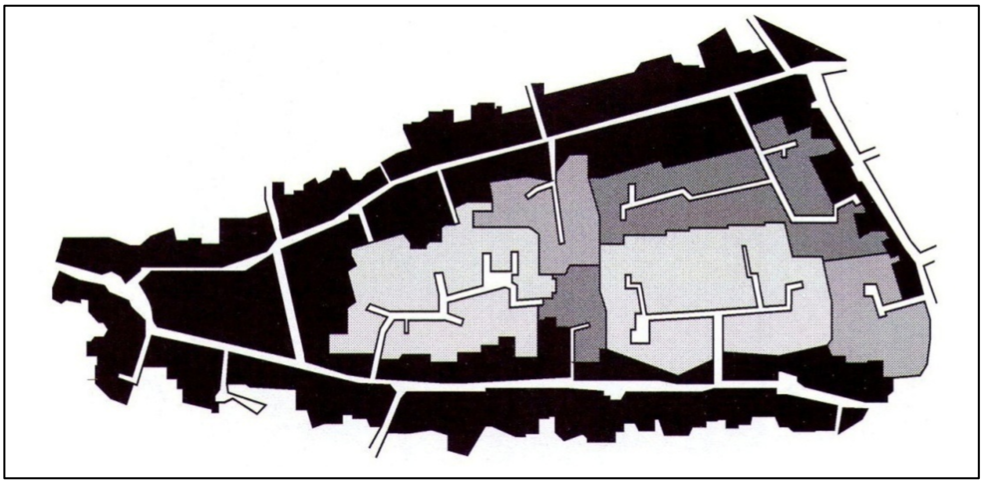


Figure 3.14: Cul-de-sacs structure within the traditional Islamic urban fabric of Alppo (Mortada, 2003, p80)

The courtyard buildings in the Islamic city are closely knitted and wall to wall structured, which form inward-oriented autonomous units. Each residential unit in the Islamic city has a unique main door that provides not just an access to the nearby street but also a visual contact to the outside. This is due to the fact that the house windows are normally higher than the level of human sight in order to provide more visual privacy from the adjacent street and neighbouring buildings. The street network within each residential quarter is broken into successive hierarchical roads, increasing the degree of privacy as the walker approaches cul-de-sac, where the public space is swallowed and converted into a private access corridor for several units (Figures 3.14 & 3.15) (Petruccioli, 2007).

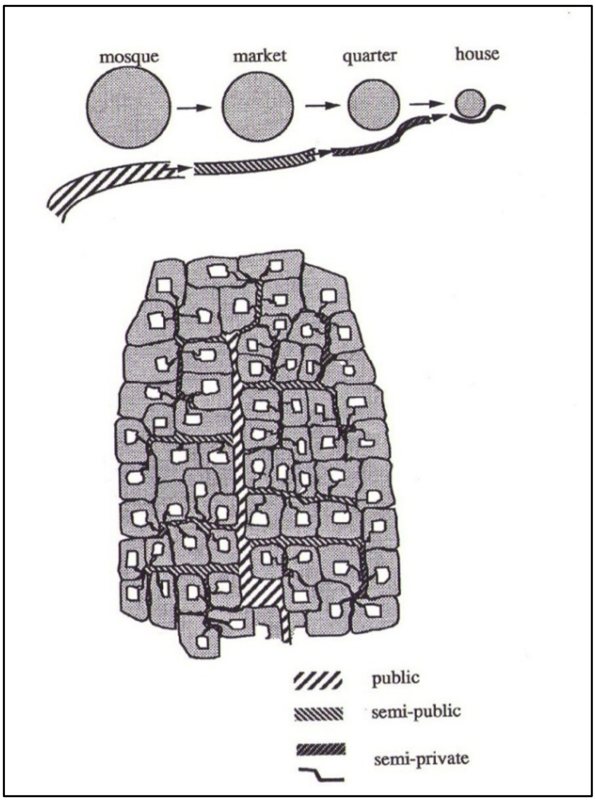


Figure 3.15: The traditional hierarchy of street width: a hierarchy of privacy (Mortada, 2003, p86)

The conception of urban public spaces was absorbed by the courtyard buildings both public and private. These open spaces became the core of individual units' activities instead of outdoor public spaces. The dwelling courtyard shows a well-located place for family meetings, while the courtyards of public buildings exhibit convenient places for community gathering (Petruccioli, 2007).

Bianca (2000) points out that the formal ways of creating public and private spaces, which were produced according to Islamic townscape principles, differ from those of the classical European tradition. The prevailing attitude was to make a combination between the anonymity of the outer geometric arrangements (quantitative) and the personalisation of the inner affinity of structuring principles (qualitative) by defining and enclosing a multitude of self-contained individual volumes. Therefore, courtyard buildings were likely to become architecturally self-sufficient, imposing their vocabulary on the street system rather than relying on encoded criteria (Figure 3.16). Following such a method in the composition of individual nuclei, public spaces become interior corridor systems, which are framed by adjacent buildings leaving no loose residual spaces.

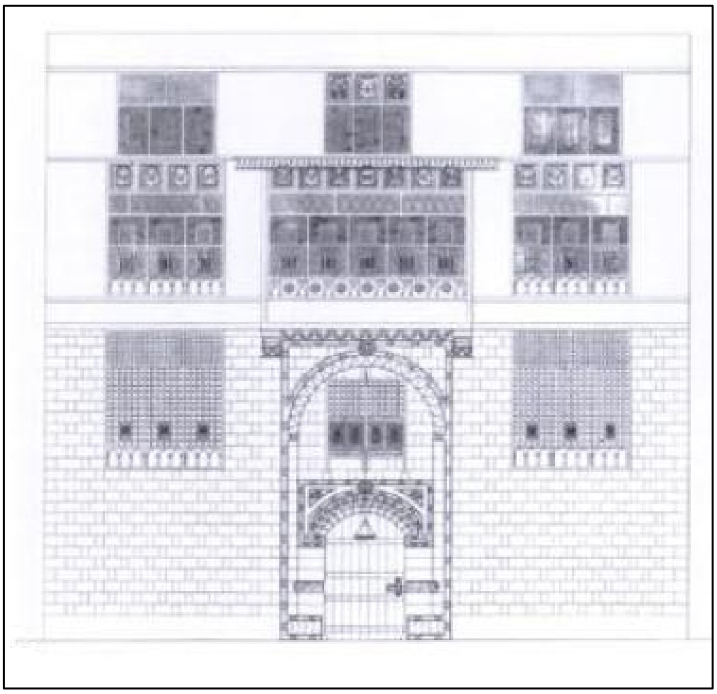


Figure 3.16: Street elevation of an early 19th century house
(Bianca, 2000, p73)

The majority of public buildings and a few important residential units were located on the main streets that are consistent with public flow, while the mainstream of common residential units are located along quieter streets, such as connecting streets and cul-de-sacs. "*Since the definition of private territorial identities was so dominant, this led to the absence of representative civic space in the Western sense, and also to the lack of undefined public open space which, if it ever existed, tended to be neglected or rapidly appropriated for other uses*" (Bianca, 2000, p38). Therefore, Islam accepted self-sufficiency and responsibility to a range of social groups within the community, where the sense of the modern city planning was practically missing.

These principles were embodied in traditional urban fabric by default and are mainly preserved in the Traditional Islamic Old Towns. Unfortunately these principles are barely represented in recent planning system in the Muslim world. This is mainly because since the 1960's major changes took place in the Muslim countries causing a shift from traditional system of construction and planning to a contemporary, so-called modern system. Although the forces of change and motivation were different from one country to another, most of these changes were a direct result of modern movement. Even after gaining their independence, most Muslim countries adopted foreign strategies in creating new urban developments, causing a fraction in the relationship between the Islamic values and urban environment.

3.7.2.10 Responsibility

In his book "Crisis in the Built Environment: the case of the Muslim city", Jamel Akbar (1988) believes that a better understanding of the physical and spatial elements of the built environment can be achieved if these elements are assumed to have individual interest in their own well-being, just like a human being. Observing the built environment in this way provides an objective value-free process of investigation, where the state of any object merely mirrors the management of that object by individuals in the form of owners, users or controllers. Therefore, the condition or state of any object in the built environment is related to the responsibility of owning, using and controlling it.

According to Jamel Akbar (1988) the model of using any property within the built environment combines two concepts, which are claims and parties. The concept of claims is based on the pluralism of those who own, use or control the property. For example, a house can be used by someone as a tenant but is owned by another person, where the tenant cannot add any physical element inside the property without permission from the owner. A computer can be owned by a university and used by the student who is not able to take it out of that space. A park can be owned by the state and used by the public, while the overall management of this park is related to the state responsibility. The planning bureau of a city or a town can change the function of a building or a land to be suitable for the new development concept, although they neither own nor use them. These examples show that the claim of ownership is different from the claims of use or control. Consequently, any property is subject to three distinct and observable claims: the claim of ownership, the claim of use and the claim of control.

Moreover, the concept of a party is obviously based on the interaction of values, norms and motivations of the cultural, social, traditional and religious factors. All of these factors converge in a specific decision that relates mainly to the property not the ownership, which represents one party only, whether a person, a group of people, or an organisation. A group of family members or a company can share the ownership of a property. Yet, the decision for any physical transformation or change in that property should be taken by all the members as one party. The same notion applies to control the property, for instance transforming the function of any public property into another is based on a single decision that is usually made by a controlling party (decision-makers), where the residents' agreement or disagreement in regard to such transformation does not matter. The usability of a property operates in the same way as ownership and control. A property can be used by only one party regardless of whether that party is one person, a family or the public (Akbar, 1988).

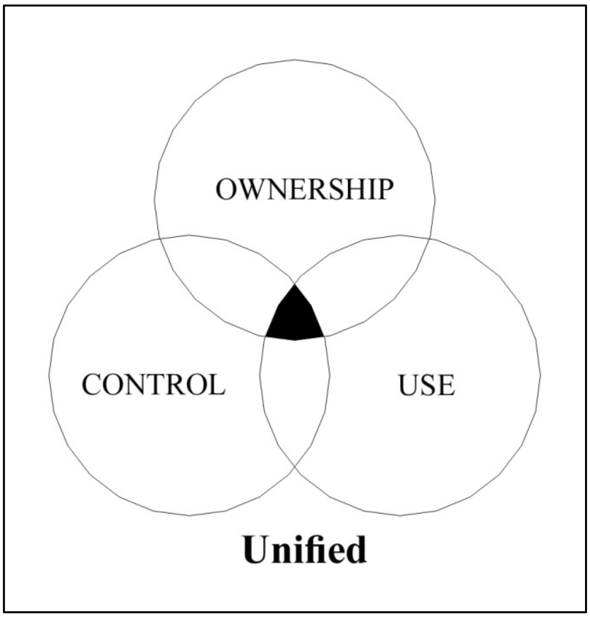


Figure 3.17: The prevailed form of submission "Unified"
(By the Author based on Akbar, 1988)

By investigating the possible relationships among the three claims and the number of the parties that can be involved in sharing the property, five basic interrelationships generate the advantage of this model and shape the form of submission of property. The first possibility is "unified" form, which occurs when the same party owns, uses and controls the property (Figure 3.17). Under Muslim law this is considered the most desirable state of property.

The second is "dispersed" form, which occurs when a property is jointly owned, used and controlled by three independent parties (Figure 3.18). The best example of this form can be seen through the applications of "Waqf" or endowment, an institution common in the Muslim world, where a property is devoted to Allah (no one owns it), used by tenants and controlled by the trustee.

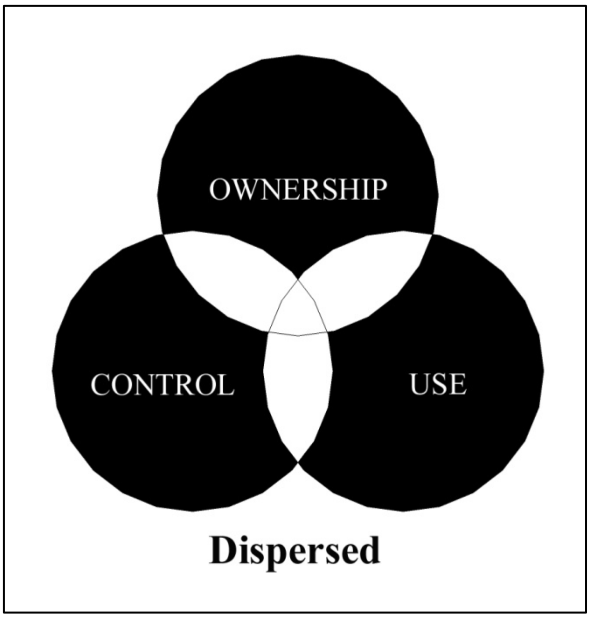


Figure 3.18: The Waqf form of submission "Dispersed" (By the Author based on Akbar, 1988)

The third option lies between the previous two possibilities and has three different forms of relationships. In the "permissive" form, the property is used by a party differs from those who own and control it, such as a rental property. In the "possessive" form the property is used and controlled by a party different from those who own it, such as the peasants who live and cultivate a land owned by a lord. In the "trusteeship" form the property is owned and used by a party different from those who control it, such as the trustee of a property that is owned by an orphan who lives in it (Figure 3.19).

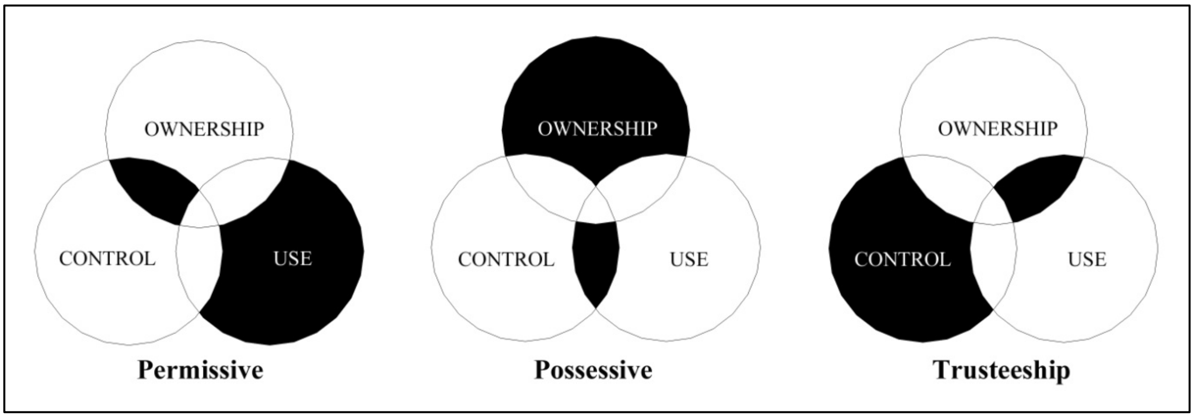


Figure 3.19: The third form of submission in its three cases (By the Author based on Akbar, 1988)

A form of submission does not provide information about the physical nature of a property whether it is large or small, built or a piece of land. It does not indicate its function whether residential, commercial or institutional. It does not show the entity of the owner whether individual, collective or organisational. The overall rigidity of the system is heavily a function of the involved parties and their mutual form of submission that shows the influence or interrelationship between one or more factors and their relationship with the built environment.

According to the relationship between ownership, control and use, which is applied within the built environment in the Muslims' settlements, there are five social points that are seen as the main principles in regulating the Islamic urban developments. These principles are: firstly, do not harm others and others should not harm you; secondly, affairs are determined; thirdly, certainty is not removed by doubt; fourtly, hardship brings relief; and finally, custom has the weight of law.

Based on these Islamic principles Hakim (1986) proposed a set of guidelines that are deeply based on the combination between the solidarity of community members and the mechanism of traditional built environment. These guidelines are grouped in five categories covering main considerations in designing Islamic urban form, which are:

- Streets should include the hierarchal network system and diversity in dimensions and related elements
- On micro zoning: there should be restrictions on uses that cause harm, such as smoke, offensive odour and noise

- Buildings should always protect family privacy from visual infringement that are usually generated by doors, window openings and heights
- In clustered or compact housing, careful thoughts should be given to the walls between adjacent neighbours, in order to clarify the rights of ownership and usage and avoid problems and conflicts between neighbours
- Careful thoughts should be given to the discharge of rain and waste water, as the first is viewed as a gift from Allah that can be utilised and shared, while the second is a harmful substance that should be appropriately discharged.

The outcome of this approach provides many examples of the participation of the Islamic principles in producing urban physical elements. For instance, recessed and projected elements along street edges (Figure 3.20) are mainly used to encourage social interaction in public spaces without blocking the movement flow.

Figure 3.20: How the physical street edges enhance the social interaction in the old city of Jeddah (Mortada, 2003, p24)

Cul-de-sac structures are physical elements that are used to maintain the family privacy by reducing the diversity of land use, keeping the residents away from the most nuisance streets, generating the social interaction between neighbours and providing appropriate and safe places for the children to play. In addition, the dwellings' main doors are avoided to be exactly facing each other in order to prevent any direct visual contact and maintain the residents' privacy. Al-Hathloul (2002) notes that Maliki scholars did not allow positioning an entry door for one house directly opposite to another house's main door, mainly to preserve privacy and to allow the house owner the personal use of the space in front of his door. He added that in his survey of over two hundred houses in Medina, he found only two examples of doors placed directly opposite to each other. Upon closer examination, al-Hathloul (2002) found that one door in each of the two examples was a recent addition that accrued during the last fifty years.

Moreover, the concept of the ownership, control and use of the public spaces (streets) as elaborated by jurists can be explained as follows: In a main thoroughfare, the public space adjacent to the property door can only be controlled or used by the nearest property, and does not extend more than half of the width of the street. In cul-de-sacs, the public-private space covers the whole area abutting the house, and usually extends to include the whole lane's width, as this space is usually kept away from the main movement flow. The Islamic public space within the residential or commercial areas therefore, can be seen as a space belonging to those who have a door opening onto it and who maintain and use it with complete respect to the public movement. However, the ownership of these spaces belongs to the municipality or governmental organisation. Consequently, some main streets within the Islamic urban forms were designed with recessed shops to allow the shops' owners to utilise the adjacent public space for displaying their goods with complete consideration to the flow of public movement (Figure 3.21).

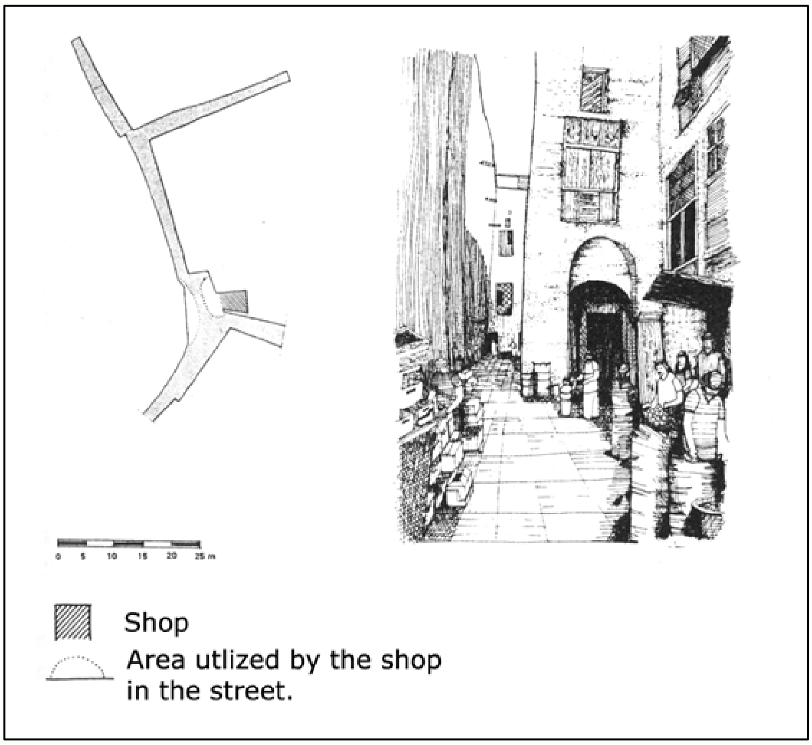


Figure 3.21: The public space that could be utilised by the adjacent shop (Al-Hathloul, 2002, p3)

3.7.2.11 The Role of the Muhtasib

Since the public domain is used by all Muslims collectively, it was not possible for all users to meet all the time and protect this public domain from any misuse. In the Muslim built environment there was a specific system for such collective control represented in "*Muhtasib*", who was assigned the role of owning and controlling the public spaces. The *Muhtasib* had no official position that could influence the morphology of the street. The main responsibility of *Muhtasibs* was to represent the community in preventing the public from misusing the public domain. *Muhtasibs'* manuals were fully detailed tasks that prohibited people from throwing dirt into the street and stopped them from adding or changing elements on the streets, such as installing a water-spout that would drop water on passers-by or putting a bench that would narrow the street. The role of M*uhtasib* in regard to streets did not reduce the street's susceptibility to encroachment (Akbar, 1988). However, their role did not only enhance the building and urban regulations, but also control the construction specification of buildings in regard to the materials and craftsmen quality. It was the M*uhtasib*'s responsibility to protect customers from deceptive manufacturers and builders. According to Jamel Akbar (1988), the M*uhtasib* also intervened in controlling the quality of building materials and their technical assembly, but never interfered in the organisation, the construction or the design of the building itself.

3.8 Similarities and Differences: Traditional Islamic and Traditional European Cities

There are similarities and differences between the Islamic built environment and the traditional European urban forms. Traditional cities, Islamic and European, were both developed incrementally; the Islamic city was based on the jurists' guidance represented by Muhtasib, while the traditional European city grew under the supervision of an uncanny spatial sense of successive generation of builders.

When comparing traditional Islamic urban fabric to traditional Western urban form, especially around the Mediterranean basin, it is fair to say that there are little differences. The reason behind this fact could be summarised as follows:

Historically, most Islamic cities around the Mediterranean basin were originally founded by the Phoenicians, the Greeks or the Romans. Therefore, the layout of the streets and gradual change from public to private spaces has some similarities to non-Muslim cities. However, there are two main differences between the two fabrics. The first is the replacement of narrow alleys by dead-end streets or cul-de-sacs, to provide more privacy to the traditional Islamic residential units. Cities that are originally occupied by Muslims or substantially expanded by them are characterised by a more convoluted streets patterns than traditional European cities.

The latter had more regular urban blocks and straight streets where the low degree of privacy required was easily achieved through courtyard houses alone without the need to apply cul-de-sacs. The second is the absence of open public spaces (piazzas or squares) that existed in traditional Western urban form. The church was the centre of life in traditional European cities. In this sense, a church was positioned at the centre of towns, while a cathedral placed at the centre of cities. An open public space was usually located in front of the religious buildings, which was surrounded by shops. This public square was a place for markets, festivals and fairs (Collins & Collins, 1965) (Figure 3.22). On the other hand, mosquesor masjids in Islamic citieswere considered the central element in structuring the traditional Islamic city, which were not only for religious activities but also a place for education, and community meeting. Masjids in traditional Islamic cities mostly included an internal open space for social activities, rather than an adjacent square or piazza (Figure 3.23).

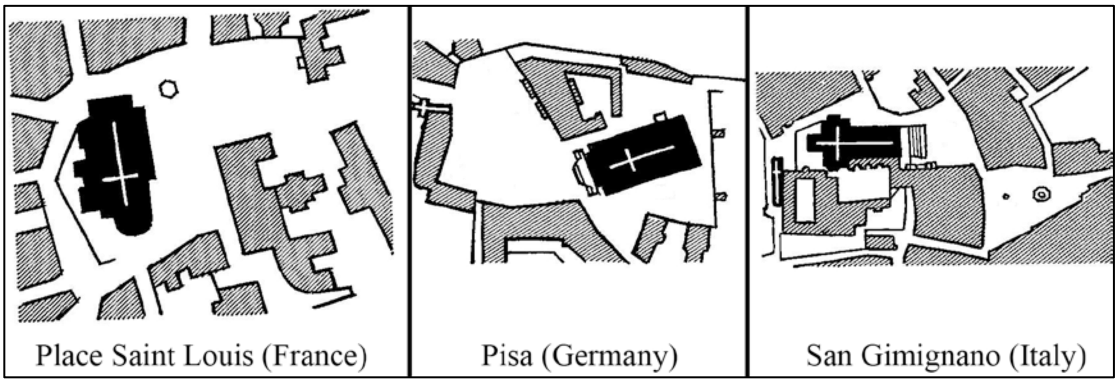


Figure 3.22: Traditional European examples show the church position and its relationship to the adjacent open space (Collins & Collins, 1965, p151, 157)

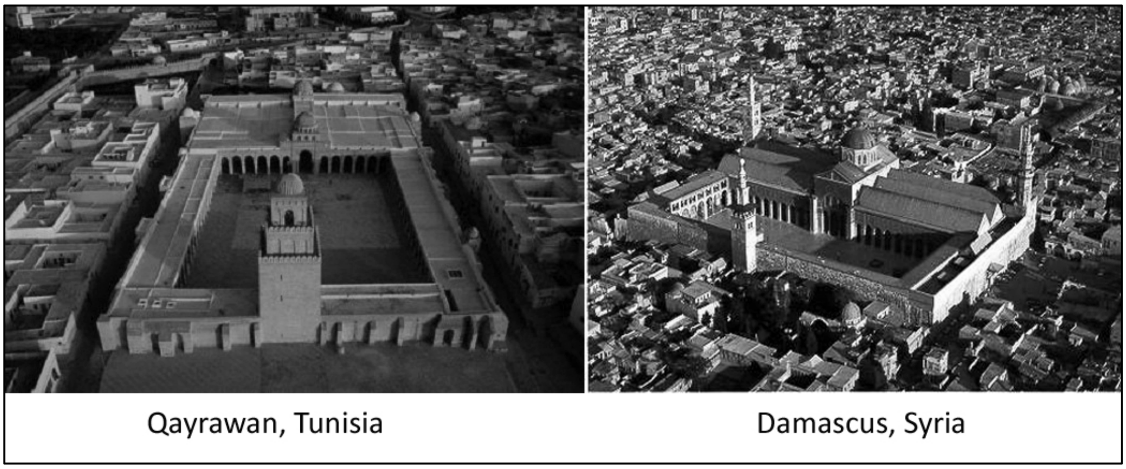


Figure 3.23: Traditional Islamic examples show the position of mainMasjids and its relationship to the surrounding urban form

In addition, the use of compact fabric is proven to be ideal around the Mediterranean Basin whether is located on the north, east or the south shore. Accordingly, traditional Islamic cities like Tripoli and many other North African cities were developed following the compactness concept. As these cities were based on the idea of compactness in their urban evolution, courtyard buildings in the Islamic city formed abstract exterior walls with fewer openings at the ground floor, and architectural richness in the internal courtyards. Conversely in the European city, most buildings had ornamented façades full of architectural details, which interacted with the public spaces even at the ground floor.

Bianca (2000) states that in traditional European cities, the relation between the leadership, represented by kings and nobility, and spiritual authority, represented by Pope and Church were always kept in a state of fragile balance. Conversely, Islamic way of thinking always stressed the interaction and integration of material and spiritual realms within a stabilised and complete social order. Unlike Other orthodoxies, Islam is not just a religion. It is a complete way of living that covers all aspects of human existence and regulates all human activities. Islamic principles can be easily seen through Shari'ah, which was founded to clarify and save Islamic principles from human misunderstanding.

As stated in the research, Stefano Bianca (2000), points out that Islamic law differs considerably from the Roman law, which served as a base for the majority of European official systems. He adds that the Islamic urban form is a result of both the religious and social life of Islam.It is a balance or equality between two different sides without inclination to one side above the other. It is a balance between materialism and spirituality; between rights of creator and rights of people; between individuality and community; and between mind and sympathy.

Janet Abu-Lughod (1987) states that the urban management problems that faced traditional Islamic cities are not different from those faced by non-Islamic cities, but the relevance of Islamic planning and rights has permeated the planning debate, underpinning socio-religious dimensions. One can easily see many similarities between Islamic cities around the world. This can be easily seen forexample when comparing the city of Hofuof in Saudi Arabia with Samarkand south of modern Russia, although the first is located in hot dry climate and the second is located in a cold climatic condition (Figure 3.24).

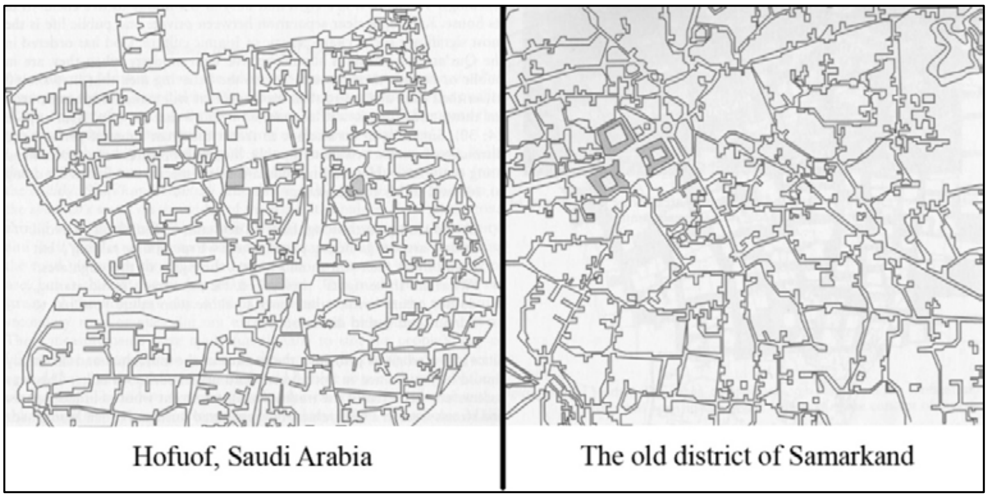


Figure 3.24: Traditional Islamic examples show the relationship between main mosque position with its open space and the surrounding urban form (Mortada, 2003, p59, 84)

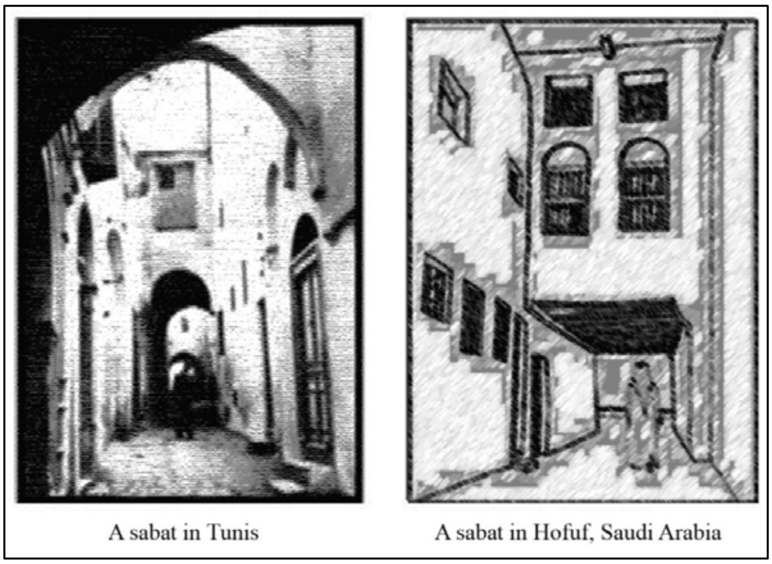


Figure 3.25: Example of two sabats in different Islamic urban forms (Hakim,2007, p92)

The similarity between Islamic urban structures in different cities does not only appear at the scale of urban forms but can also be seen at the scale of the physical elements. Figure (3.25) shows two different sabats; the first is located in Tunis, while the second is located in Saudi Arabia.

3.9 Conclusion

This chapter provides valuable insights to the way socio-cultural factors influence the use of urban space and subsequently to the relationship between the key elements of the traditional built environment and the Libyan Islamic tradition. Viewing the traditional built environment in its socio-cultural context provides a substantive means to understand the urban form and its elements.

The city centre of Tripoli can be interpreted as an expression of values that were manifested through a unique system of relationships and linkages. The Old Town underlines a system that governs the way these values are expressed in a distinctive urban form and the method in which the elements of this form are arranged. The religious value attached to the physical accessibility to the mosque determines the location and distribution of mosques within the city, as well as their relationship to other urban components. The importance of privacy determines the way in which spaces are arranged and used, not only within the residential unit but within the urban form of the whole built environment. The desire to maintain a sense of community among diverse groups of people led to the development of quarters, which represent a correlative mechanism between a given space and the inhabitants' system of value, as well as between spaces themselves.

In addition, Islam, as both a religion and a main guidance of life, is the most influential aspect in shaping the Libyan social structure. Social solidarity, as one of most important Islamic values, should be considered in future urban developments in order to create urban forms that enhance social interaction and reflect local requirements.

In general, traditional built environments have a strong sense of place and meets people's needs and expectations. Some human behaviour is governed by culture, the system of shared attitudes and symbols that characterizes a group of people. The people's culture is a shared schema that designates regularities in a group's thinking and behaviour. Individuals are socialised within a culture, but at the same time, their behaviour shapes that culture, which makes culture something that evolves over time rather than something static. Each culture is unique, depending on its historical background. However, this does not mean that certain values are not held in common by different cultures. Each culture is the result of the past efforts of people dealing with physical and social environment. People can deal with their own cultures in a collective way. As a result of being socialised within a culture, an individual has the ability to know the appropriate behaviour (Hakim, 2008a & 2008b).

In conclusion, Shari'ah is the Islamic law, which is established to clarify and prevent the philosophy of Islam from human misinterpretation. Shari'ah, with its concepts and sources, is a constitution that provides Muslims with an Islamic guidance showing the prohibitions and allowances. Therefore, any case that relates to the planning of the built environment and designing buildings must be investigated according to the various sources and techniques of Shari'ah, especially when the case is seen as a source of violation or suspicion. In order to facilitate the Muslim's life and achieve the main objective of Islam, Shari'ah founded a hierarchal social scale which is: society, neighbourhood, family and individual.

Through Shari'ah, the Qur'an and Sunnah established certain values to regulate the physical environment in various scales, in order to promote and generate the social interactions. In regard to the natural environment, Shari'ah identifies the relationship between man and nature in terms of using and preserving the natural resources. Since arriving to Medina, Prophet Muhammad set up clear urban regulations that are related to the urban zoning and land use. The main aim of these regulations is to strengthen the social integration, protect people's rights and achieve their requirements in harmony with Islamic concept. On the domestic scale, the design of Muslim's house should meet Islamic demands for protecting the privacy of residents. Furthermore, any house should never become a source of offence neither to neighbours nor to the public life, as Shari'ah disallows any element or activity within the house that could harm the use and users of public spaces and neighbouring houses.

Chapter Four:
Urban Morphology

4.1 Introduction

The recent economic development and urbanisation have accelerated the process in developing cities, causing some aspects of social life and built environment of traditional urban forms to disappear. The sense of place plays a major role in a renewing attention to the quality of urban forms. There was an increasing concern about the built form that was produced during the Modern Movement, as it was not ideal to shape the locality of social and cultural environment (Bentley et al., 1985 and Van der Ryn & Cowan, 1996). Following the Modern Movement’s heterogeneity domination during the middle of last century, several urban thoughts, especially in Europe, took the initiative to understand the local social life and cultural identity in order to create a better quality of built environment (Relph, 1976).

Urban morphology is one of those approaches that explore the relationship between the social life and the transformation of urban forms over time. Its concept is consistently developed to interpret the existing urban form and enhance the use of traditional design language, producing new developments that are in consistency with the local context. Urban morphology also confronts the globalisation and the standardisation in producing urban forms (Trancik, 1986). The domination of standardisation has recently led to the production of new built form that is less optimised to the local environment than the traditional built form. Therefore, a significant matter has risen in relation to the sense of place, where social and cultural suitability of new built form is included (Komorowski, 2007).

This chapter defines the meaning of urban morphology and urban form through their definitions from a range of perspectives. It also explores the morphological schools, theories and approaches. In addition, it demonstrates the recent urban movements that are effective in shaping the structure and function of cities. Secondly, it presents the mathematical models of the late twentieth century such as the Space Syntax and the Multiple Centrality Assessment, which were introduced to study the evolutionary process of urban forms. Thirdly, the chapter aims to explain the street network and block structure in order to understand the components of the physical built environment and their relationship to the city life. Finally, the chapter defines the relationship between built environment and its social life.

4.2 Definitions of Urban Morphology

At the end of the nineteenth century urban morphology started to be crystallised as a field of study focusing on the urban built environment, where its originality goes back to the traditional urban fabrics that were widely spread within Central Europe. Although urban morphology was founded by the German-speaking geographer Otto Schluter, it was M.R.G. Conzen, also a German geographer, who established the Conzenian School and became the most outstanding scholar of urban morphology during the middle and later twentieth century. *Morphogenetic method, conceptualisation of historical development, terminological precision and cartographic representation were characteristic of Conzen's work* (Whitehand, 2007, p1).

The urban morphology is simply identified as the study of the urban shape and it could include some other disciplines that are relevant to urban landscape. Initially and at the late 1800s, morphological studies were an obsession of German scholars, and in the 1920s this obsession moved to Britain. The roots of the word morphology is constituted from two Latin words, morphe (form) and logos (logic or description), which jointly assemble the word morphology meaning the logic or description of the form. The Oxford English Dictionary defines morphology as the particular shape, form, or external structure of an organism, or landform. It is also expressed as the history of different elements of form. Form is characterised as a general system of arrangement, whereas figure or shape is defined by lines and angles. Ching (1996) defines *form* as a three-dimensional mass, which includes the external outline, internal structure, and the unity of the whole.

Urban morphology is related to the shapes and forms that are associated with the natural connections between urban spaces and places, which could be descriptive or classificatory. Its approach studies how and why neighbourhoods took specific shapes in their urban structure, which includes analytical element of morphogenesis - *Morphogenesis is defined in the Oxford English Dictionary as the "origination and development of morphological characters" and "formation of landscapes"*- (Peart, 2002) and expresses the city as a human habitat (Moudon, 1997). Bentley and Butina define urban morphology as "*an approach to studying and designing urban form which considers both the physical and spatial components of the urban structure (plots, blocks, streets, buildings and open spaces), all of* *which consider as part of history or evolutionary process of development of the particular part of the city under consideration*" (Bentley & Butina, 1990, p67).

Urban morphology studies the composition of urban fabrics, which were created by earlier urban generations, in several ways in order to examine the individuals, organisations and the processes of creating towns and cities. Urban morphology focuses on the physical and spatial characteristics of urban areas and analyses the elements that configure the urban form and the way these elements are organised and structured. Urban morphology in this context refers to the study of the physical form of cities: the layout of the streets, the size and shape of the buildings and plots, the architecture and the patterns of land use. Urban morphology goes beyond architecture and looks at the entire built landscape, emphasising on the relationships between the different components of the city by applying urban techniques to examine the common and non-monumental areas of built environment and its syntax. Despite multiple definitions, in general urban morphology means the structure or the study of urban form (Kropf, 2005; Larkham, 2005 and Whitehand, 2005).

Urban morphology is one of the critical disciplines of urban design applications. Since the creation of urban form is the most imperative section of urban design, the main function of urban morphology is to study urban form and make theoretical and practical contribution in designing urban landscape. Urban morphology mainly focuses on the structure of urban fabric and studies the physical urban structure at different scales; from individual buildings and plots to street blocks and street patterns that make up the structure of the whole urban form, in order to understand how this urban form has developed and progressed. Urban morphology is used to read elements that belong essentially to the physical and spatial dimension and relate directly to the ideologies behind the planning and design tasks. It is used to investigate the relation between what the disciplines of urbanism and planned or under process architecture thoughts are compared to reality (Larkham, 2005).

Kropf (2005) indicates that urban form is different to a piece of textile, as it is a type of material that has its own properties. The productive direction for the likeness between them, however, lies in the identification of the internal structure on how they respond to different stress and manipulation, where each material has its own characteristics and has to be handled differently. Therefore, people with skill in textile understand the potentials of a material and how it is cut or joined in relation to its internal structure. Similarly, it is essential for those specialised in urbanism or urban design to be equipped with urban morphology in order to understand the internal structure of an urban fabric.

The other primary consideration of urban morphology is the study of urban tissue or fabric in order to distinguish the essential physical structure of built environment. This approach raises the awareness to understand the constituent elements of processes that were rooted in spontaneous urban environments, where urbanisation depended on disorganised or disordered methods of composition. Therefore, urban morphology analysis aims to understand the urban form and space of traditional urban fabric as well as the structures underlying urban growth and development (Whitehand, 1993).

In addition urban form considers streets, urban blocks, plots and buildings as the main urban components of the city, where the city is the outcome of a process that is formed by specific determining forces at macro or micro scale. Morris (1994) divides these forces into two categories; firstly, geographical factors such as climate, topography, and local construction materials, and secondly, man-made determinants such as socio-political and economical powers, culture, and religion. Parallel to the classification of Morris, Banz (1970, p92) states "*urban form is determined by simultaneous action of dynamic and constraining forces that result from the needs and demands of the moment*". Lynch (1981) considers the settlement form as a composition of physical built environment, activities of people, social structures, and economic systems. He defines the settlement form as "*the spatial flows of persons doing things, the resulting spatial flows of persons, goods, and information, and the physical features which modify space in some way significant to those actions, including enclosures, surfaces, channels, ambiences, and objects*" (Lynch, 1981, p48).

Morphological analysis studies the structure of cities in different scales starting from micro-scale, which observes buildings and their plots, urban blocks and street network, and reaching macro-scale that examines districts and the whole city. However, it is important to note that urban blocks and street networks could be analysed in both scales. Moudon (1997) specifies three principles for urban morphological analysis. Firstly, she lists three fundamental physical elements that define an urban form: buildings and their open spaces, plots or lots, and streets. Secondly she states that there are various levels of resolution in which urban form can be understood, which commonly correspond to building/lot, street/block, city, and region. Finally, she argues that urban form can only be understood through the interpretation of its historical development. Moudon then defines three fundamental components of urban morphological research, which are *Form, Resolution, and Time,* where a plot is identified as the smallest unit of urban development. In addition, Kropf also suggests three useful conceptual tools of morphology which are represented in the *outline of the form exterior shape, level of resolution, and level of specificity* (Hall, 1997).

Urban morphology defines the history of spatial, social, and economic factors that shape a specific urban form where people, institutions, regulations, and management are included. Urban morphology is an analytic tool that assists to interpret the development processes of different urban forms by understanding the characteristics of their components of the whole urban structure.

There are three schools for morphological analysis and each school has a different theory. These three schools are; the British School, the Italian School, and French School. They all have a great participation in developing typology and morphology theories. It is important and more meaningful, therefore, to give a brief description about these schools and their theories before looking at urban morphological approaches.

4.3 "Schools" of Urban Morphology

The schools of urban morphology are considered to be a vital approach to those interested in studying the fundamentals of architecture and urban spaces within an existing urban context. The Italian, British and French schools are the main three disciplines, which focus on analysing and examining urban built environment. The principles of these schools were initially established by two individual outstanding leaders of the domain: Severio Muratori, an Italian architect who was a member of teaching staff in Venice and Rome, and M. R. G. Conzen, *a German geographer who migrated to England before the Second World War, first to study and practice urban planning, and then to teach geography* (Moudon, 1997, p4). These significant morphologists represent the foundation of an interdisciplinary field in terms of physical urban structure. They had a great influence on identifying the basic theories of building type and fabric, which created an approach for the following generations of urban morphologists. These schools provide not only the principles of understanding historical urban context, but also the roles of analysing modern urban landscape, which examine "*the* *relationship between building type and urban fabric and between typology and morphology*" (Levy, 1999, p80).

4.3.1 The British School

During the last decade of the nineteenth century the phrase *urban morphology* took its shape to analyse the components of metropolitan areas and study their characters and spatial structure, as well as to examine physical forms of urban structural patterns at different scales. This field of analysis started in Germany by Otto Schluter, who is considered to be the father of urban morphology. In 1899 two of his early papers were published; where the first was about a programmatic character and focusing on urban landscape (1899a), while the other is related to the towns' ground plan (1899b) (Whitehand, 2007).

Despite the fact that Schluter's work described an urban ground plan of town based on the earlier paper of the historian John Fritz (1894), his early examples of tracing historical development were able to produce the basic foundation of urban form application, which became an essential hallmark of urban morphology during the following century (Whitehand, 2007). Under cultural landscape (kulturlandshaft), Schlüter classified objects into settlements, land utilisation, and lines of communication, while cultural geography (kuiturgeographie) is divided into settlement geography and economic geography (Whitehand, 1987). Through urban geography, Schlüter regards the city as a part of a wider landscape and "*the physical forms and appearance of the town,.......as a distinct category of cultural landscape*" (Whitehand, 1981, p2).

In 1916, Hugo Hassinger became another example who used the morphogenetic approach to map different physical forms within urban context. He was the first to use colour in mapping the historical architecture styles in the city of Vienna. Two years later one of Schluter's student, Walter Geisler, traced the inner Danzig by mapping land and building distinguishing clearly the residential buildings' heights. His major work gave a "*comprehensive classification of sites, ground plans and building types of German towns*" (Whitehand, 1987, p4).

This morphogenetic approach led to produce the most significant work of M.R.G. Conzen, who in 1932 mapped in different colours the building types that were located between twelve towns around the city of Berlin, where the number of storeys was also shown by different colour depths. Twenty five years later, influenced by his early work around Berlin, Conzen produced better-known maps in 1958, which represented the English town of Whitby. In his later maps the historical periods of the building types were shown amongst the physical structure of the town's urban composition (Whitehand, 2007).

In other words, the initial Schluter's concept of urban morphology provided a solid motivation for Conzen's thoughts, which formed unique characters in terms of understanding and managing urban built environment. The distinctive features of his work focused on analysing a method of studying the plans of historical towns, which depended on the precision in terminology and cartographic depiction. The principle of the Conzenian School began to spread largely within central Europe and inspired many scholars and morphologists such as Whitehand, Slater, Kropf and Larkham (Whitehand, 2001).

The participation of Conzen is significant in the context of typomorphology as well because it eliminates the prescriptive dimension of planning and design that motivates the Italian and French schools. The process of building urban form is Conzen's main concern as it was examined, studied and clarified on his research. Conzen was not concerned about how to design future cities, but he was more interested in finding practical techniques in examining the process of the actual city form. Accordingly his approach provides the main comprehensive, detailed and efficient typomorphological system of the three schools (Moudon, 1994).

Conzen put urban physical structure into three conceptual categories, which make his thoughts more practical than the Italian School's philosophy. These categories are: the town plan, or ground plan in two-dimensional layout including the site, street, urban blocks and plots of buildings; the building fabric in three-dimensional form, which combines buildings and open spaces; and the pattern of land and building utilisation related to detailed land use (Conzen, 1960 and Moudon, 1994) (Figure 4.1). Despite the fact that Conzen represented a town plan in two-dimensions, his work described the town plan, the urban building types and the diversity of land use. In his approach of *town-plan analysis*, Conzen defines three fundamental elements of the town plan: the streets, the plots and the buildings (Moudon, 1994).

Figure 4.1: Elements of Town Plan (Whitehand, 1981, p26)

The plot, as one of the urban elements, was significantly developed by Conzen's thoughts and characteristically became the most productive ideas at micro-scale of urban structure, where the relation between plots and the block plans of building remarkably supplies an essential method of urban reconstruction (Moudon, 1994). Although, the town plan approach and its elements is used by Caniggia and later the Versailles School, *Conzenian plan analysis* made a significant advanced process for typo-morphological analysis by implementing the basic town plan elements as systematic tools (Larkham, 2006). The concept of *compositeness* of the town plan later set up by Conzen in order to show the diversity in the forms, land uses and urban configurations that are applied in different places of a city. The composite town plan identifies the differences in socioeconomic and built environment as it is made of different units called *plan units*. These plan units could be located in street, plot, and the size and shape of buildings.

Conzen paid full attention for an aspect of burgages (Figure 4.2) and examined in detail plots' boundaries and dimensions, which become a subject of Slater later. This metrological approach shows flexibility when used to maintain the historical features in the reconstruction of plot borders (Whitehand & Larkham, 1992). Beside Conzen's fertile ideas of urban form division, he developed another two fundamental concepts that are related to the process of urban theory. The first one is the burgage cycle and the other is the fringe-belt. The burgage cycle is a particular phenomenon in building repletion, where plots play a major role in increasing pressure and sometimes coincide with the modified functional requirements of growth in an urban area (Whitehand, 2007).

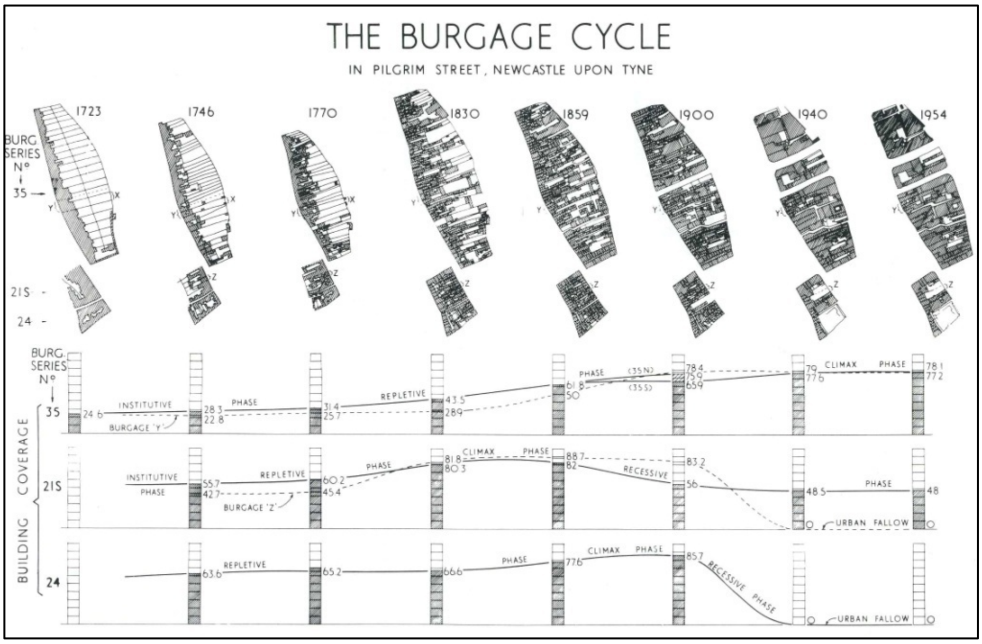


Figure 4.2: The burgage cycle in Pilgrim Street, Newcastle (Whitehand, 1981, p45)

The Lingual and architectural analysis show that each ward of the phrase ‘the burgage cycle’ has a clear definition, where the former means a small medieval town or part of a large city that is managing its own services and gives the people who live in it the right to vote, while the latter represent the gradually filling-in development of plots with buildings over a period of time, which reach to cover most of urban preparative plots to be developed.

The fringe-belt idea had been initially identified by Hebert Louis, where the growth of Berlin’s outward urban areas was uneven in their progress during the 30s of the last century. Seventy years later the concept was sophistically developed by Conzen in his remarkable town-plan analysis of the English town of Alnwick-Northumberland along with the morphological studies of the city of Newcastle (Conzen, 1960). The study of Alnwick, in particular, demonstrates the participation of Conzen’s methodology, where the layout of the town describes the regional structure, road network, topography and the site of the town with its surrounding field structure(Figures 4.3 & 4.4) (Moudon, 1994).

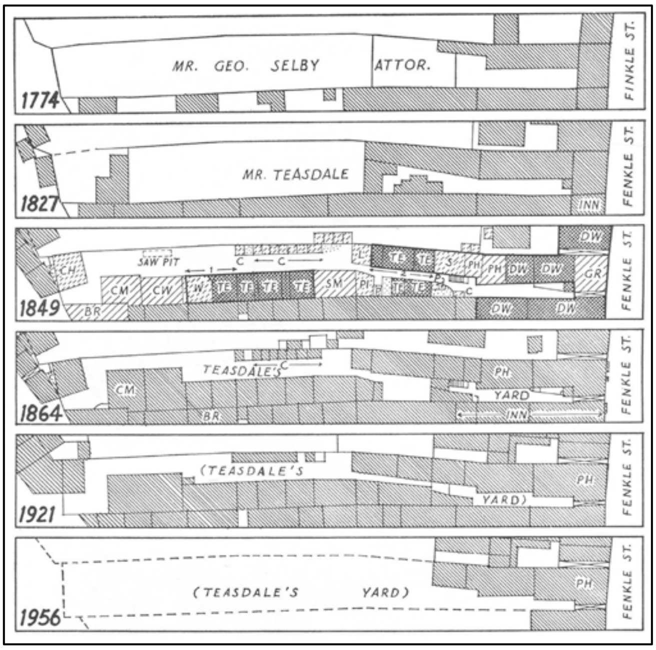


Figure 4.3: Alnwick and its burgage cycle form 1774~1956
(Conzen, 1960, p68)

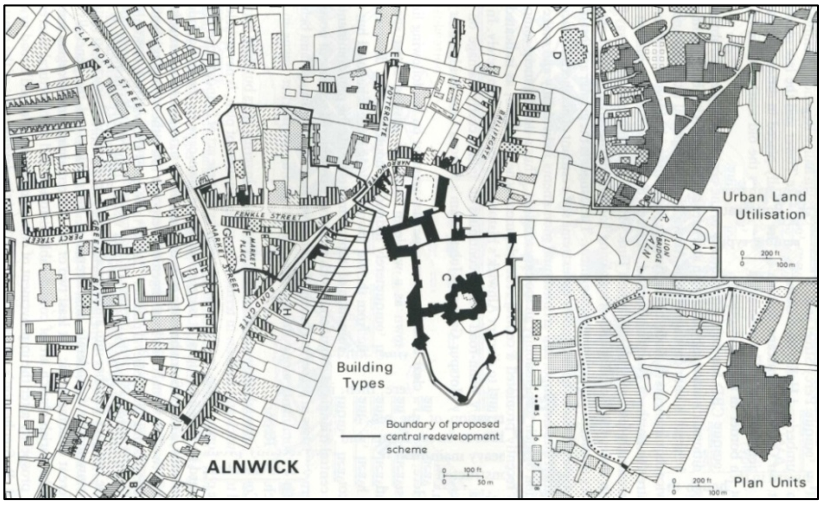


Figure 4.4: Building types & land utilisation (Whitehand, 1981, p67)

Conzen also introduces the gradual evolution of the original open air marketplace at the centre of town identifying the concept of *market colonisation*, and *fringe belt*, which represents a zone of the two sides of town' walls, where typical buildings and different functions are located (Moudon, 1994). The physical creation of fringe belts formed the outward expansion of built-up areas during a very slow growing period or even a non-growing period. Consequently, this demonstration of growth was associated directly with the fluctuations in land values during that time, which had an obvious imprint in forming fringe belts. In other words, fringe belt led to the creation of slumps in houses during the time when land values were low; whereas the characters of high-density housing appeared when land values were high (Figure 4.5) (Whitehand, 1987).

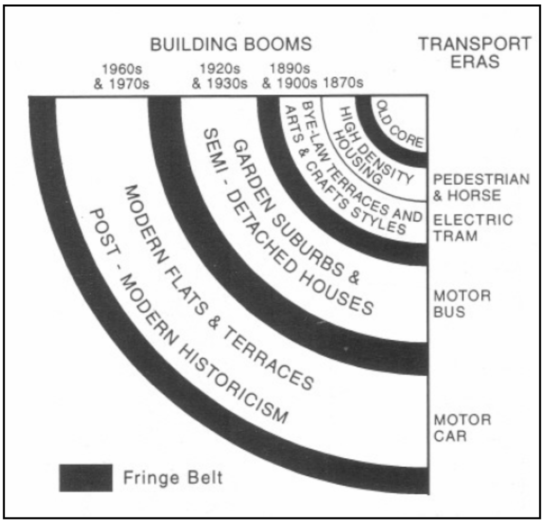


Figure 4.5: An innovation / building-cycle model (Whitehand, 2001, p105)

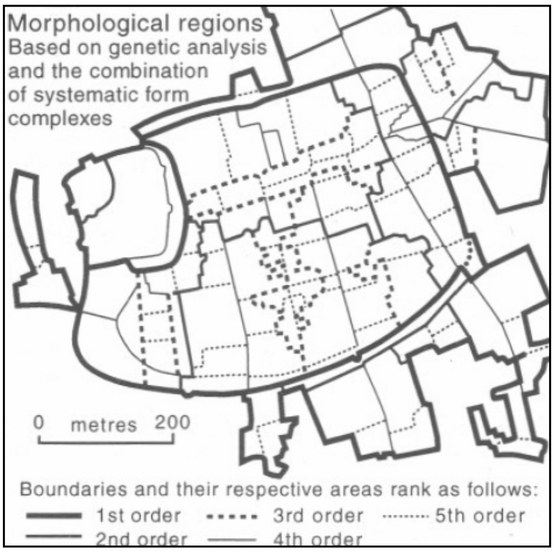


Figure 4.6: The morphological regions of Ludlow's Old Town (Whitehand, 2001, p106)

Fringe belts are usually characterised by the irregularity in plot dimensions that are never arranged as a series of rectangular shapes. Beside their variety in shapes and sizes, *fringe belt have considerably larger average plot sizes, less hard surface and fewer road crossing and they are less permeable to traffic* (Whitehand & Morton, 2003, p831). The fringe belts' significance becomes stronger in the formation of a wider framework with variations in basic features of environment, such as the density and pattern of pedestrian and vehicle network, the amount of vegetation, construction coverage areas and the plots' sizes and shapes.

Moreover, the *form complexes* of cities and towns attracted Conzen's attention alongside their urban structure layout. According to his morphological surveys of Ludlow town, Conzen found that form complexes of town-plan consists of different areas of plan type, building type and the land utilisation type (Figure 4.6). Subsequently, the fringe-belt concept is connected to further basic principles of Conzen's work of the morphological frame and the physical development that relates to the division of an urban area of morphological regions (Whitehand, 2007).

Following Conzen's approach, during the 1980s a group of geographical scholars established the Urban Morphology Research Group at the University of Birmingham. Among this group was T. R. Slater, who has some similarity to Conzen approach in analysing medieval towns (Slater, 1987 & 1990). Whitehand is another one of these scholars, whose mission related to the influence of industrial building and development on urban form. Whitehand expresses the concepts of fringe belt and building cycle that originated from identifying the building types' transformation. Larkham is another example of those applying the Conzenian approach as a preservation method to study the recent urban forms.

The fringe-belt concept is linked to Conzen's morphological frame concept, which states that the way buildings are formed on the ground during the development process, especially when rural land is transformed into urban form, act as a dominant long-time restriction on future growth. The map of morphological regions of Ludlow's old town is a composition of separate plans that were based on plan type, building type and land utilisation. This approach of designing urban form shed light on its historical development, as Conzen believes that the past provides object lessons for the future (Whitehand, 2001).

4.3.2 The Italian School

The Italian morphological School represents the continuity between pre-industrial and modern concept of urban context. It is a unique approach that connected tradition with the creativity in urban studies. It was based on the understanding of Italian Rationalism and Muratori's theory of architectural typology in the late fifties of the last century. The reflection of this peculiarity is deeply ingrained throughout design projects within existing urban tissues, along with practical and theoretical terms. The typological conception in addition, has found a productive field amongst researchers since the beginning of the last century with the intention of establishing a relation between local traditions and modernism in urban form. The Italian pioneers of typology analysed the concept of classical architecture as a formation system that was organised by its original principles and ruled by building's practicality, mainly due to its strong combination of structural system and mass features (Caniggia & Maffei, 2001).

In that sense, the typological process is a result of an architectural approach to urban morphology. The term "typology", according to the Oxford Dictionary, is the systematic classification of objects in relation to their common characteristics, which produce a particular form. Karl Kropf (2001, p31) defines urban typology as "*the transformation of types (a class or population of buildings or other elements) in which a generic process is repeated but the resulting sequence of specific transformations*". Therefore, type according to Kropf (2001) is the continuance application of a specific form. Caniggia and Maffei (1983) define type as objects that were made by different people who have a mutual conception of those specific objects. This typological process is related to the historical response of human interaction to the built environment and the evolution of types.

In the early-twentieth Century, Gustavo Giovannoni set out the basis of contemporary theoretical and operational discourse of urban design. He was, therefore, well known as the father of the Italian urbanistic tradition. He absorbed the concept of contextualism, which made him believe that a concept of "organicity" creates harmony between tradition and modernity within the historical centres, where sites express the idea of continuity with the existing urban structures. His work was mainly based on the idea that "*there are no cities that are truly old or totally new*" (Marzot, 2002, p62).

During the early-twentieth century the Italian School of urban morphology was initially manipulated and materialised by Gustavo Giovannoni's thoughts of historical centres and the professional practice of Giuseppe Pagano, who together established the basic principles of this school. Later on Saverio Muratori, Gianfranco Caniggia, Paolo Maretto, and Sandro Giannini, being equipped with profoundly studies of urban design, eliminated the separation between architecture and urban design through a deeper understanding of the transformation of urban structure according to historical processes, and taking the initiative to develop typo-morphological studies in order to create their own school (Cataldi et al., 2002).

Although Giuseppe Pagano's objectives were rather different from Giovannoni's approach, he too was inspired by using historical process to characterise urban form. Like the scholars of the modernism movement, Pagano supports the idea of rationality. Yet his interpretation was quite different. Functionalism's followers consider architecture as "*representative shared values, making itself a matter of language and aiming to offer itself simply as a working tool for programmatic purpose*" (Marzot, 2002, p62). Pagano and Daniel (1936), on the other hand, consider rationality as a constructive process, where form and structure are coming together in a simple aesthetic matter to join the historical process of transformation with new vision of functional process (Figure 4.7).

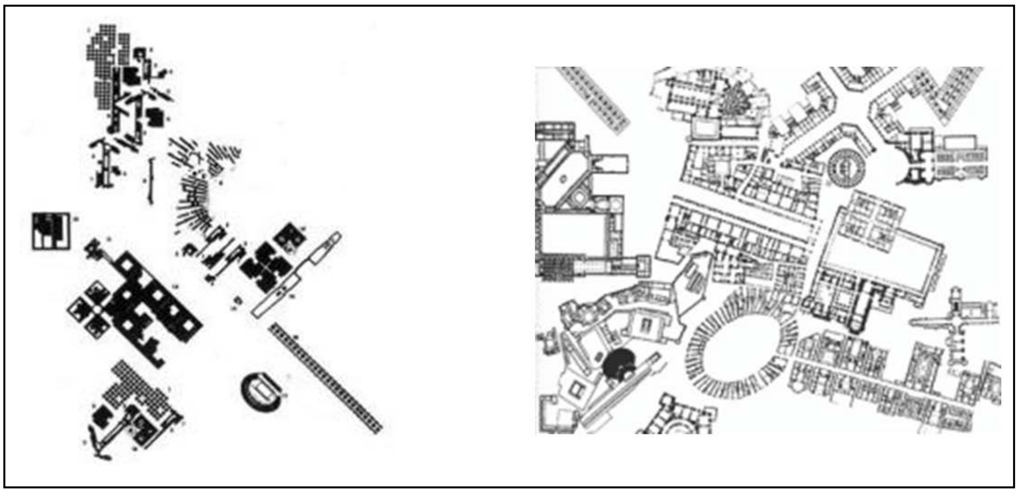


Figure 4.7: Carlo Aymonino, 1973 & Hans Kollhoff, 1976 proposals of urban form
(Marzot, 2003, p30 & 31)

The historical interpretations of urban form that was initially set out by Giovannoni and Pagano formed the centre of Muratori's thinking in terms of urban typo-morphology. Saverio Muratori considered the building type as a "collective project" and his belief was based extensively on the cultural values and rooted deeply in local traditions. Additionally, building type for Muratori was "*conceived as the temporary result of never-ending process of transformation of existing buildings*" (Marzot, 2003, p30) that increasingly restructured to meet the new social and practical needs and inevitably created a strong architecture, which is a completely different view from the abstract approach of the Modern Movement.

This ideology was set as a natural response to terminate the architectural forms of modernist interference, which is based on a master-plan scale and completely dissenting the logical way of traditional construction that took place within a city over centuries. According to Muratori, "*Modernism discarded the inherited knowledge of construction, which seen as a system, and reduced architecture and urban design to simple technical matters*" (Marzot, 2002, p63).

Muratori was a member of teaching staff in the School of Architecture in Venice. During that time he recognised that the use of self-awareness in the compositions of urban fabric is more than in monument, which was a result of all human activities that preserve cultural meanings. He considered the history of urbanism as a motivated action and a significant approach in understanding the building type and urban tissue, which helps to achieve the distinction in designing urban open spaces and forms. Muratori believed that "*there is no knowledge of real phenomena outside history*" (Petruccioli, 1998, p60).

Muratori's design method is based on the complementary relationship between historical typology and design development. The philosophy of Muratori examined the rationality of Italian architecture and urban form in the past by studying the active urban history of Rome and Venice in order to extract and "*find the laws of continuity within a transformation process*" (Marzot, 2002, p63).

Within his works, Muratori considers Romanesque, Baroque and Gothic styles the most significant Italian architecture periods in history. He believed that these themes were decades ahead of their time, as they represent an international panorama of contemporary architecture. He re-examines the theoretical assumptions of his early essays to generate fundamental concepts of building type, urban fabric, organism and operative history. The idea of operative history describes the city as an art work collection of buildings and places, representing an organism of built environments (Cataldi, et al., 2002).

Muratori made a comprehensible effort to develop an 'operational history' in Venice and Rome, which then provided the basis of integration between new architectural vocabulary and the pattern of the urban tissue. The root of Muratori's theoretical assumptions as described by Giancarlo Cataldi (1998, p35) are as follows:

*1- **Building typ**e is a priori, a synthesis or a spontaneous living concept peculiar to a culture, variable in time and space. Our typological current is based on this well-known, commonly quoted definition.*
*2- **Building history** is a sequence of spontaneous constructional phenomena. This is the logical consequence of the first assumption, and it implies the continuity of building development in a given cultural area. It also implies a more aware design that as a rule avoids individualistic contrasts with the surrounding historical established environment.*
*3- **The history of architecture** is a sequence of designed constructional phenomena. It expresses the greater intentionality of the architect designer and the typological influence that greater cultural areas can have on time.*
*4- **The crisis in modern architecture** is a typological and linguistic crisis. Hence the need to try to fill in the gap through the design method based on the dialectic between reading and design.*

According to Cataldi (1998, p45, 47) these assumptions are based on four appropriate quotations that can be stated as principles of references, which are:

*1- **Towns are history**: "the reality of a town lies in its characteristic individuality which is only completely revealed in its form which has been moulded to its natural environment by historical events, on intentional and practical grounds, and by various psychological and spiritual values. In brief, towns sum up the basic historic facts of a civilisation and develop them" (S. Muratori, 1950).*
*2- **History is continuity**: the art of building arises from some pre-existing germ. An antecedent is always necessary: nothing comes from nothing, and this can only be applied to all inventions of mankind" (A. C. Quatremere de Quincy, 1832).*
*3- **Discontinuity is crisis**: "Modern architecture cannot be subjected to any law of historic continuity. In modern times the process of consecutive stylistic development in architecture has ceased. Architecture has broken away from tradition; it has to start over again from scratch" (A. SantElia, 1914).*
*4- **Continuity is working reading**: "One can do anything but invent new things: real invention lies in not inventing anything" (S. Muratori, 1971).*

In 1950 Muratori took the initiative to point out that the idea of integration between urban organism and modern building should be adapted. Consequentially, he established a unique theory, which includes all characteristics of reciprocal interrelations, starting from an individual building and reaching a whole region. Each single characteristic was developed by urban morphologists as follows: "*Gianfranco Caniggia worked on urban tissues, Paolo Maretto on aspects of architectural language, Alessandro Giannini on the territorial scale, and Renato and Sergio Bollati also on urban tissues*".(Marzot, 2002, p64).

According to Muratori and Caniggia, buildings are extensions of human being's existence, in which "*buildings are to humans what the shell is to the snail*" (Caniggia & Maffei, 2001, p19). Caniggia, being deeply fascinated by the urban morphology of Old Italian cities such as Como, was interested to study the vernacular designing process that was developed to suit human needs. He describes this process as the "constructed apace", which is based on the built space and its interconnected open space. Caniggia conceptualised the city as a dynamic procedural typology, where a set of elements and characteristic processes led to shape an urban context.

Caniggia based his theory on experimental evidence that was a result of elaborated analysis into the way traditional cities were designed and built over time. He promotes the need to take advantage of the old traditional methods in the formation of modern cities, and as Kenneth Frampton in "*Architecture Composition and Building Typology*" states that "*the future development to architecture should result from the continuity of tectonic tradition*" (Caniggia & Maffei, 2001, p11), where places are based on the combination rather than separated work of cultural tradition. However, Caniggia's idea of the typological method was mainly generated at the scale of a singular building and adapted the existing forms that were built in one period of time in order to extract appropriate architectural vocabulary, which suited the following modern forms.

Caniggia's thoughts conclude that the built environment where people live is not selectable, "*just like we do not choose the way we look or act*" (Caniggia & Maffei, 2001, p20). Yet, we have the ability to make such modifications to our attitudes or beliefs. This approach is to introduce "spontaneous conscience", where the inside of a building represents our nature and tradition, as a result of long-term collective experience, whereas, "critical conscience" represents the reshaped and manipulated outside of a building, as a result of buildings laws and social forces. Based on these two terms, the definition of modernism refers tothe case when the latter rules the former and when "*our "shells" become over-engineered and shaped by temporary social forces*" (Caniggia & Maffei, 2001, p22).

Caniggia based his work on the idea of diachronic approach in terms of producing structures. This methodology always required specific designing methods to reconstruct formative processes integrally as a continuous comparison between existing urban context and the produced buildings. This interpretation of urban form showed not only how to build but also how to choose a building that would be suitable to its context; "*therefore, from interpretation we must understand the co-presence and derivations system in which the building that we introduce into its context has to participate as efficiently as possible, within the limits of the tools that we shall have managed to use*" (Caniggia & Maffei, 2001, p68).

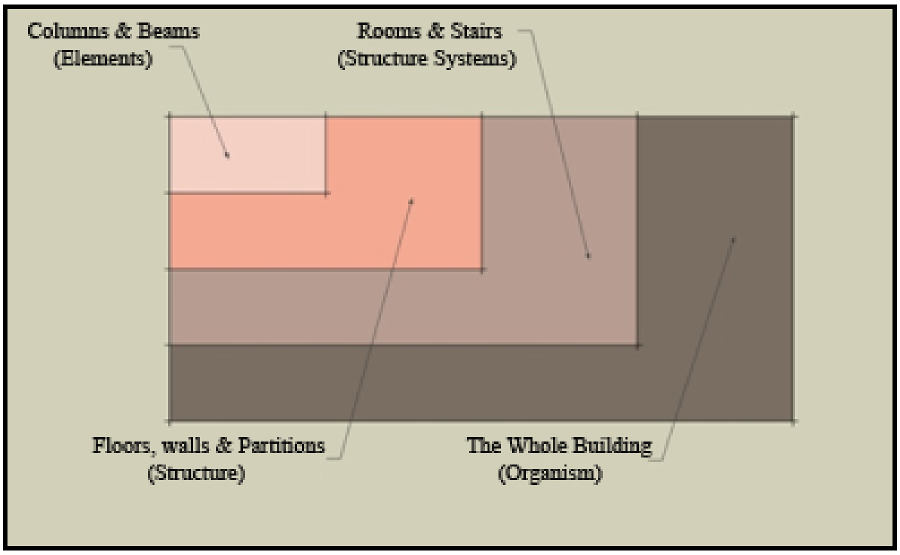


Figure 4.8: The hierarchy scale of building's components (By the Author)

Caniggia and Maffei (2001) (in Architectural Composition and Building Typology) categorised organic as the nature of an aggregation, which consist of elements with different positions and shapes that are either unrepeatable or dissimilar. They point out that the role of each component within the aggregation should have its own shape, function and should match the roles, positions, shapes and functions of other components, as well as being organised in harmony with others on a large or a small scale. At a unit scale, they divided a building into four main components which are: elements (beams and columns), elementary structures (floors, walls and partitions), structure systems (rooms and stairs) and systems organism (the whole building) (Figure 4.8). The components of the city structure based on

Caniggia's vision are presented as follows: buildings are elements, tissues are structures, districts are structure systems and the whole city is an organism (Figure 4.9).

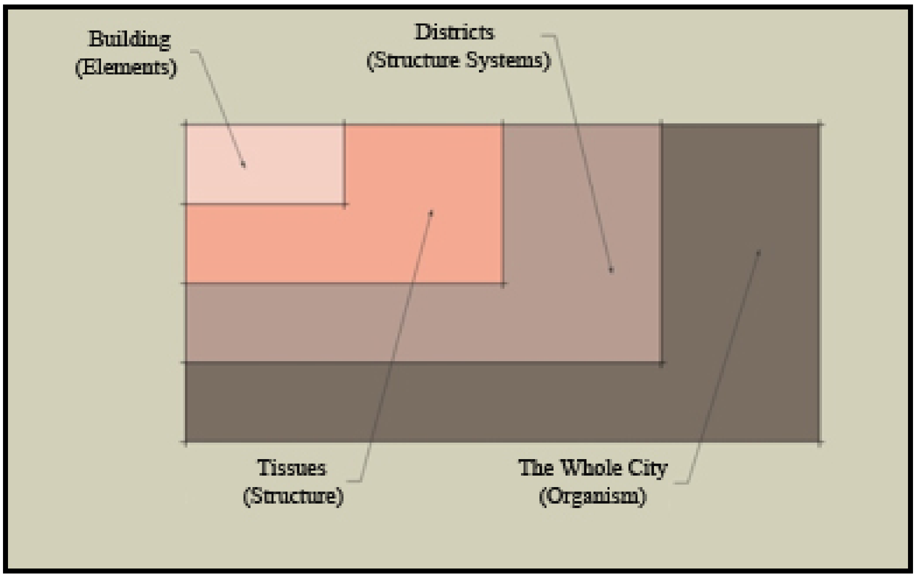


Figure 4.9: The hierarchy scale of city's components (By the Author)

Building types, tissues, urban organisms, and territories are defined by Caniggia and Muratori in relation to typology (Kropf, 2001). Caniggia applied an organic approach, where a cumulative process is developed from the elementary cell (Levy, 1999). He stated that time and regulations have a significant influence in the uniqueness of a city formation, where the building type is a collective object based on traditional values of a community. As a result, building type reflects the urban form of a city (Marzot, 2002). Muratori carried out the first systematic survey of an internal structure of a historical building in the lagoon town of Venice. Afterward, Muratori's ideas were developed by Caniggia and simplified in terms of building fabric, and basic building (Sima & Zhang, 2009).

Pasquale Carbonara is another Italian scholar who believed that rationality is not an extraction of architectural practice from local traditions but is a connection between social objectives and unpredictable retractions, which respond to functional and technical requirements. He studied the foundation of historical fabrications to the present, and applied this approach as analysis to design forms that are firmly related to the idea of contextual architecture. Franco Purini also was captivated by the transformations of abstract geometries, where he based his investigation on a method of architecture process through specific formal operations. Purini believes that type has a great ability to take a leading role as a viable scheme to build an urban environment, which is considered as a continuing development of architectural vocabulary (Cataldi et al., 2002). The majority of these contributions shared cultural background, which made an understandable approach to urban morphology and urban design. Noticeably, most of them belong to classical architecture and urban design. As a result, they state that architecture is significant in the practical formations of the urban design, which sustains formal rule in urban development and searches for harmonised organism within urban open spaces and forms.

4.3.3 The French School of Versailles

The third school of urban morphology is the French Versailles School, which emerged in France during the 1960s. The most representative pioneers of this typo-morphological theory are; the architect Philippe Panerai, the sociologist Jean Castex and the art historian Jean Depaule. They worked together and founded the School of Architecture in Versailles, which addressed clear ideas on building a framework of urban planning (Moudon, 1997). "*The school followed the Maratorian philosophy which had preceded it, believing that modernism had created an unmendable break from the past and that roots of architecture had to be rediscovered in past traditions*" (Moudon, 1994, p301). The French School was also based on the historical works of thirties' authors, Poete and Lavedan (Darin, 1998). The former's work was concentrated on a continuous evolutionary past and present process of Paris city as a whole. While the main concern of the latter "*was not the particular evolution of each city, but the understanding of the whole urban process*" (Pinho & Oliveira, 2009, p108). Moudon (1994) states that the Versailles School merges between the typology and morphology schools, through concentrating on both the architectural design as well as the urban form.

The main three members of the Versailles School examined some urban fragments to study the city as an architectural product and set up some major objectives, which are: "*to connect a set of urban elements in order to understand the modern urban space, re-establishing the dialogue between the city and its architectural history, to contribute to the definition of a new architectural model which is distinct from the modernistic proposals and finally, to gather the indispensable tools for an architectural analysis of the city*" (Pinho & Oliveira, 2009, p108). They believed that the relationship between streets and urban plots play a major role in understanding urban development and its permanent modification to cultural and economic changes.

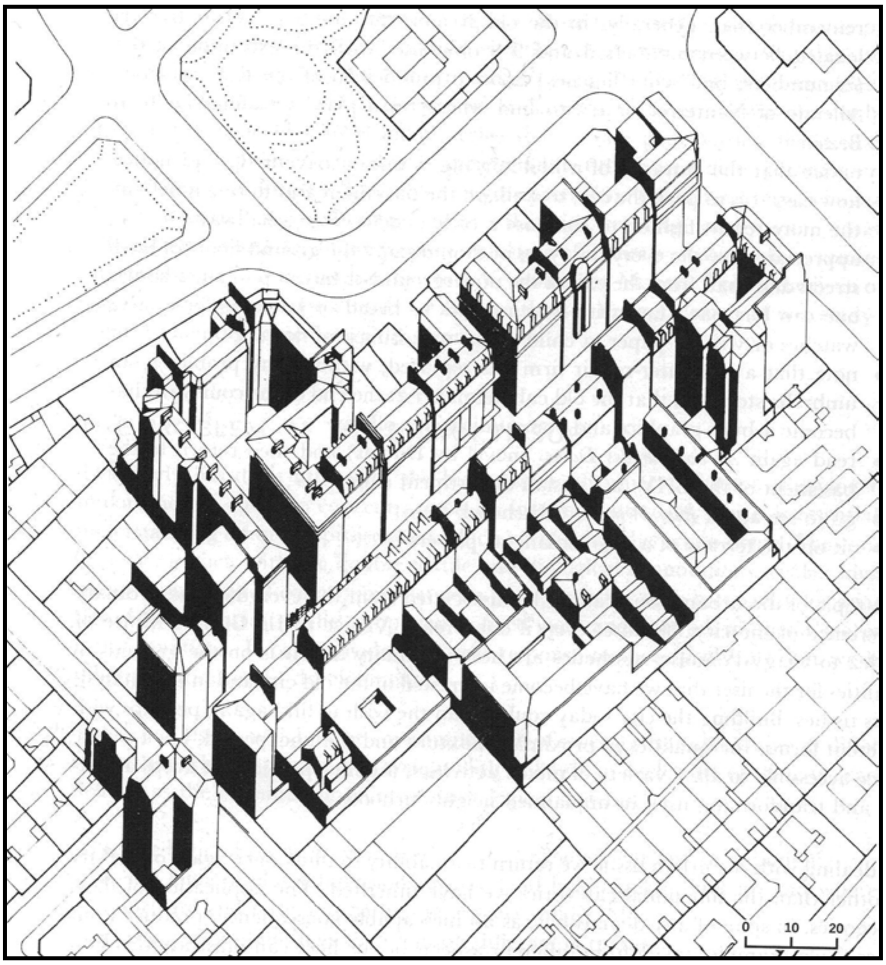


Figure 4.10: Streets as basic elements of the urban tissue (Panerai et al., 2004, p160)

Castex and Panerai applied the typo-morphological approach to study the different historical periods of Versailles' compositions as a part of examining the general development of urban forms and building types (Figure 4.10). Both of these scholars provided such a motivation for further theoretical dimensions in terms of urban morphology, even though their study was not exactly corresponding to the Muratori's thoughts. Castex and Panerai's early publications had a substantial influence throughout the architectural community in Europe. Later, detailed studies of the two cities of Versailles and Cairo had a practical impute to inspire the following generation of morphologists in France (Moudon, 1997).

The Versailles School is still a major European reference in studying urban morphology, urban tissues, building typologies and architectural analysis. French School differentiated its approach by two characteristics; the first is how French philosophers of urban morphology accepted the modernists thought and considered it as a set of new design principles, unlike

Italian scholars who raised a reaction against modern architecture and its rejection of tradition. The second is the creation of the morphological approach, which shows the relationship between the architecture and the city, in terms of architectural types and urban form (Petruccioli, 1998). The applied typomorphology approach of the French School is a new separate discipline, which is different from the approach of Muratori's and Caniggia's (Moudon, 1994). Moudon (1994, p303) adds that typomorphology "*enhances the ability to describe and discuss the city as a socio-physical phenomenon, and thus sets the design of the city within the broad, multidisciplinary intellectual framework of the humanities and the social sciences*".

Other French philosophers, who examined urban morphology and the importance of place, were Michel Foucault and Henri Lefevre. Both of them are regarded as significant scholars and philosophical authors, who have remarkable works in relation to urban morphology. Foucault's approach focused on the site compositions and how buildings occupy sites. He identified space of domination and conceptualised the power of place as a tool of analysis. Although he studied the built environments from a historical point of view, he considered himself a scientist, which applied an empirical fashion in urban context. The interstices of built places were another imperative shift of his thought, where he believed that "*the interstices of form and the places of town are as important as the built forms*" (Mugavin, 1999, p96). Foucault's focal point is related to institutional sites as space of domination, '*isomorphic patterns*', which combined urban space and regulations with people. Therefore, he considers the built environment to be not just the combination of buildings but also included the spaces around them. Foucault also regarded spaces between buildings as meaningful places for social and cultural interactions, where space is not just a physical entity but also has a morphogenesis and history (Mugavin, 1999).

Lefevre was also a considerable philosopher for urban morphology; his major work was the space production, which was relevant to the study of the characteristics of social space and constructed environment. Lefebvre (1991) believes that every society should produce its own urban landscape that goes with the aims and potentials of the society. This approach raises "*a series of propositions (linking social, mental and physical space): first, natural space is disappearing and so lost to thought; secondly, every society produces its own appropriated space; and thirdly, if space is a product, our knowledge of it must be expected to reproduce and expound and expand the process of production*" (Mugavin, 1999, p98). His ideology founded the "*new urban sociology*" and his views enlightened other theorists such as Harvey and Castells. Lefebvre emphasised that there is a mutual affiliation between social life and the physical built environment. He introduced the "*unitary theory of space*", as a "*triple conjuncture of space*", rather than reductionism. This space includes three main elements which are: the physical built environment, the conception of a space and the community interactions (Mugavin, 1999). Both Foucault and Lefebvre are considered to be significant resources for urban morphology as their intention is to reflect the social behaviour on the quality of the local built environment.

4.3.4 Comparing the British, Italian and French Schools

When comparing the British and the Italian schools one can find that the former school studies the characteristics of a combination of cells, which shape the urban form, while the latter one examines the cells of urban form such as the buildings and open spaces separately. However, the two schools become complementary to the idea that there is a direct relation between the urban form and the historical evolution (Levy, 1999).

Moudon (1994) states the theories of both the British School's approach of morphology and the Italian School's approach of typology were developed unconnectedly, where their founders, Muratori and Conzen, worked separately with noticeable differences in their initial principles of urban studies. However, the two theories potentially share some similarities in terms of examining urban design in an extensive scope. For example, Conzenian's approach identifies the plan unit as a type, while Caniggia defines it as an urban fabric. Caniggia and Muratori identify building types, urban tissue and urban organisms of territory and building, as well as transformation elements such as the "tabernisation" and "insulisation" of courtyard houses. Conzen, on the contrary, identifies the burgage, the process of fringe-belt formation and plan element complexes, which are divided into street system, plot and building patterns. Consequently, the two theories are not identical but together provide practical tools related to urban study and design (Kropf, 2001).

The British and Italian schools are mainly dealing with the contextual architecture, in which the typological process and the morphological region concentrated on the way new designed forms are successfully integrated with the surrounding existing urban built environment. On the one hand, the process of fringe-belt and burgage formation in the growth of urban tissue is an example of ontogenetic change, which is based on the philosophy of urban form. On the other hand, typological process is a model of transforming building types and therefore, characterizes an example of phylogenetic change. Based on this concept, both theories are complementary to each other. Morphologists' concern is to provide an elaborated study in terms of the growth of towns, which supplies typological scholars with fertile ground to base their philosophy, whilst the objective of typologists is to conserve the origins and identity of urban context by reinterpreting existing urban architecture and taking the initiative as prolific approach for the morphological thought (Kropf, 2001).

The three urban schools concentrate on the building type and urban fabric with the aim of understanding and analysing the historical and modern contexts alike in practical and theoretical perspective. The British School of urban morphology laid down clear foundations of empirical study of urban physical structure and the development process of urban fabric, whilst the typological Italian approach placed the philosophical basis of understanding urban building within historical built environments. Meanwhile, the French School depended on a practical approach to analyse the urbanisation processes through studying architectural forms and examining the importance of built space in fulfilling social activities.

When comparing the three schools, it can easily be seen that the Conzenian School mainly searched for the production of urban form and the Italian school paved the way to understand the traditions of urban planning and design, while the French combined the interpretation of built environment with evaluating the design theory. They all advocate to study the built landscape in terms of space, time, habitat and culture, where time, form and scale are considered to be vital dimensions that should be understood (Moudon, 1994). The three schools defined the built landscape based on time and the accommodated social interactions. In other words, the three schools are well responsive to the socio-cultural aspects that functioned over time, and therefore, as stated by Moudon (1994), their approach is more morphogenetic than morphological.

4.4 Urban Form and Urban Design

The urban morphology concept is related to the understanding of the historical evolution of urban fabrics including the urban form that responds to the social dimension. Based on that, the urban design approach carried on the initial morphological ideologies emphasising on specific aspects, such as; the quality of the public space, social interaction and the relation between the part and the whole. This approach takes into account the socio-economic issues and traditional regulations of built environment at the macro and micro scale. Therefore, urban design is a field that merges between urban dimensions, theoretical application and architectural language. This interpretation was discussed by several scholars, who were in favour of the urban morphology concept such as: Camillo Sitte (1945), Zucker (1959), Rob Krier (1979) and Aldo Rossi (1984). Their theoretical concepts focus on traditional urban centres that face modern development (Wharton, 2005).

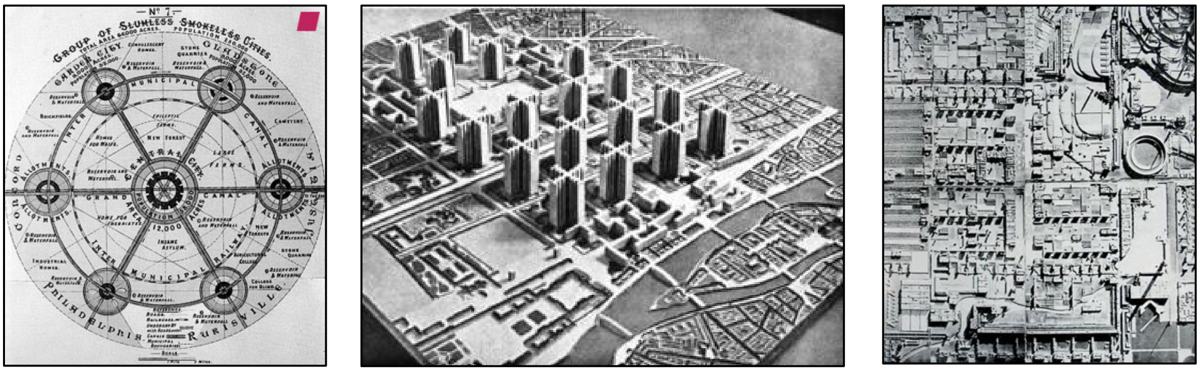


Figure 4.11: The Garden City, The Radiant and Broadacre City (Hall, 2002, p89, 220 & 311)

In addition, there are more prescriptive and utopian ideas relevant to the city composition and structure aiming for the ideal cities. These attempts were proposed separately during the second half of the nineteenth century as a reaction to the squalor of the industrial cities. The most outstanding visions are the Garden City of Howard -1898, the Radiant City of Le Corbusier -1935 and Frank Lloyds Wright’s Broadacre City, which he presented in his book “The Disappearing City” (1932) (Figure 4.11).

These thoughts of creating cities and structuring urban form were a motivation for Haussmann in Paris between 1853 and 1882 and the City Beautiful Movement in North America between 1890 and 1900. During the late 19th and early 20th centuries, the Modernist Movement followed the CIAM principles and trigged the demolishment of traditional neighbourhoods of some cities around the world, where beautifulness, cleanness, greenery and healthiness have to be applied in such modern urban form (Bohl, 2000).

By the 1960s many efforts turned the theoretical discourses of city-building into more practical contributions. Jane Jacobs (1961), Gordon Culler (1914 & 1961), Christopher Alexander (1964) and William H. Whyte (1980) provided remarkable participations in analysing urban forms in observation method and human sense that related to places and people. Jan Gehl (1987 & 2010) made a significant contribution to express the relationship between the built environment and social activities.

Christopher Alexander took the initiative to use the mathematical methods in analysing urban form. In his book 'A Pattern Language', Alexander and his partners categorise the urban system into smaller units in order to understand the wholeness of urban form and its performance, pattern and order (Alexander et al., 1977). Moreover Alexander refers the city to an organic urban fabric that was formed by rational design methodology, yet not like a tree, as he states in his favourite quote, 'A City is not a Tree'.

According to Alexander, urban form is a composition that was arranged in hierarchical way, starting from a largest pattern and coming down to a smallest unit, such as; from a region to city, district, block and plot. He refers this hierarchy of patterns to language, where the method of gathering words significantly constitutes an index (Alexander et al., 1977). Following Alexander's thoughts, Salingaros (2000a) compares the structure of complex systems in nature and geometry. Salingaros (2000b) also states that urban geometrical consistency is important for the city life and the quality of built environment, as he believes that the city has to have flexibility in bending and extending like a plastic. In achieving such characteristics, an urban fabric should be strongly joined at the small scale and weakly joined at the large scale. The coherence of macro-scale can be sustained by the hierarchical pattern, interrelation of subunits and connectivity at both scales, and diversity at small scales.

4.5 The Form of Urban Network: Multiple Centrality Assessment

Following a theatrical approach of urban morphology, there are two recent methods that were introduced in analysing the structure of urban form based on digital mathematical tools. The first is developed by Bill Hillier and called "Space Syntax", and the other is developed by Sergio Porta and called "Multiple Centrality Assessment" (MCA). These geometrical tools provide a clear understanding of how the structure of urban blocks and street network work together and show the DNA of cities.

Analysing the pattern of an urban form and its spatial configuration is the core aspect of Space Syntax. The approach of this application reveals the urban structure of cities in correlation to the social interaction and provides alternatives for future urban planning and design processes. At the Space Syntax Laboratory, the University College London, a set of tools related to the application was developed in order to understand the spatial configuration and its influence on the movement patterns. For instances, Space Syntax provides axial analysis tool, which is an effective method for studying the street network and walkability, and the tool of visibility graph, which focuses on visual fields in public spaces (Hillier & Stutz, 2005).

Space Syntax is different from metric geographical approaches of space, where the subunits or decomposed elements of space are calculated separately from their size and shape and are treated similarly in the analysis (O'Sullivan, 2000). Hillier and Stutz (2005) state that Space Syntax highlights the similarities and differences of cities, studies the city both at the small and the large scale at the same time, and provides a clear assessment of existing urban structure, which helps in making alternatives for future planning and decisions within cities.

Being based on visibility and integration, the methodology of Space Syntax provides urban designers with a profound understanding of some spatial structure of city spaces. However, its quantitative analysis restricts the creativity in city-building. Technically, *space syntax* shows some deficiency in regional analysis and transport planning. This is mainly due to the fact that Space Syntax does not have any consideration to centrality and omits the geographical nature of a place, which is associated with the *dynamics* of a city and presented by diversity of land use, real-estate values and pedestrian movement. However, recent studies of Space Syntax that are related to the social cognition have accepted centrality as a new method in interpreting spatial configuration (Porta & Latora, 2008). Space Syntax is examined widely in correlation with integration (closeness) and is related to motivations such as; walkability (Hillier et al., 1993), land use (Mora, 2003) and crime (Baran et al., 2007). However, Sergio Porta believes that MCA model presents a significant number of advantages compared to Space Syntax (Porta et al., 2010).

Sergio Porta's basic approach was to avoid the failure of Modern Movement in building cities, where traditional urban fabrics, with un-designed master plan and incremental development, proved to be better in their adaptability and liveability than the present urban ideologies. He found that applying social inclusion in urban process is more convincing in the study of participatory practises, the theory of argumentative planning and Christopher Alexander's ideas about generative codes and patterns of change in urban space. His mission was to make urban form democratic and reflective to the social life or "public participation" (Porta et al., 2010). His thoughts were influenced by the history of cities, where the bottom-up method in structuring the urban form was applied. Based on Mark Buchanan's book and theory of self-organisation in complex systems, Sergio Porta grabbed a very rough idea of using graphs as a main mathematical tool. He was searching for a graphic approach to be used in urban planning, which is similar to the graphs that are originally used during the second half of the 19th century, to produce simulations of vehicle flows and Regional Analysis. Although graphs were already applied in these fields, they were not related to small-worlds or inner structure. The application of graphs in Porta's work represented street network as models only in simulating the overall dynamic of population, production and market without any relevance to urbanisation processes (Wilson, 2000).

Sergio Porta was searching for an approach to complexity in a comprehensive way that produces a structural method in understanding the whole organisation. The real motivation that paved the way in producing the MCA was at the University of California, Berkeley in front of Allen Jacobs' office, when Porta was waiting to meet him. In that hall there was an entire wall full of self-explanatory graphics representing samples of world-wide urban forms graphed in the same scale and with the same conventional graphics. The graphics pinned on that wall represented urban blocks in black colour, while streets and spaces between blocks were represented in white. These graphs, which covered one square mile samples of a city plan, were published later in "Great Streets". Sergio Porta was amazed by the displayed graphics and him being in Berkeley hall was the turning point of his intellectual path, or as he explains in his own words: "*my whole contribution to the understanding of cities since then has been reformed by that appointment with Allen Jacobs at Berkeley*" (Porta et al., 2010, p127).

Four years later, Porta displayed copies of those maps to Vito in Catania to capture the fundamental differences that seem so obvious visually, yet very difficult to define. It motivated Vito to make a significant participation in this field by defining “integration” as “closeness” (Porta et al., 2010). Closeness is one of the most common indices of centrality in networks as defined by scientists in structural sociology at the early 1950s and then recognised by Freeman in the 1970s (Freeman, 1979). Afterward, Porta and Vito built the graphs of those maps, which were presented in “Great Streets” in GIS, and then established a table containing the information that relate to the connectivity, nodes and the length of their streets.

The MCA was initially developed at Polytechnic of Milan, Italy, and was recently advanced at the University of Strathclyde, Glasgow, through the contribution of Sergio Porta and other scholars of urban planning and design, together with the physics of complex network (Porta et al., 2010). The MCA is a methodology of mapping and finding central places within cities by using a basic network structure, which represent streets and intersections.

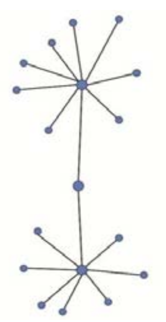
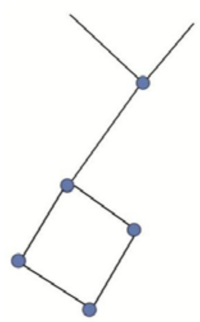
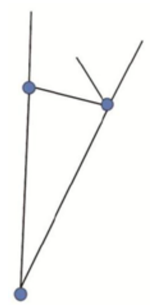
BETWEENESS CENTRALITY	CLOSENESS CENTRALITY	STRAIGHTNESS CENTRALITY
		
A node is central if it lays on the shortest paths that link many nodes with each other.	*The Closeness Centrality Index measures to which extent a node is near to all the other nodes in the system along the shortest paths.*	*The Straightness Centrality Index indicates the efficiency in communication between two nodes and is equal to the inverse of the shortest path length between them.*

Figure 4.12: Betweenness, Closeness and Straightness centrality indexes (By the Author)

The MCA adopts the centrality indexes that were developed by Freeman as betweenness, closeness and straightness. These were used to quantify how a node in a network holds a structurally unique position (Freeman, 1979) and represents the urban network through a primal graph, where the streets are edges and the intersections are nodes. The graph is fully metric, rather than topologic. It creates a representation of the network by retaining the original geographical information and having the same shape of the street network, which can easily be interpreted. In order to be operated, the MCA model uses the GIS system as a platform, which gives it an advantage to reach additional layers of information. The MCA has three centrality measures related to street structure, which are based on nodes and edges. The three indexes are significant to determine whether a place is close to many surrounded locations (Closeness, C^C), intermediary between other locations (Betweenness, C^B), or has accessibility through a straight route to adjacent streets (Straightness, C^S) (Porta et al., 2006b) (Figure 4.12).

In 2003, the developed procedures of MCA were arranged in three stages. The first phase focuses on understanding the practicality of the tools and the meaning of their results, which is based on the physics of complex networks and city planning. In the second phase the analysis goes beyond centrality and measures the city form in order to figure out the characterisation and structure of the network's layout. The last phase concentrates on understanding centrality at larger scale in relation to density, rather than interpreting the centrality according to its links (Porta et al., 2010).

In the late 1940s, the idea of centrality was applied in social integrations for the first time by Alex Bavelas at the Group Networks Laboratory, M.I.T (Freeman, 1979). The centrality concept was thereafter applied to different fields, such as political integration (Cohn & Marriott, 1958), technological innovation (Czepiel, 1974), community organisation and planning (Rogers, 1974 and Pitts, 1965). A few years later, Freeman (1979) defined a set of indexes related to centrality, which were: degree, betweenness and closeness, to quantify the way where a node in a network holds a structurally unique position. Porta and Latora (2008) state that centrality discloses how a real city works and provides a clear understanding of the urban form structure. By applying the MCA in the study, a central part of any urban fabric can be identified. This identification exhibits the most accessible place in an urban fabric and shows its potentials in providing a walkable environment. Therefore, the use of centrality does not only reveal the central part of a city but also exhibits the place where special features, social life and diversity in land use take place (Figure 4.13).

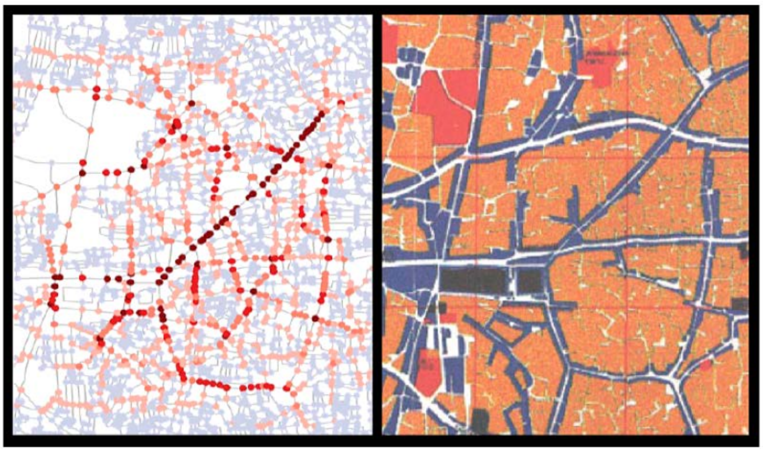


Figure 4.13: Betweenness centrality *CB* & land uses of Ahmedabad, India (Porta et al., 2010, p118)

Centrality is also relevant to the evolutionary process in making cities. Instead of being just an informative tool to show the heart of contemporary urban life, it links spatial forms and collective behaviours. Zimring and Conroy-Dalton (2003) state that centrality does not define the more reachable urban spaces but also identifies the more liveable urban places, where the two dimensions of centrality, cognitive and geographic, are firmly interwoven in a complexity with balance in terms of urban dynamics. Central places are easy to reach with straightforward routes and mostly busy places, where most of urban social activities take place (Porta & Latora, 2007a). Therefore, the central urban spaces are usually safer and more efficient as they provide good quality of natural surveillance (Newman, 1972), where more people on the street indicates more eyes on it (Jacobs, 1961). Central places become safer by accommodating secondary land uses that are active with people on a daily bases, such as: local shops, cafes, groceries, community libraries and stores. On the other hand, primary activities, such as secondary schools, education institutions, major libraries, civic centres and exhibitions, do not need central places to attract people (Porta & Latora, 2007b).

In order to reach more sustainable policy for urban planning and design, the priority should be assigned to the understanding of centrality and interpreting the performance of an existing place to be central (Newman & Kenworthy, 1999 and Frey, 1999). The failure of understanding the potentials of an urban form generated the advent of modern planning, where public spaces were mainly designed for transportation instead of social life (Willson, 2000). As streets act as main components of an urban structure, the potentials of organism are affected by the constitutedness and centrality setting of these streets (Hillier, 2004 and Porta & Latora 2007a). Additionally, the locational, constitutional and functional dimensions of streets deeply participate in the performance of social life at different scales within a city space (Porta & Renne, 2005).

Centrality represents *the structure* of a city by identifying the street system and their intersections, where nodes are street intersections and streets are edges. The street or the edge is the length between two nodes, whether it is curved or straight. On the other hand this format is based on opposite representation in space syntax, where nodes are streets and intersections are edges, identifying a street as the distance between two turns, regardless to the number of intersection it passes, through a process called "*generalisation process*". However, the point "*un-generalised primal"* in MCA is the standard format for all transport planners and geo-mapping professionals, which gives the MCA model the capability to bring together a massive amount of information that relates to a specific street network, where the street structure responds to the global update (Porta et al., 2006a, b; Cardillo et al., 2006; Crucitti et al., 2006a, b and Scellato et al., 2006).

The MCA is used effectively in analysing different places around the world. The MCA was applied by the Agencia de Ecologia Urbana, to define the network layout of Barcelona, Spain. This application exhibited the efficiency of historical paths and patterns, which are integrated to the contemporary city, and highlighted the correlation between street centrality and the diversity of land use. The MCA was also applied by the same organisation in Vitoria, Spain, to provide new visions in developing the city structure. Under the framework of City Form, the MCA is used with the involvement of five universities: Oxford, Sheffield, Leicester, Edinburgh and Glasgow, where it is mainly used to measure structural analysis of city-wide and neighbourhood-wide as sustainable indicators. In Bologna, Italy, the MCA analysis shed light on the relationship between shops and services that are relevant for betweenness centrality, where passing-through factor leads the economy movement in a city context (Porta & Latora, 2007a).

"*Everyone knows that a place which is central has some special features to offer in many ways to those who live or work in cities: it is more visible, more accessible from the immediate surroundings as well as from far away, it is more popular in terms of people walking around and potential customers, it has a greater probability to develop as an urban landmark and a social catalyst, or offer first level functions like theatres or office headquarters as well as a larger diversity of opportunities and goods*" (Porta, et al., 2007b, p1). Therefore, centrality is the potential of an urban area to sustain community through providing a key-factor such as retail and services and achieving a number of relevant urban sustainability goals in the sub-centres of the nodal information city of the future (Newman & Kenworthy, 1999). Porta et al. (2007) state that centrality has the ability to form self-surveillance from social cohesion, increase local economy richness from liveability, and create visual landscape diversity from cyclist-pedestrian friendliness. Centrality appears as one of the most important basis that can be used by urban planners and designers to interpret the structure of an urban area and eventually to produce and address policies for new development.

Studying the relationship between centrality or integration as applied in Space Syntax, and the liveability of urban form helps in finding how the street network and urban spaces interact with the city life (Porta et al., 2005; Hillier & Hanson, 1984 and Hillier, 1996). However, in space syntax centrality is never investigated as an issue in itself with its own history and formal definitions, but is only used as a tool that is firmly engaged to a dual graph representation of spatial network. The dual approach of space syntax neglects the metric dimension that actually leads to a picture of spatial systems. This proves that space syntax is no more than a complex of empirically supported argumentations, which throughout the last two decades was used as a new disciplinary space instead of being a tool in itself (Porta et al., 2005). In this study centrality is used as an innovating tool that examines a space (Wasserman & Faust, 1994) in relation to its structural sociology (Freeman, 1979). "*Actually, MCA research stemmed from the encounter between sustainable urban design and complex networks perspectives*" (Porta et al., 2005, p3). The spatial systems that are made by MCA are completely accessible from the complex networks community, which indicates a substantial potential for further developments (Porta et al., 2005).

In order to study the quality of social life and built environment, central places are identified through the use of MCA as a significant aspect, which is related directly to liveability of a city (Porta et al., 2008; Jacobs, 1961; Jacobs, 1993; Hillier, 1996; Hillier & Hanson, 1984 and Newman & Kenworthy, 1999). Porta et al. (2008, p450) state that "*A more central location commands a higher real estate value and is occupied by a more intensive land use*". Throughout seven millennia, the process of urban growth was happening in relation to centrality as a natural logic pattern (Mehaffy et al., 2010), where density and activity are organised around main connections (Jacobs, 1961). Furthermore, areas with greater degrees of centrality are more accessible (Porta et al., 2006a & b), visible and popular and are characterised by the presence of a larger variety of services, a higher land value and a more intensive use of the ground (Wang et al., 2011). Jacobs (1961 & 1996) states that centrality is a main and natural order that generates the formation of urban forms, as it measures the relationship between social activities within a built environment.

During the early fifties, the structural sociologists were the first to address a specific work on centrality, in order to control challenges coming from human, economic or institutional organisations (Porta and Latora, 2008). The perception of centrality comes from the way each individual or origination is interconnected to another in accordance to their structural reference system, through quantitative measurements (Wasserman and Faust, 1994). Applying Multiple Centrality assessment in this study will help to find out the centrality of each case study's urban fabric, where a more central urban structure is usually a place for higher social activities and street liveability (Porta et al., 2008). Central locations in an urban form provide the potential environment with the ability to sustain social capital, increase the quality of streets and support the formation of urban "nodes" (Newman & Kenworthy, 1999).

4.6 The Urban Form and its Components

This section of the thesis aims to explain the street network and block structure in order to understand the components of the physical built environment and their influence on the design process. The general definitions of the urban fabric and its components, as block structure and street network, can be obtained through the pattern of the physical structure, where their interrelation defines the evolution and dominant role of characteristics of the formation process within an urban fabric.

Léon Krier defines the relationship between the block structure, street and square by introducing three models to produce urban space (Figure 4.14). The first shows that urban blocks are the natural production of streets and squares, the second shows that streets and squares are the consequence of the arrangement urban blocks, while the third shows that streets and squares are the only two types of urban domains that result in blocks (Gruber, 1978).

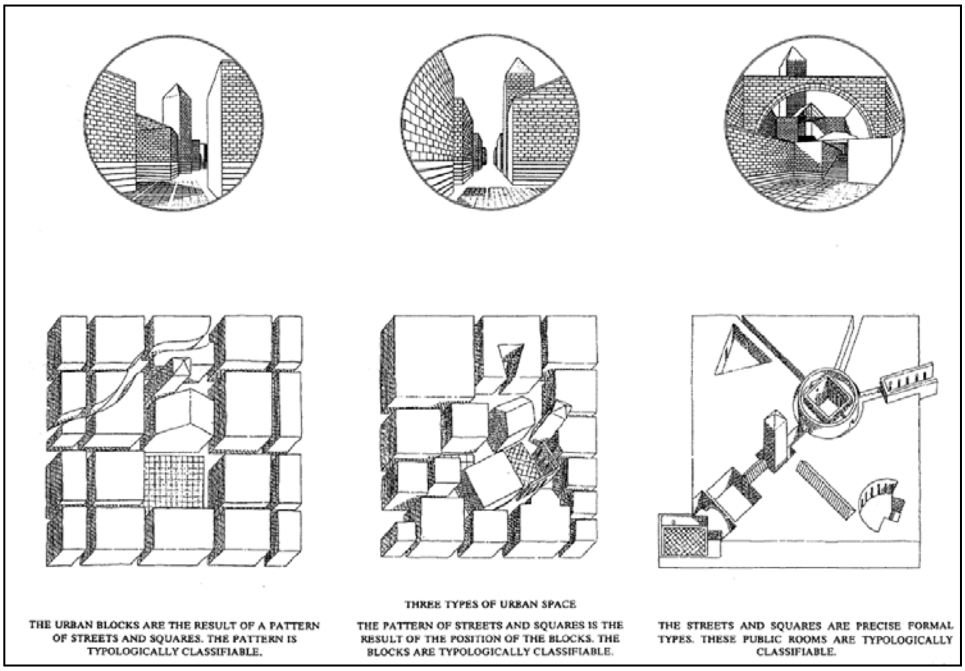


Figure 4.14: Léon Krier's definitions of urban space (Gruber, 1979, p58)

"*Street and block patterns reflect differences among cities beyond those of scale, complexity, available choices, and the nature of the spaces. They relate to the time period when the city was built, to geography, to differing cultures, to city functions or purposes, to design or political philosophies, and to technological demands, to name some of the more obvious. They are, as well, the settings within which great and not so great streets are to be found*" (Jacobs, 1996, p202).

4.6.1 The Street Network

Street pattern is one of the main components that are identified in urban morphology analysis and urban characterisation. Route type is a general indicator of character that makes a contribution to the morphological identity of urban structure (Kropf, 2008 and Marshall, 2005). Originally the term "street" comes from the Saxon word (straet) that means a paved way and is usually referred to the longest route in the city (Sitte, 1965).

Street is one of the most important elements of the public realm and is essential to the formation and the functionality of any urban environment. Streets structure influence the peoples' existence, the relationship with each other and the way of experiencing an environment, where this experience will determine the success of a street as public space and movement corridor (Gehl, 1987, 2010).

Initially, and within fortified towns, dwelling plots were distributed inside the wall and surrounded by streets and alleys based on climatic conditions. The main concept of that layout of network was to exclude winds from the public movement channels in order to provide appropriate open spaces for pedestrians (Vitruvius, 1960).

According to Conzen (1960) the term street refers to the open space bounded by street lines and occupied by any kind of transportation. Therefore, the street-system is an arrangement of these adjacent and co-dependent movement spaces within an urban area. *"The ideal street must form a completely enclosed unit and a pleasant street could be produced by an undulating arrangement of houses"* (Sitte, 1965, p65).

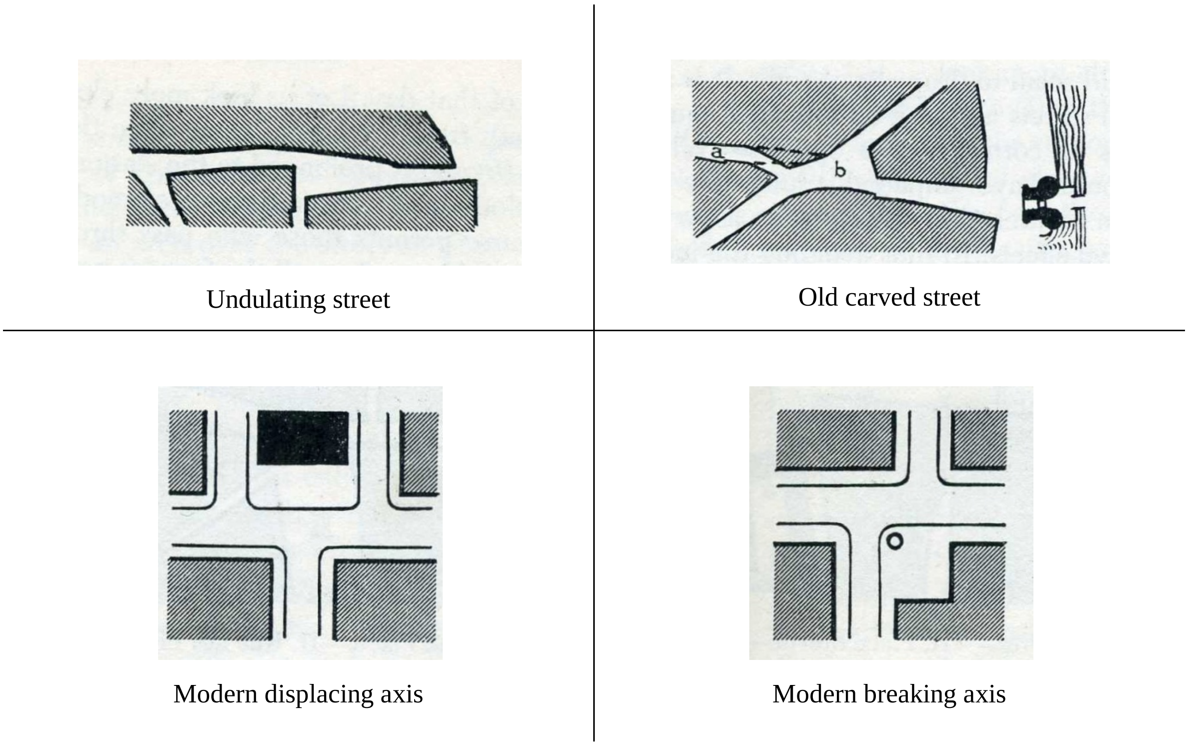


Figure 4.15: Traditional street character and Modern street arrangement (Sitte, 1965, p63 & 66)

Sitte (1965) states that the zigzag features of the earliest streets kept blocking sights within them, even though they offer the observer a new characteristic at each following turn. Practically, the layout of a street was essentially adapted to its topography in order to respect an existing structure. In old towns, the perpendicular intersections of streets were squared, while streets that approached each other at an oblique angle are usually curved slightly toward their opening in order to smooth the progress of the movement flow and to shape better dwelling plots (Figure 4.15). Sitte (1965) categorises street network into three types; rectangular, radial and triangular (Conzen, 1960). Beside housing and fixed activities Rossi considers circulation amongst the main three principal functions that compose the urban fabric. He believes these are main urban components that carry on the permanent growth of the city (Rossi, 1984).

The path is the frame of the city character. It is a linear or curvilinear three-dimensional enclosed space with two sides of buildings, where the characteristic of spatial qualities have an ability to strengthen the image of its distinctiveness and the special façade features that are important for its identity (Lynch, 1960). The morphological approach of Conzen (1960) considers street network as an essential physical element of urban form that accommodates public activities. The street is arguably the basic building block of the structure of traditional townscapes, and is also increasingly being rediscovered in contemporary urban design. The system of streets, which connects the built form into the urban structure, generates the continuity of urban fabric and confirms the coherence of urbanity (Marshall, 2005).

The path represents a basic property of human existence and it is one of the great original symbols. The street has two main characteristics directly related to its format at the same time; path and place. Based on that, Jane Jacobs saw streets as the livelihood of cities rather than mere traffic channels, while Christopher Alexander saw a street as multi-functional urban pattern that should be a place to stay in and not just a place to pass through, and it may be expanded into a wider space such as a square (Moughtin, 2003).

The hierarchy composition of the traditional urban block was systematically organised by the network of public spaces, where the importance of a street is underlined by the buildings' uses. Accordingly, the main front streets are usually occupied by trading buildings while houses and workplaces are located along the side streets, whereas the back streets are mainly designed to be appropriate for the simplest residential dwellings (Meyer, 2005).

According to Frederic Gibberd (1955) the street is not building frontage but a space where dwellings are grouped to form a series of street pictures and have, for many generations, provided urban communities with public open space outside their homes. It usually has a special use and activity as well as defined places or nodes along its length. It presents to the observer a memorable image of connected places. The street layout must be considered to have three main elements; an entrance, the place itself and a termination or exit in order to achieve the quality of enclosure.

Unlike urban squares where the degree and the nature of enclosure usually give a visually static character, most streets are practically lively with a potent sense of progression and produce a continuous experience over time. Streets with strong physical character generally obtain a positive form in their volume and acquire a strong sense of enclosure. The continuity of the street wall and the height-to-width ratio determine the sense of spatial enclosure, while the width determines how to perceive the surrounding architecture and its identity (Carmona et al., 2003).

The combination of street form provides qualities and diversity in terms of its dynamism; its enclosure, length, width, straightness, and the formality or informality of the architectural vocabulary. Street form can also be analysed in terms of scale, proportion, architectural rhythm and connections to other streets and squares, not just at the scale of neighbour but as a contribution to wider urban structure (Carmona et al., 2003).

The paths, edges, landmarks, nodes and regions are elements that grow collectively in order to build blocks and make firm structures at the urban scale. The network of potential line of movement through the urban complex should have some notable quality, which marks it off from the surrounding channels such as a special quality, a special use of activity, a special texture of floor or façade, a particular lighting pattern, a unique set of smells or sounds, a typical detail or mode of planning (Lynch, 1960).

Tripp (1942) highlights that Modernist urban policy focused on a street from the traffic point of view, where the circulation system was the backbone of built environment. However, Marshall (2005) states that traditional urban street presents three main physical roles at once, the movement channel, the public space and the built frontage. This traditional approach was adopted as a model of a mutual contribution of the traffic engineer, the planner and the architect to accomplish this significant street performance. The movement space also forms the fundamental connective tissue from the micro scale of urban public space within buildings to the macro scale of the entire city. In that sense, routes might be various in lengths and their continuity will differentiate the street typology. In this sense, the route only spans from one node to another, the different kinds of routes will be distinguished and then the route type becomes achievable (Figures 4.16 & 4.17).

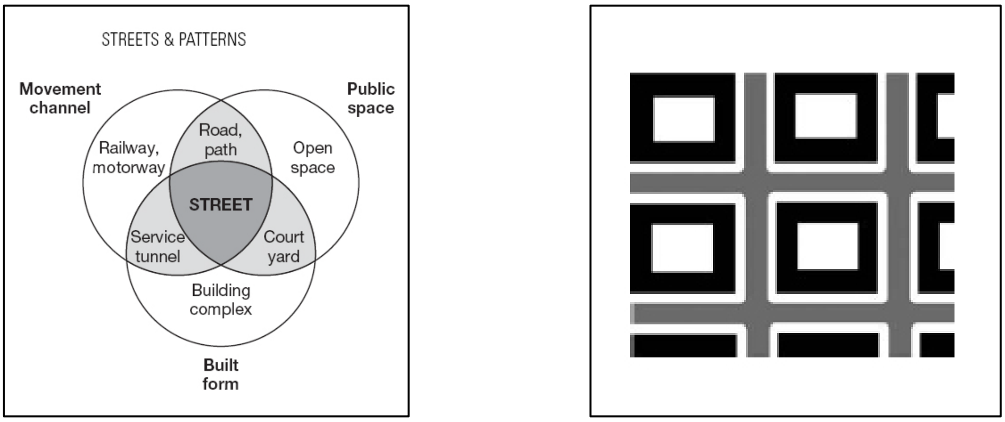


Figure 4.16: Traditional street structure (Marshall, 2005, p6)

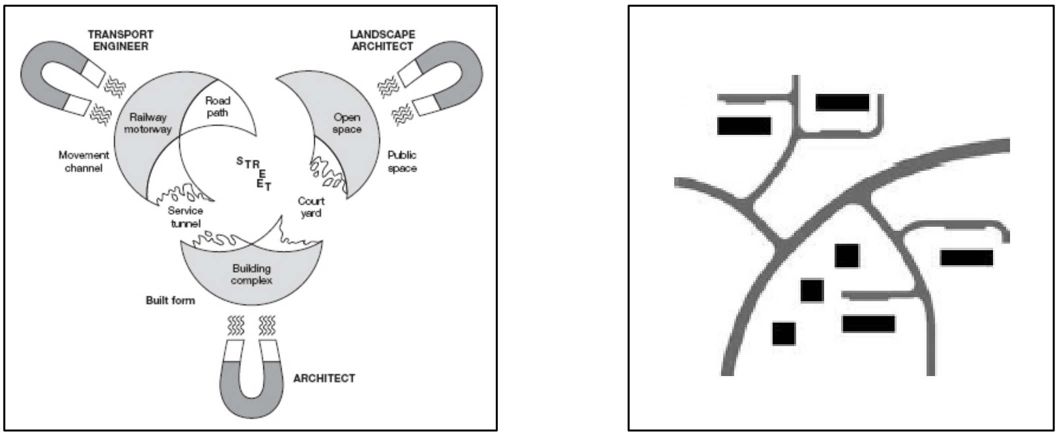


Figure 4.17: Modern street structure (Marshall, 2005, p6 & 7)

Although agglomerations of plots are fitted to form blocks, streets represent the boundaries of blank spaces that show the separation around urban block. Hence, streetscape forms the basic core of all urban public space and all public spaces form a contiguous network, where every single urban component is correlated to the others. The street has to be conceptualised as an urban access road that belongs to a road hierarchy, not a street grid where a *"street can be seen as a road that happens to have an urban character or as an urban place that happens to serve as a right of way"* (Marshall, 2005, p13). In this sense, the street could be considered to be a basic building-block of urban form beside its main role within the urban transport system.

The dialectical relationship between street and built plots creates the tissue, where the continuation of this relationship is capable of modification, extension and substitution of buildings and cultural changes that mark its evolution (Panerai et al., 2004). Based on this perspective, an urban fabric is a composition of different forms of streets, where the character of each single street has a direct relation with plots' type and buildings' uses, therefore, "*the more important the street, the larger the lots are*" (Meyer, 2005, p253).

Rob Krier (2003) indicates that the network of streets that run through the urban form in different types and shapes characterise the urban structure and determine the process of the development of the built environment as the movement routes are finely meshed at the centre of any urban fabric and become widely meshed at the peripheral areas.

The Paris street network through the Haussmannian process was divided into three types, which are based mainly on financial considerations not on hierarchical structure. The first type of street network contains some important work that is financed by the state; the second is formed by routes radiating from essential nodes, where rectilinear connections are also applied. The third type of network is achieved through the completion of the star-shaped squares of the Place du Chateau d'Eau and of the Place du Trone (Panerai et al., 2004).

Stephen Marshall (2005) classifies the system of urban streets into four kinds of patterns. He believes that A, B, C, and D types present the different stages of network evolution and development within urban built environments, and they systematically reflect typical street forms that are based on varied urban fabrics (Figure 4.18). The specifications of each type are:

A-type: presents the features of network located in historic core of old cities, where the streets are irregular with fine scale angular, different street width and mostly short, not straight and going in all directions.

B-type: is regular planned extension, where bilateral directions are naturally enhanced by dominating perpendicular junctions of four streets as a result of a grid composition. These streets are orthogonal, rectilinear with consistent width and going in two directions.

C-type: is more common type that consists of regular and irregular streets and spread in different positions of a built environment. These streets are usually arranged in a settlement in a radial shape around an arterial street and meet at right angles. This type typically applies the formations of curved or rectilinear streets with consistent width.

D-type: is often a carved looping pattern of distributor roads that link to typical modern layouts. This type is based on consistent road geometry, curvilinear or rectilinear formations, which mostly meet at right angles.

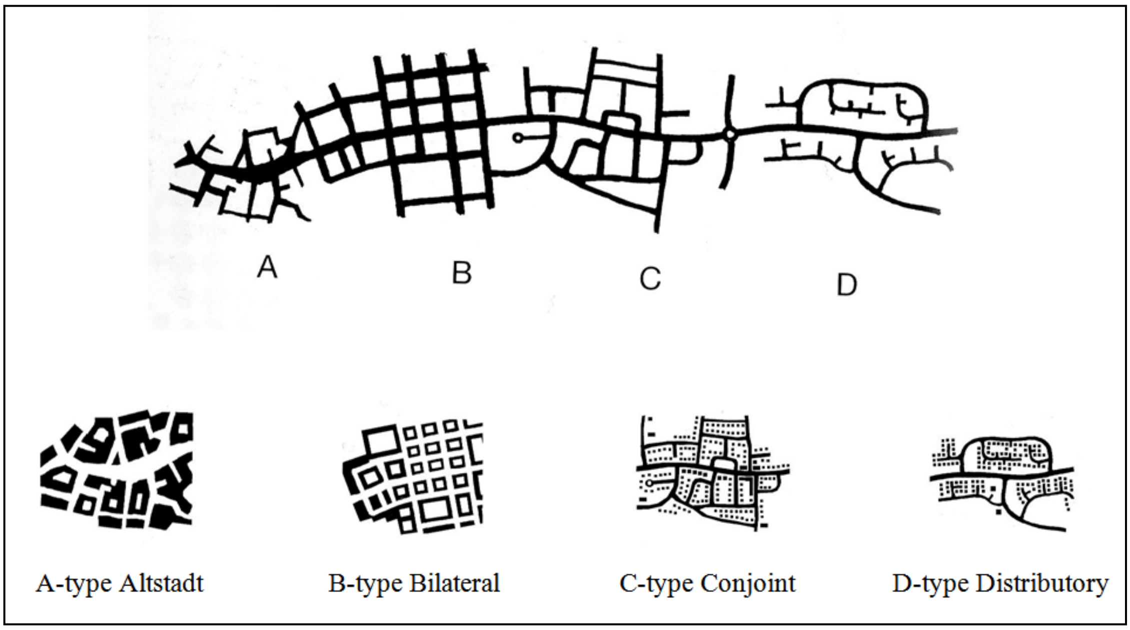


Figure 4.18: A, B, C & D typology of street patterns (Marshall, 2005, p88 & 89)

Stephen Marshall (2005) considers the network a result of the way the routes connect with each other, where the characteristics of the whole street structure are influenced by the way these routes fit together collectively. On the other hand, the character of the routes could be identified by the relation between each other and to the whole system simultaneously. In this sense, the street could be considered to be a basic building-block of urban form beside its main role within the urban transport system.

Bill Hillier (2005) through his hypothetical study emphasises on the connection between street liveability and structure, where he categorises street network into four types: main street, cross street, side street and back street. Hillier (2005) considers urban space or street as an intrinsic aspect of everything human beings do, not just the background to human activity or buildings (solid objects). Hillier (2005) highlights that the initial attempts to understand the city form view the purpose of the street network only to link the aggregations of buildings into a single system, despite the fact that the street network is a common ground between the real space of the city and our experience of it. He adds that the street network does not shape the pattern of movement only, but it also shapes the pattern of human co-presence and co-absence, where the good cities are reflected by the social interaction as well as the physical structure. The network is the means of flow and attractiveness, where people's movement is generated by the mass of street's attractions. Consequently, space network shapes the pattern of movement and the diversity of functions at the ground floor in a reciprocal relationship (Hillier, 2005). The general acceptance is that diversity of land-use generates not only the walkability, but also the liveability in a particular part of city or even in whole urban fabric. Therefore, street pattern has a mutual relationship with mixed functions (Gehl, 1987).

Although Bill Hillier uses a high-tech method in interpreting the pattern and the evolution of movement, Karl Kropf applies a low-tech method to understand the relationship between route structure, movement, permeability, legibility, character and growth of street network (Kropf, 2008). Kropf's approach identifies streets in relation to their adjacent streets and centres, where the significance of people's movement and interactions are influenced by the range of facilities and services that can be reached within walking distance. Kropf identifies two categories of streets. The first category at the macro-scale or regional level classifies streets into four types; *Super-strategic*, which connects many centres; *Strategic*, which has routes with a centre on both ends; *Semi-strategic*, which has a centre on one end and route on the other; and *Secondary strategic*, which is connected to any type of higher strategic route on both ends. The second category is at the micro-scale or local level, which classifies the streets into three types; *Thoroughfare*, which is connected on each end to different routes; *Loop*, which is connected on each end to the same route; and *Cul-de-sac*, which is connected only on one end (Kropf, 2008).

In addition, Llewelyn-Davies (2000) classifies the street types into five categories based on the movement capacities and the character that includes the role of street within the urban structure as well as the type of buildings that define it. These categories are primary distributor, district distributor, local distributor, access road and cul-de-sac.

The street is an urban space where the social activities usually take place, affecting the relationship between social and cultural interaction and the physical dimension. The notion of the street is to generate the interaction between social, cultural and economic factors in physical structures of the city (Nasr, 1998 and Gehl, 2010). Movement is the fundamental requirement of interaction of whole society and individuals. The amount and nature of movement are determined by the nature and volume of urban activities. The description of street structure can be introduced in terms of composition, volume, distance, time, rhythms, location, routes and density (Gehl, 2010; Jacobs, 1993; Jackson, 1998; Crouch, 1998 and Rudofsky, 1982).

Rob Krier (1979) and Carmona et al. (2003) state that streets are the finest element of public domain and are the most essential components of urban form. They identify the characteristics of urban structure and determine the wholeness of city shape (Lynch, 1960) by providing space for social activities and accommodating diversity of land use as well as representing the identity of outdoor spaces (Jacobs, 1996). Regarding the importance of the street network, Jane Jacobs in "*The Blackwell City reader*" emphasises that "*streets and their sidewalks…. are a city's most vital organs*" (Bridge & Watson, 2010, p273).

Jan Gehl (1987 & 2010) reveals that people depend on streets for functional, social and leisure activities, where access and opportunities to socialise are the main street functions. People use the street to move between different destinations while they are meeting, shopping and socialising. Allan Jacobs (1996) states that sociability is the main purpose of the cities' existence, where streets are the major, if not the only, public place for that sociability to be performed.

4.6.2 The Urban Block

Urban block or a city block is considered an advanced essential component of urban fabric and is usually built-up to creating a clear identity of interior private enclosure and form the street-walls of public space (Castex, 1979). Urban block is not an elementary building block, but it is the result of a process of growth based on networks and plots, where the blocks define the public space or the streets defines urban blocks. Basically, any urban fabric could be understood by the composition of public spaces around an urban block that contains a subdivision of several plots or parcels, where the characteristics of streets around the block show a direct relationship between plots' division and street typology (Meyer, 2005). However, Rob Krier, (2003, p11) states that urban block is "*the original cell of every urban structure and it defines the street network around its edges and building plot structure in the middle*".

Initially, the term "urban block" originates from an ancient Roman word (Insulae), which reflects the topological containment of buildings and land parcels either nested or subdivided within a comprehensive urban public space that is constituted by the system of network (Marshall, 2005).

The evolution of each community's individuality and of the historical developments in terms of ownership and institutions play a major role in producing the block subdivision and building plots. Despite the fact that the permanent characteristics of the buildings and their plots develop in slow rhythm by the passing time, their imprint within their boundaries still effect the morphological features of the block structure (Kalogirou, 2002). Block structure is not just two dimensional space, but it also has an effect of three dimensional field of experience. As stated by Trancik (1986) figure-ground relationship exhibits the two dimensional patterns and form of the urban space, the third dimension of building mass generates the character of the urban fabric. Therefore, thinking in two dimensional block structure during the design process may mislead the design production.

According to Cliff Moughtin (2003) and Han Meyer (2005) the urban block layout is based on two categories; the former is the result of evolution (process) that is rooted in streets network and plots of traditional cities, where public urban spaces are carved from solid buildings, while the latter is adapted by modern approach and describes the urban block as an architectonic unity (object); this concept is based on viewing open landscape and buildings as pieces of sculptures sitting within a parkland. Consequently, an urban block is a basic urban unit combining an aggregation of plots, which are connected to each other and enclosed entirely or partially by streets. Often a single massive building dominates one unit of urban block, but more commonly this unit is occupied by several attached or free standing buildings and platted into plots or lots. "*Over time, large plots may be subdivided or several may be amalgamated and the growth of blocks demonstrates that buildings change more rapidly than plot pattern*s" (Carmona et al., 2003, p63).

Urban block is not just a row of plots along public streets, but it is also a form that accommodates the diversity of urban life. This diversity does not only express the differences between front, side and back streets, but also the differences between the inside and outside of the block (Meyer, 2005). Moreover, the arrangement of urban block structure is significant in shaping the pattern of movement and in meeting considerations for subsequent growth (Barnett, 1982). Han Meyer (2005) states that different structures of urban blocks at first appeared to identify an urban fabric as they related to each other and make a clear interpretation to a city map. Urban block system is not just an arrangement of buildings to fill in a series of parcels of land along various streets, but it links the classification of plots with the position of public streets (Meyer, 2005).

Jonathan Barnett (1982) states that the arrangement and organisation of urban block structure is significant in both shaping the pattern of movement and providing potentials for subsequent development. In juxtaposition with basic typologies/codes/rules about physical characterisations, urban block can provide coherent and good urban form in a way that processes comprehensively with the surrounding urban form. *"As the block pattern forms a basic element of the capital web, the pattern and configuration of blocks should be based on appreciation of the different rates of change of different morphological elements"* (Carmona et al., 2003, p81).

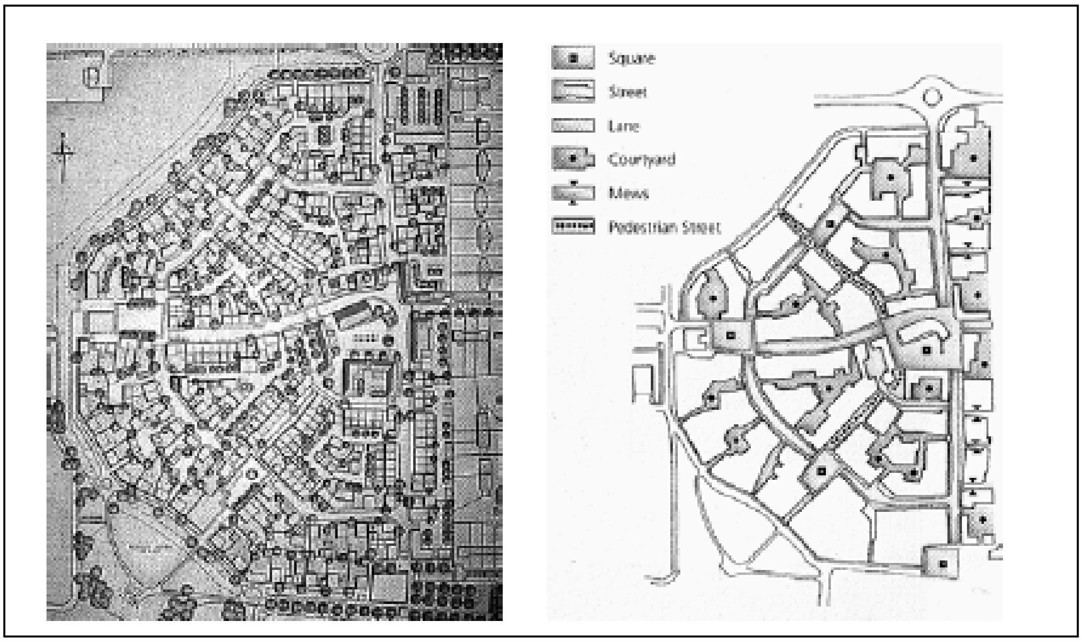


Figure 4.19: Poundbury's typology of streets & spaces (Marshall, 2005, p33)

According to Moudon (1994) and Krier (2003) the scholars of the three schools (British, Italian and French) consider urban block as one of the main elements of urban structure, where they complement the street network as the agglomeration of plots tend to form insular blocks separated by blank spaces that represent access routes. The size of urban block is another matter that contributes significantly to an environment’s character and affects the city liveability (Carmona et al., 2003 and Jacobs, 1961) and is examined in eight residential projects around the world (Sonne, 2005) as the block size was the main concern of Léon Krier in his practical urban project of the 'model village' of Poundbury on 400 acres outside of Dorchester (Figure 4.19).

A balance between small and large blocks needs to be struck in order to generate pedestrian permeability and social use of space, where the diversity of building types and land use are promoted. Block size as stated by Carmona et al. (2003) could be determined by analysing the requirements of particular land uses or through applying the existing patterns that held evolution and changed over time. Léon Krier (1990) argues that different sizes and shapes of urban blocks are more appropriate in forming a composition of urban structure throughout assessment and experience.

The conducted observation of Léon Krier (1990), which is carried out in many European cities, revealed that the smallest and most complex typological urban blocks are located at the centre of the urban form, while the block’s size become larger and simple towards the peripheral areas before transforming into separated objects (Carmona et al., 2003). In this sense, Jacobs (1961) states that small block is greatly needed to enhance the street liveability and the movement choices.

Léon Krier (1990) prefers small blocks for greater urbanity, which could be achieved by the creation of dense pattern for the sake for intimate built quality, intense social interactions and economic exchange. Carmona et al. (2003) points out that vitality, permeability, visual interest and legibility are highly promoted by the small urban block’s size (Figure 4.20). However, Martin and March (1972) provide a mathematical argument showing that large block structures could be more efficient in relation to distribution of built environment and open spaces, while Llewelyn-Davies (2000) highlights that large block size provide greater opportunities for bio-diversity (Figure 4.21).

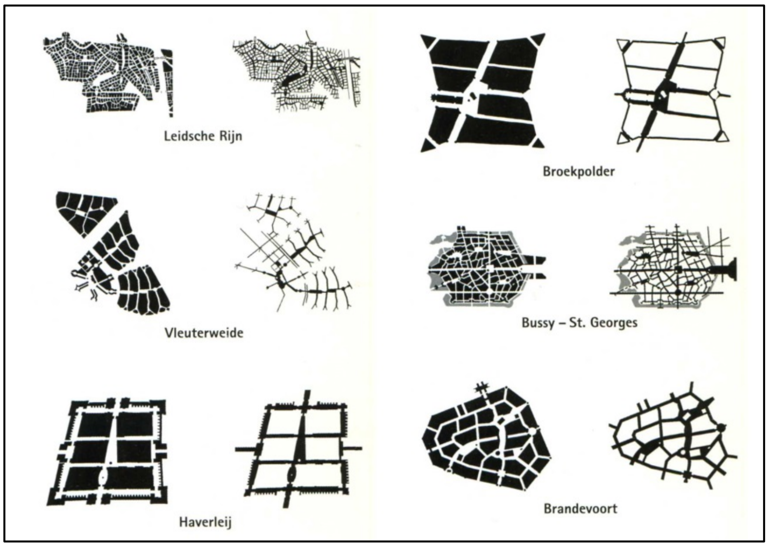


Figure 4.20: Varieties of block structure (Krier, 2003, p9)

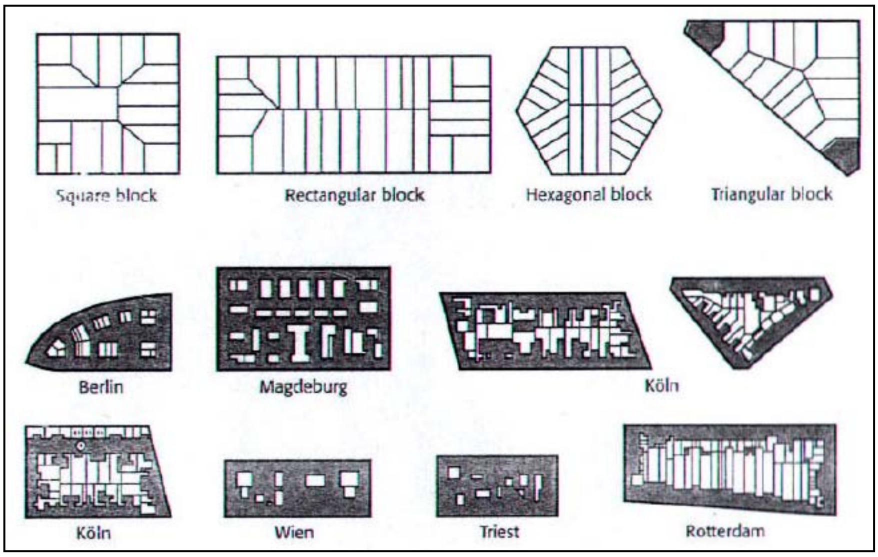


Figure 4.21: Formation types of block structure (Knox & Pinch, 2000, p79)

In "Public Places and Urban Spaces" Carmona et al. (2003) describe the cadastral pattern as the relationship between urban blocks and streets network. Basically, they consider that cadastral system takes the initiative to produce permeability within an urban fabric and increasingly provides flexible choice of movement within and around urban blocks in order to achieve accessibility. Based on that concept "*visual permeability refers to the ability to see the routes through built environment, and physical permeability refers to the ability to move through the built environment*" (Carmona et al., 2003, p64). Cadastral pattern is a collection of small street blocks that create a fine urban grain and unlikely contains a coarse urban grain that is based on large blocks. However, a fabric with smaller blocks provides a superior variety of network and offers more effective permeability in the context than those with large blocks (Figure 4.22).

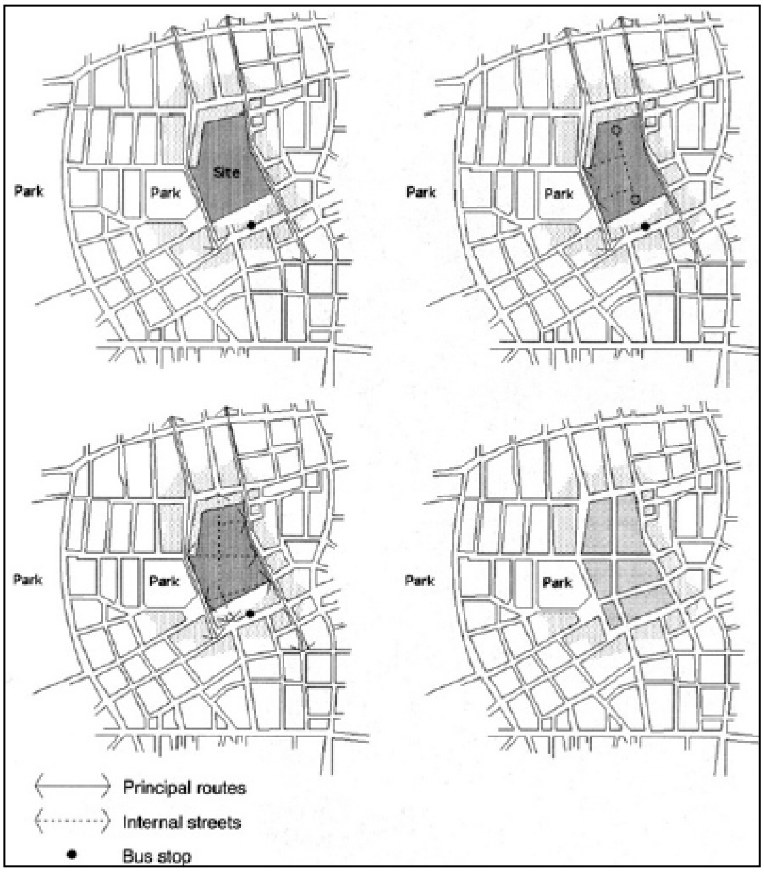


Figure 4.22: Block sizes, street linkage and connections (Carmona et al., 2003, p82)

Diversity in cadastral pattern might be ideally created by a mixture of model regular grids and deformed irregular ones. In addition, the shape of the block does not have an effect on physical permeability while visual permeability is likely to be very vulnerable to the irregularity of the blocks shape and their size. Traditionally, "*urban block systems have an inherent discipline that relies on each individual property by certain rules in order to achieve a collective benefit*" (Carmona et al., 2003, p68).

Moreover, the amount of public space in the old cities is restricted, and there is a clear distinction between public and private spaces within the plots. The amount is determined by necessity, and the clarity offers unambiguous guidance for present and future use. However, a smaller amount of public space is easier to propose, organize and preserve. By placing the front doors of dwellings on street level along the edges of this public space, a strong and a direct connection between dwelling and street will be achieved. This enhances the liveliness and social control of the public space. Generally, old cities are likely to have irregular patterns of street shape and urban block, whereas new cities that are based on grids have much more regular arrangements (Marshall, 2005).

Apart from traditional urban structure, the modern movement of built environment set a new approach to arrange urban blocks. The modern paradigms deconstructed the coherence of the traditional urban block and reconstructed new roles of division between the public streets and urban blocks, which lead to disjoining of the link between the street and plots. As a result, this approach omits the indigenous relationship between public and private domain and transforms urban structure from socially active to socially passive (Carmona et al., 2003).

A deliberate effort of modern pioneers such as Le Corbusier and Giedion proceeded unprecedented characteristics of modern public spaces based on dropping the traditional direct reciprocal relationship between lot divisions and street typology. Le Corbusier, for instance, considered traditional network as a trench, a deep cleft and narrow passage. Within modern planning, the public streets are transformed into a large field of public space with separated buildings, where the relationship between the network of streets and plots is disappeared and the land use lined with an abstract composition of objects and spaces (Carmona et al., 2003).

Nevertheless, the traditional urban fabric is a composition of individual plots, where the structure on an individual plot could be replaced by other structures without affecting the essences of the street scene. In the modern fabric it is so easy to make a change to a large part of built environment and to destroy the entire concept of its components due to the fact that the organisation of the modern urban structure is inflexible. In top of that, "*the urban planning concepts of the modern city proved to be very vulnerable because of the great overabundance of public spaces which proved impossible to control and the programmatic definition of the differentiation of public space*" (Meyer, 2005, p256).

In "Urban Forms: the Death and Life of the Urban Block" (2004), Philippe Panerai and his colleges state that a new shape of urban blocks was introduced to the urban structure of Paris according to Haussmannian method. Considering that Haussmann's spatial models are not thoroughly separated from the old space, but they are reinterpreted in order to reproduce their forming mechanisms to develop progressively coherent urban form. The triangular slice across the traditional Paris block was produced by cutting the rectangular plan grids and thereby, not only squares shapes, but also triangle shapes characterised the Haussmannian urban blocks (Figures 4.23).

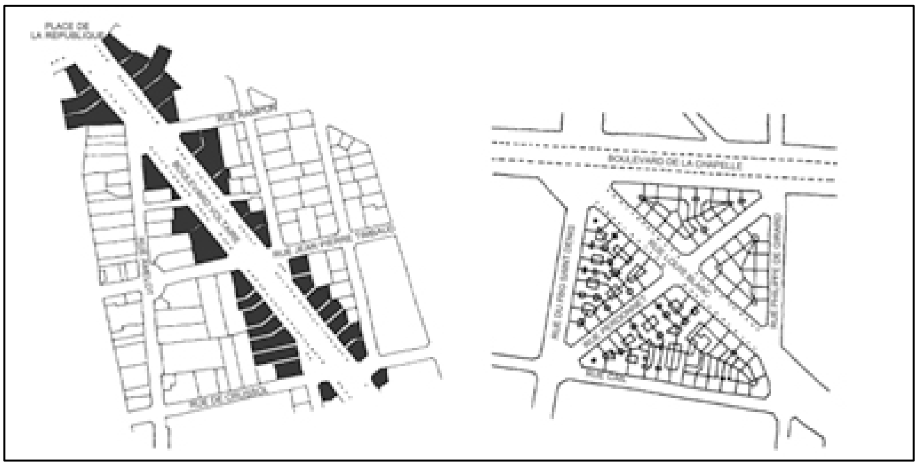


Figure 4.23: The Haussmannien tissue (Panerai et al., 2004, p15)

However, Panerai et al. (2004) point out that most of the modified blocks that were transformed from square into two triangles, have their functional, structural and physical unity threatened. In addition, the triangular outline apparently generated inequity in terms of plots shape and size, where there are certainly some sharp angles that are hard to deal with especially for designing residential units (Figures 4.24).

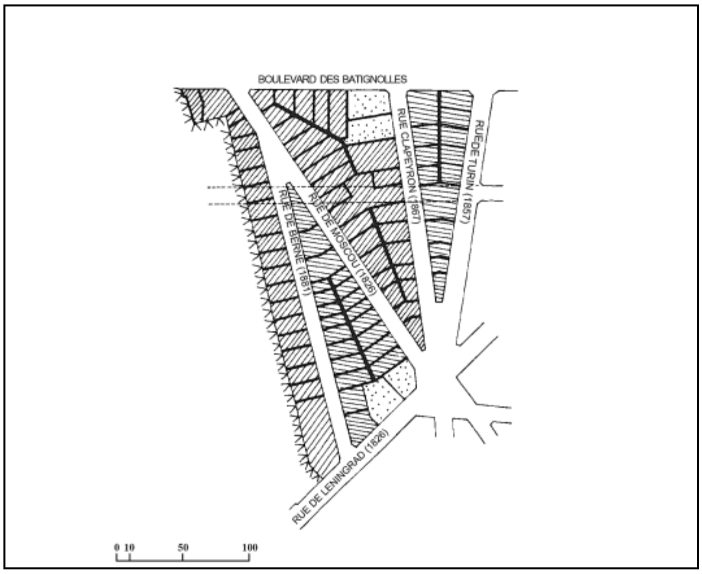


Figure 4.24: Typical Haussmannien urban block shape (Panerai et al., 2004, p20)

The meaning of the block depends mainly on its edges and on the perceived outline of physical and social cues. The definition of block is related mostly to the end of one place and the beginning of another or the discontinuity of each ownership and belonging, where all physical and social cues coincide (Rapoport, 1977). Jon Lang (1987a) states that the urban block is an essential component of the urban fabric, where its layout can be recognised by physical objects such as buildings, walls, trees or preserving the continuity and characteristics of the adjacent blocks. Lang (1987b, p148) defines the territory as "*the ownership of or rights to use a place, the personalisation or making of an area, the right to defend against intrusion and the serving of several functions ranging from the meeting of basic psychological needs to the satisfaction of cognitive and aesthetic needs*".

The street intersection will be affected by the block size, where the number of nodes increases as a result of small block structure. Montgomery (1998) states that the modern urbanite advocates large blocks with few streets and intersections in order to diminish the mass movement and accomplish a better practical efficiency. However, this approach of applying transportation-base ideologies in modern cities affects negatively the urbanity and vitality of these cities. John Montgomery (1998) emphasises that city structure with short blocks is more likely to generate more street liveability, provide more circulation routes and increase the permeability of an urban form, where long block structures thwart permeability and the development of the small enterprises (Figure 4.25).

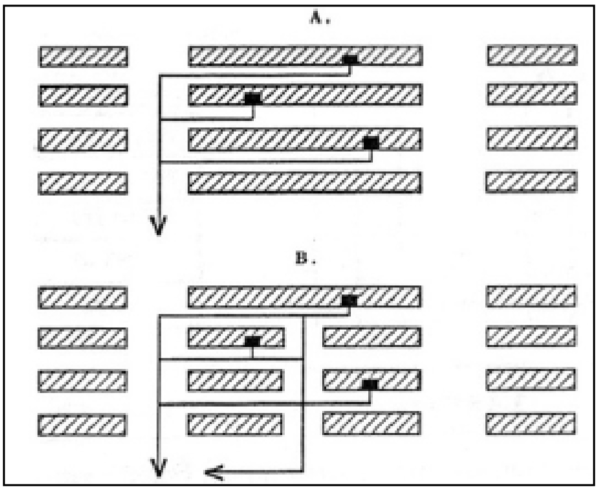


Figure 4.25: Permeability of block structure (Montgomery, 1998, p108)

Therefore, more streets become inactive. In addition, the fine-mesh urban structure provides more building façades that face streets, which increase the trading activities especially for small enterprises. "*Psychologically, people are less inclined to walk down long unbroken streets with little activity or a mono functional identity, so that such streets become self-isolating and stagnant*" (Montgomery, 1998, p108).

Paumier and Ditch (1988) in "Design the Successful Downtown" point out that the uniformity of the block pattern provides a strong structure for central development areas and reflects the scale of the buildings, where the small block sizes restrict the horizontal dimensions of buildings. He adds that historically small block sizes enhanced the fine-mesh pedestrian activity by making connections to other blocks and offering easy visibility and accessibility to other adjacent districts. Thereby, small blocks have a positive effect on the traffic flow, while super-blocks and mega-structures are ineffective in central areas.

Through-block connections are another feature of urban structure that provide pedestrian pathway, located at street level to contribute to the built environment with short cuts and enjoyment through development blocks (Paumier & Ditch 1988). Therefore, through-block connections are essential urban characteristics for pedestrian use particularly in large block patterns (Figure 4.26). Through-block connections could be in formation of an open footpath, courtyards, covered arcades, or lobby atrium spaces. Accordingly, their contribution to the ground level provides more choices for pedestrian movement, social activities and street life by creating a new texture and variety of the circulation system, as well as increasing the shopping frontage as an extra retail activity.

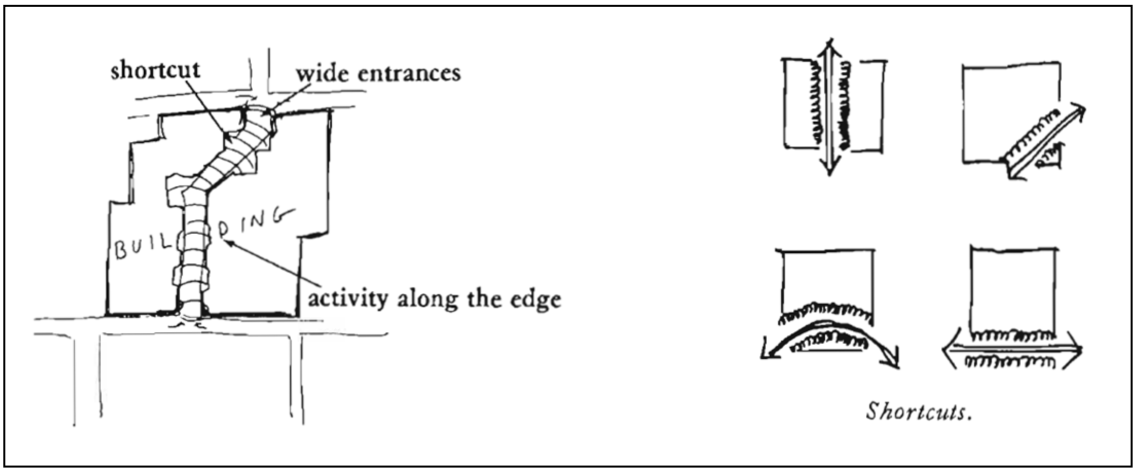


Figure 4.26: Through-block connections (Alexander et al., 1977, p495 & 498)

4.7 Street Quality and Street Life: Link between Form and Behaviour

The interaction between social, cultural and economic factors with the urban structure of a city generates the nation of urban fabric identity and produces the morphological characteristics of its components. Therefore, any urban physical structure is considered to be a reflection to these interconnections, which merge the human artefacts and the urban elements. In a nutshell, the city as urban fabric expresses that the 'whole' is constituted by interaction of the city parts and shows a three dimensional spaces where all those factors grow to be solid (Jacobs, 1996).

4.7.1 The City Life

The general acceptance is that varieties in land use increases the amount of movement either at the scale of an urban fabric or at the scale of a city. However, the change in the conditions of the movement, which might slow down or modify the traffic routes, could negatively affect the location pattern of the land uses. In that sense, Carmona et al. (2003) states that there is a reciprocal relationship between land use and circulation pattern.

Kostof (1991) states that pattern, language, geometry, fabric, order, layout and landscape are the most permanent features of building the physical structure of the city. Urban form is considered comprehensive multidimensional entities, where its physical presence expresses human needs and environmental aspects.

In regard to the features of the physical structure, Spreiregen (1965) points out that the urban form of a city or town is generated through its population "size", which is linked to the physical outline structure "shape", in order to produce and qualify the geometry of city form "pattern". As a result the intensity of using land by people and buildings "density" play a major role to modify these elements. In other words, "*density is determined by urban texture and grain*" and expresses "*the degree of homogeneity or heterogeneity of use by people or buildings*" (Spreiregen, 1965, p64). The regularity or irregularity of the geometry of any urban pattern is formed by routes, open spaces and buildings where "*grain is the degree of fineness or coarseness in an urban area*", while "*texture is the degree of mixture of fine and coarse elements*" (Spreiregen, 1965, p55).

There are two main concepts of perceiving a street; firstly, the street in the traditional city is considered as an urban spatial structure generated and bounded by vertical planes on either side in inseparable interaction. While the second is presented by modern architecture where "*the prototypes buildings stand free, separated from the roads and marked out on the ground as independent systems*" (Ellis, 1985, p115). In that sense, Ellis (1985) classified traditional street as unified wall, where the production of a positive spatial configuration is achieved. On the other hand he considered the modern type as a series of pavilions that generate a negative effect on the structure of urban form. Since spaces between buildings are considered to be the rooms of the city, the degree and the shape of these rooms' enclosure are dependable on the exterior walls of the located buildings (Ellis 1985 and Gehl, 1987).

Gehl (1987) states that "*the city was not a goal in itself, but a tool formed by use*". It is truly significant to note that the development of old cities is a result of processes that extended for a long period of time. The production was perfect urban spaces that still provide good condition for life between buildings even today.

Historically, the old urban fabrics were not planned in the true sense, but they have been freely evolved through hundreds of years. Those fabrics have developed whenever there was a need for that and accordingly each neighbourhood has owned its special shape in a direct city-building process as a response to its local residences and requirements. "*Medieval urban spaces are exceptionally well suited to urban outdoor activities by virtue of their spatial qualities and ample dimensioning. Urban spaces from later periods are much less successful in this respect; generally tend to be too large, too wide and too straight*" (Gehl, 1987, p40).
Jan Gehl (1994) points out that walking is an enjoyable activity that most people love. For that reason any urban fabric has to contain an attractive street network that takes people where they want to without any monotony, uneasiness or danger. He adds that a pedestrian network requires high quality feeder and arterial routes in order to increase its efficiency, where a good mix of uses, trees and arcades relatively play a major role to improve the activeness of streets and create more active façades.

In addition, "*any city has lots of people walking in it. A liveable city also contains many people who are standing or sitting. The number of people engaged in these stationary activities is an excellent indicator of city quality, because most people only stop and settle when the conditions offered are truly fine*" (Gehl, 1994, p5).

4.7.2 The Relationship between Urban Form and Social Life

Understanding the characteristics of an urban form and its network structure has an ability to disclose distinctive principles in the direction of social behaviour and city life. It would also engage distinctive social activities in its urban context (Ley, 1981). Kevin Lynch (1960) states that the image of the city is percept through five common elements: path, edge, district, node and landmark. Lynch's elements are identifiable in most urban settings but have been proven to be more related to global physical quality than local quality of urban form. In his study of the city of Ciudad Guayana, Donald Appleyard (1976), a partner of Lynch's, concentrates on the image of the environment as a tool for planning a better community.

The built environment affords the settings and surroundings that enhance people's life and impact their sensations, feelings and contribution, as well as the relationship between physical activity and human behaviour. It is generated by buildings and spaces in which they are recognisable and legible by those who pass through them. Currently, the process of creating and forming places is controlled by policy makers which have a direct effect on the urban users in terms of the participations, accessibility and usability of those spaces (Butterworth, 2000).

Studying the quality of urban structure from the perspective of environment-behaviour thoughts is a major approach that emphasise the role of cultural variables within different built environments and urban fabrics (Rapoport, 1990). Simultaneously, recent theories of social and built environment exhibit how the features of social performance correspond to the physical elements of the built form (Lawrence & Low, 1990).

Lawrence and Low (1990), argue that the integration between built environment and collective social behaviour has initially originated in the early evolutionary and practical theories of Durkheim and Mauss. They point out that these early approaches searched to make a coherent explanation of the meaning of built forms as a contribution to the preservation of the whole society in terms of their features, behaviours and interrelationships. Durkheim (1965), and Durkheim and Mauss (1967) suggest that the built environment and human behaviour are integrated to each other. They emphasise that the spatial order is not only a result of collective symbol of social forms but also a representational model for regenerating the social organisation.

Robert Gifford (2002), in his book "*Environmental psychology: principles and practices*" states many theories that are related to environmental perception, which provide models and frameworks to guide the perception process of the surrounding environment and to produce analysable assumptions for theoretical study. His approach seeks the nature of the relationships between people and society and the built environment, where a range of formulations have been used to conceptualise this interactive correlation. Each of these conceptualisations corresponds to a different theoretical perception; each embraces distinctive sets of facts corresponding to aspects of the built environment and human behaviour. The "*Probabilistic Functionalism*" by Egon Brunswik drives from the idea that both perceiver and environment are important: "*Both the organism and environment will have to be seen as systems, each with properties of their own*" where the texture of the environment is as important as the texture of the organism (Brunswik, 1957, p5).

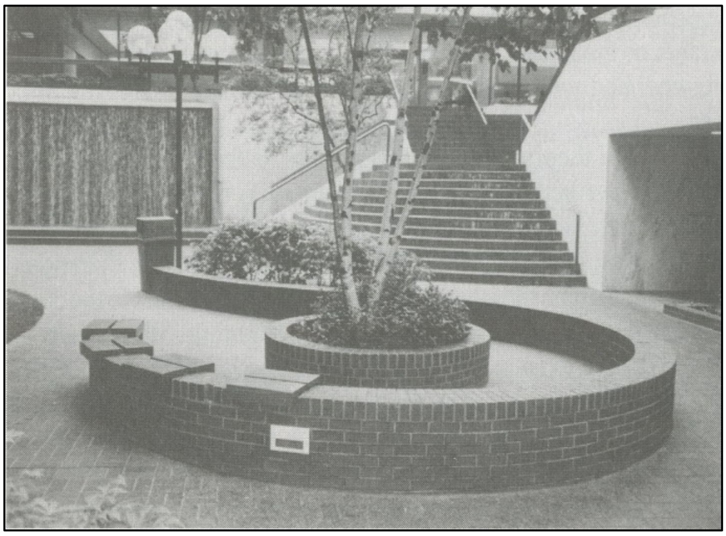


Figure 4.27: Surfaces may offer seating and walking (Gifford, 2002, p27)

On the other hand, the "*Affordances*" by James J. Gibson (Gifford, 2002) perceives environment differently from Brunswik's approach. Gibson believes that the environment is a composition of substances such as concrete, stone and glass, and surfaces such as floors, walls and roofs (Figure 4.27). The result of the collection of substances and surfaces is called layouts. In other words, Gibson's perception does not require the understand of sensory information, but it stands on the processing of surrounding information after they are gathered and analysed as in Brunswik's theory (Figure 4.28) (Gifford, 2002). These theories have acquired a main influence on recent thoughts and research environmental perception, and have also participated into the empirical fields of urban planning and architecture (Gifford, 2002).

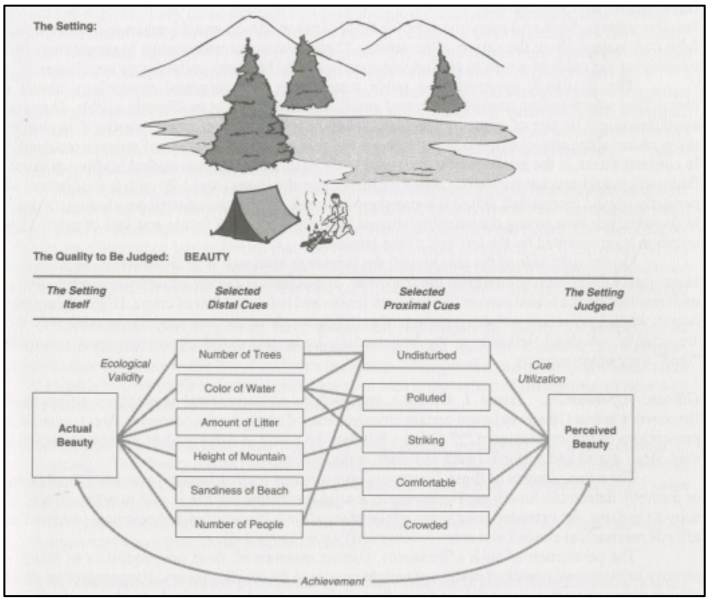


Figure 4.28: Brunswik's model for environmental perception (Gifford, 2002, p28)

According to Rapoport (1976), built forms are primarily influenced by socio-cultural factors modified by architectural responses to both climatic conditions and limitations of materials and methods. Rapoport (1977) adds that the lifestyle of any specific community is recognised as the interactive relationship between cultural, material, spiritual and social aspects, which are varied from one place to another.

In their book "*Identity by Design*", Watson and Bentley (2007) point out that the built environment is a consequence of local climatic conditions and the aspects of indigenous cultural behaviour, where the outcome of urban structures and planning plays a major role in forming people's behaviour and making homogeneous communities. They advocate that there are four key issues currently at stake in the relationship between the built environment and the human activities. First, to increase the sense of stabilisation by creating an environment that supports a large range of choices in peoples' everyday lives. Secondly, to promote the image of community in a way that enhances the sense of belonging. Thirdly, to achieve sustainable ways of living together or with others by developing the domestic identity and helping people of different backgrounds to be part of the society. And finally, to create an environment that enables residents to live in consistency with nature. In addition, they suggest that the best way to create well-structured urban fabrics is through the process of analysing different case studies in practical approach. Each case study will focus primarily on the relationship between the physical structure and the performance of social activities in order to understand the particular roles of the built form in place-making potentials.

In the Architecture of the city, Aldo Rossi says: "*The city, which is the subject of this book, is to be understood here as architecture. By architecture I mean not only the visible image of the city and the sum of its different architectures, but architecture as construction, the construction of the city over time. I believe that this point of view, objectively speaking, constitutes the most comprehensive way of analysing the city; it addresses the ultimate and definitive fact in the life of the collective, the creation of the environment in which it lives*" (Rossi, 1984, p21). Rossi's emphasis's on understanding the nature and character of individual artefacts or types since he considers type as an analytical instrument, an individual cell, a basic organising element, a sort of gene or DNA of urban form. Therefore, types have significant implications for understanding place-identity as they do not only represent physical structures but also exhibit associations with a way of life (Rossi, 1984).

Jacobs (1961), Rapoport (1990), Gifford (2002), Whyte (1980), Marcus and Francis (1998) and Gehl (1987 & 2010) have all undertaken the relation between urban built landscape and social life and show the tools that could improve the liveability of urban spaces. Urban design studies in general measure the urban fabrics at the macro-level, where the pedestrian-level qualities that capture the characteristics of streets, sidewalks and adjacent buildings have been overlooked (Park, 2008). People love to spend time in a city where walking, standing and sitting are the most enjoyable activities. In general most cities are liveable and have great potential for many attractions to make people walk or even stand or sit in its public spaces. The amount of people involved in these immobile social activities is a great indicator of the city quality as the majority of public spaces' users only stop and settle when the available environment provides good standard.

William Whyte describes attractive places as those located on major pedestrian routes and provide good climatic conditions, an interesting view, comfortable places to stand and sit and opportunities nearby to shop, eat and drink. People have an ability to gather wherever these conditions occur, and conversely these places will be abandoned if their situation is unpleasant (Whyte, 1980). *"According to Psychotherapist Joanna Poppink, spending time in* *an outdoor café or bustling shopping street is more than just a pleasant diversion, it is a necessary element of healthy urban life*”(Marcus & Francis, 1998, p3).

In more practical depth, Jan Gehl (1994) states that a city always in need to its inhabitants to be loveable, protectable and to take care of it. Moreover, people who enjoy themselves in the public spaces will automatically tend to look after their city and maintain its attractiveness, and they will act as if it is their own neighbourhood. He adds that people meet each other to share their ideas, go shopping, relax or take pleasure in the scenes of built environment if public domains can provide such activities. These successful public domains have a profound understanding of the local life and improve the quality of urban spaces. He reveals that a vibrant urban fabric fulfils the performance of social diversity, where people can obtain a greater understanding of each other through sharing the same public open spaces and easily achieve a perception of a single neighbourhood or the entire city.

Jan Gehl points out that the presence of human activities has for decades been neglected, where the auto-mobile took the advantage of accommodating the public domain. He sees that modernism in particular has paid little consideration to pedestrianism and the role of public domain as a meeting place for urban users. Also, the tendency in creating individual buildings instead of thinking in an integrated urban tissue increases the isolation between the components of urban built environment (Gehl, 2010). Jane Jacobs (1961) states how the urban principles of modernism and the dramatic increase of using vehicles led to produce free standing separated forms, creating lifeless cities devoid of urban users. She points out how the principles of the walking environment have been overlooked and she insists that comfortable and safe paths and visual interest could be achieved only by the existence of pedestrian movement and the diversity of land use (Jacobs, 1961).

“*Sociopetal spaces extract more information about settings; they enrich the settings, and define the spaces as being more memorable and descriptive. Social interactive settings are not selected randomly, and their allocation is also in accordance with the capacity of visual field*” (Unlu et al., 2001, p2 & 3).

Amos Rapoport in his book “*The Meaning of Built Environment*” applies a nonverbal communication approach as a conceptual tool in identifying the meaning of environment. He notes in the fourth chapter that there are three models based mainly on observation, recording and interpretation, which are relevant to the relationship between human behaviour and the surrounding urban context. These models look directly at various environments and settings by observing the users' interpretation. Rapoport calls these models: fixed feature, semi-fixed feature and non-fixed feature elements.

Fixed feature elements include those fixed or rarely changed in the urban context and which are mainly presented in streets and buildings. These elements shape the primary spatial spaces within the urban built environment and therefore their size, location and arrangements play a major role in defining the identity of a place and reflecting human relationships. Semi-fixed feature elements cover a wide spectrum of street furniture and urban spaces' edges including trees, advertising signs, seats, steps and window shops. Although, these elements are under the control of codes and regulations, it is practically difficult to read these elements alone without fixed-feature elements. Finally, there are the non-fixed feature elements, which are related to the physical characters of human occupants or users within the built environment. The physical characters do not only present the spatial relations but also the human body, facial expression and the way people move and speak. Besides, there are the hidden emotional senses of human beings, which are related to the feelings, social interactions and behaviours (Rapoport, 1990).

The study of Jan Gehl in Saskatoon (2002) shows that built environment has three main elements as a planning process of any urban fabric. The first element is public life, which is related to the people's social activities within a community as the daily life of local residents, and shapes the characteristics of their neighbourhood and builds up the significant public participation. The second is public places, which support the life of neighbourhood and play a major role in encouraging the public activities. These public spaces have to accommodate different social activities, which depend on people's requirements and desires. The third as Jan Gehl mentioned in his study is building edges. He indicates that building edges comes after creating public spaces in the planning process to ensure that the public spaces take priority over the architecture expression or iteration. In order to support neighbourhood life, these building fronts should enclose public spaces and define them spatially, provide good quality of refined materials and details, show good façade modelling with human scale and diversity in functions (Figure 4.29).

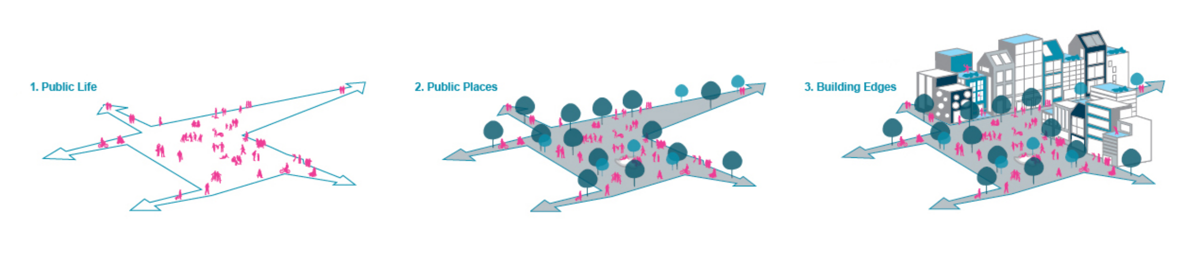


Figure 4.29: Main elements of the planning process (Gehl, 2011, p15)

According to Kevin Lynch (1960) the built environment image has three parts: identity, structure and meaning. In other words, the imageability is one of the elements promoting the identity and structure of a city and helps people to find their way around and enhance their pleasure of a place. Amos Rapoport (1990) emphasises the importance of meaning in the built environment by identifying three levels on meaning: *denotative meaning* coincides with object recognition, *connotative meaning* refers to the interaction between an object and observer and finally *abstract meaning* refers less to the object than to broader values. An analysis of responses to British urban form shows that most interactions between people and the built environment are based on the emotional assessments (Burrgess, 1978). Jan Gehl (1994) notes liveability of a place arises from the ongoing interaction between a person and the surrounding environment, where this relationship responses directly to personalisation, socio-cultural experience, economy and the content meaning of the urban form.

Nasar states that visual disorder along streets within a city can be accepted by some users, mainly because they do not recognise the weakening of such urban form, and tend to find more enjoyable and pleasant places within the surrounding built environment (Nasar, 1984). He indicates that likability refers to the environment that evokes a strong and constructive response of public experience (Nasar, 1984). Nasar (1998) states that as people have an ability to find out how objects are light or heavy, they can evaluate their preference to determine the degree of likability of various places within an urban fabric. Residents of a good quality place find enjoyment in the appearance of its memorable and perceptible street fronts. Therefore, instead of treating street edges as aesthetic objects in themselves, this research uses public evaluation to the general appearance of any urban fabric and then classifies the findings based on specific indicators.

4.8 Conclusion

In summary, studying historical development of urban form is vital to understand the evolution process of built environment and the social life. This methodology is a nostalgic experience that examines the formation process of settlements, where copying the same styles of buildings would be undesirable. Following this interpretation, Kropf (2005) points out that understanding the internal structure of an urban form is essential in the meaningful process of urbanism. Urban morphology is a field of understanding the physical characteristics, structure, relations and transformations of human settlements and the process of development over varied periods of time. The approach seeks to study in several disciplines the spatial arrangements and patterns of a metropolitan fabrication and examines the local patterns, its components and the process of their change based on historic maps. Urban morphology is usually connected to the exploration of physical structures at different scales including patterns of movement, land use and activity. Consequently, this analysis of physical form collectively deals with urban grain and the fundamental nature of organisms, which refers to street patterns, urban block, plot and urban form (Carmona, at el., 2003).

All recent theories about urban form are functional theories that study the formation of cities and their functions (Lynch, 1981). In this sense, the MCA came out as a new method to understand spatial structure of settlements, which focused on the social and economic processes that shape space. It also examines the evolution of cities as self-organising mechanisms and looks at the relationship between the structure and function of cities. The MCA has the advantage of analysing the city at the micro- and macro-scale concurrently. It does not only reveal the likeness or diversity between urban forms, but it also plays a major role in addressing future planning and urban design (Porta et al., 2010).

The MCA's main mission is to figure out the central places within an urban fabric and measure them according to different tools. Therefore, centrality is an important factor that does not only show how a city works, but also reveals the evolution of an urban fabric and provides its potentials for future development (Porta et al., 2010). According to Allan Jacobs (1993) and Jane Jacobs (1961) centrality is a vital unseen aspect that sustains the shape and form of "spontaneous" and organic cities, which omits the modernisation approaches in using the bottom-up strategies of urban planning (Wilson, 2000).

Cities, towns and neighbourhoods have a setting and a character of built environment that can easily be felt and recognised. This sensory quality participates in shaping people's feeling, inferences and behaviour (Rapoport, 1993). Nasar (1998) points out that visual quality can have powerful effects on people's perception of the surrounding landscape. In the meanwhile Peter Gould and Rodney White (1974) refer to this mental built environment of meanings as an invisible landscape that shapes people's behaviour as they experience their built environment every day.

The feeling of community in the public spaces is directly relevant in promoting liveability, safety, perceptions and belonging. It reveals the real interaction where people meet each other as they use the physical environment (Jacobs, 1961; Butterworth, 2000; Lawrence & Low, 1990 and Gifford, 2002). In addition other scholars like Oscar Newman, William Whyte and Jan Gehl study the people's life in real conditions and places to find out how the built setting impacts human behaviour (Newman, 1972; Gehl, 1987, 2004 & 2010 and Whyte, 1988).

SECTION TWO:
URBAN FORM & SOCIAL LIFE: THE CASE OF TRIPOLI-LIBYA

Chapter Five:
Characterising the Urban Form of Tripoli City Centre

5.1 Introduction

Over time, there are certain rules of organisation that logically lead to the transformation of urban fabric. An Urban morphology approach clarifies a rational logicality that has been applied within the evolution of urban fabrics where subdivision and amalgamation of plot pattern is a common procedure for developing the urban fabric, even though it remains a constant element while buildings and land uses are the components of the city structure, which are most likely to change. In addition, the street patterns and urban blocks are the most permanent components of the urban space, where their composition produces street networks and urban public realm. Moreover they are considered as important elements in the creation of the structure of urban fabric (Levy, 1999). However, a morphological approach of urban form has a large variety of definitions and approaches in the literature, where a number of researches identify certain urban elements independently, while others study these elements in relation to each other with the aim of measuring and analysing urban fabric (Levy, 1999).

Studying urban fabric form and its pattern is essential in understanding the existing conditions, since it provides a clear knowledge about the local patterns and development process. According to Conzen (1960) morphological structure of settlements could be broken down into four urban components, which are; land uses, building structures, plot patterns and street patterns, where, the reconstruction of these elements is usually responding to the conditions of cultural necessities, environmental requirements and economic stability.

The evolution of cities is usually built on the interaction of people. People meet friends or strangers on streets, buy goods from markets or participate in public activities. The urban built environment is the arena where these interactions take place. One of the primary challenges is how to design a good city to maximise interaction between people and places, and to minimise fraction. This study aims to understand urban forms within different neighbourhoods in Tripoli’s city centre, which cover the city’s physical structure. As the city is a place where people work and live, its urban structure is shaped by the collective values, its history and the culture of its citizens, thereby creating the identity of its urban form. In order to produce sustainable urban living, an investigation to find suitable urban built environment of a city should be addressed first, which can then be applied in practice (Alexander, 2002).

5.2 Identity and Urban Form

An urban morphology study of Tripoli's urban fabric as it evolved since its origin suggest that the composition of street layout and urban blocks within the city centre has been undergone significant transformation throughout the years, reflecting the continuous changes in the economic and social situation, along with the transformations in land use and population density (Figure 5.1).

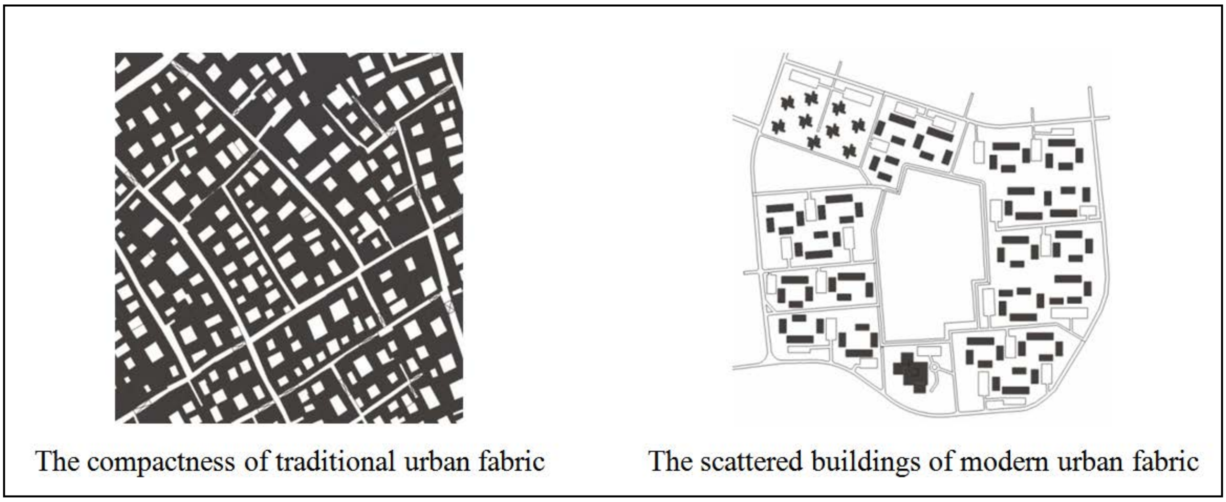


Figure 5.1: Traditional and Modern physical structure in Tripoli (Abudib, 2011, p92)

Transformations that have occurred during this process have been in such a way that contemporary blocks located in new developments share little, if any, similarities with traditional blocks (Abudib, 2011) and (Moughtin, 2003). Urban fabrics have to pursue cultural modernism, which is derived from a complete respect of cultural traditions and the preservation of cultural diversity, in order to produce permanent momentum for urban and human development. A substantial change appears to have deeply affected the recurrent spatial and geometrical relationships, not only in Libya but in many other parts of the world.

The aim of this study is to discover the transformation in the urban form of Tripoli's city centre and shows its physical changes over time. The discovery might assist to value particular urban forms within the city and provide frameworks for contemporary urban developments. Places are a production of time, responding to human senses and providing urban components to meet human requirements. In other words, it is essential to understand the identity of places and their physical built forms in order to correspond with the local residents.

Tripoli's urban growth has not yet been sufficiently understood by contemporary design professionals or local official authorities, where most of the planning decisions that took place during the last four decades produced modern buildings that are disintegrated with the existing urban fabric, merely in the name of modernisation and globalisation. As a result, the original characteristics of the city gradually disappeared and a vague identity started to dominate the whole peripheral areas of the city.

Recent research in the Urban Design Studies Unit (UDSU) at the University of Strathclyde has focused on the link between the evolution of urban form and local identity as a matter of urban design. This research explores in particular the way local identity comes, quite paradoxically, as a consequence of the loss of *universal*, rather than local, spatial patterns, or *structure*. In this sense, local identity emerges from the interplay between widely accepted structures and place specific variations. It is the existence of such structure that makes it possible for local values to find the proper conditions to be conceived and realised collectively as a matter of "common sense" in the local space. It is, therefore, of utmost importance to allow local identity to express itself in our days through focusing on what different urban fabrics *do have in common, rather than what differentiates them*. Studying what this structure is and how it allows local variations to occur through the direct ordinary contribution of city-users over time allows new urban designers to develop a new local identity and therefore work for an actual process of place-making.

Along these lines, the research follows a scale-sensitive quantitative approach to the study of urban form that aims at defining different *levels of similarity* in space and time. The aim of this research is to define *structures*, in the form of recurrent (and conversely of not-recurrent, or particular) relationships between spatial components of the fabric, whose stability is consistent in space (places) and time (historical periods).

5.3 Historical Formation of Urban Types

As cities are continually changing by creating new buildings and addressing different types of urban projects, their urban identity and local context is generated through the interaction of natural, social and built elements. Moreover, the urban environment has to be considerate from a contextual point of view, not only by following the significant historical buildings, but also through evaluating the local urban context with a consideration of human activity and built forms. Therefore, modern architecture patterns and contemporary forms have to be integrated contextually with exiting urban surroundings in order to achieve harmony and compatibility. The significant role of designing urban space is to arrange the new designed buildings with a clear response to the adjacent exiting forms and spaces, in a way that positively respect local characteristics and identity and, at the same time, provide the required developments in urban public realm (Trancik, 1986).

The history of Tripoli is very eventful, where its location on the northern coast of Africa played a great role in its evolution. Because of its geographical and strategic importance, Tripoli was a shift point of the trading process between Europe and Africa and then became a fortified city that witnessed many civilisations and invasions (illustrated in details in chapter two). This fact significantly influenced its physical and social growth. The changes and developments in its urban structure earned the city the hallmark of the special cultural characters due to the variety of configuration that resulted from the process of urban structure, particularly from the Islamic period up to the advent of the 20th century (El-Barghuti, 1972) (Figure 5.2 & 5.3).

Figure 5.2: The location of Libya as a Mediterranean and African country (The Planning Bureau of Libya)

Figure 5.3: The location of Tripoli in the west coastal region of Libya (The Planning Bureau of Libya)

The present Tripoli's city centre is essentially consists of three different urban fabrications that represent a variety of transformations and express the different stages of historical, cultural, economic and political status. Tripoli's city centre can be described today through three distinct parts (Figure 5.4): the Old Town, which is located at the heart of the city and is characterised by the Islamic principles in its urban structure; the Italian Quarter, which is located south and east of the Old Town, which dominates most of the city centre and is an example of Italian urban form and architectural pattern; and finally the Garden City, which was developed during the British military rule after World War II, based on Ebenezer Howard's concept.

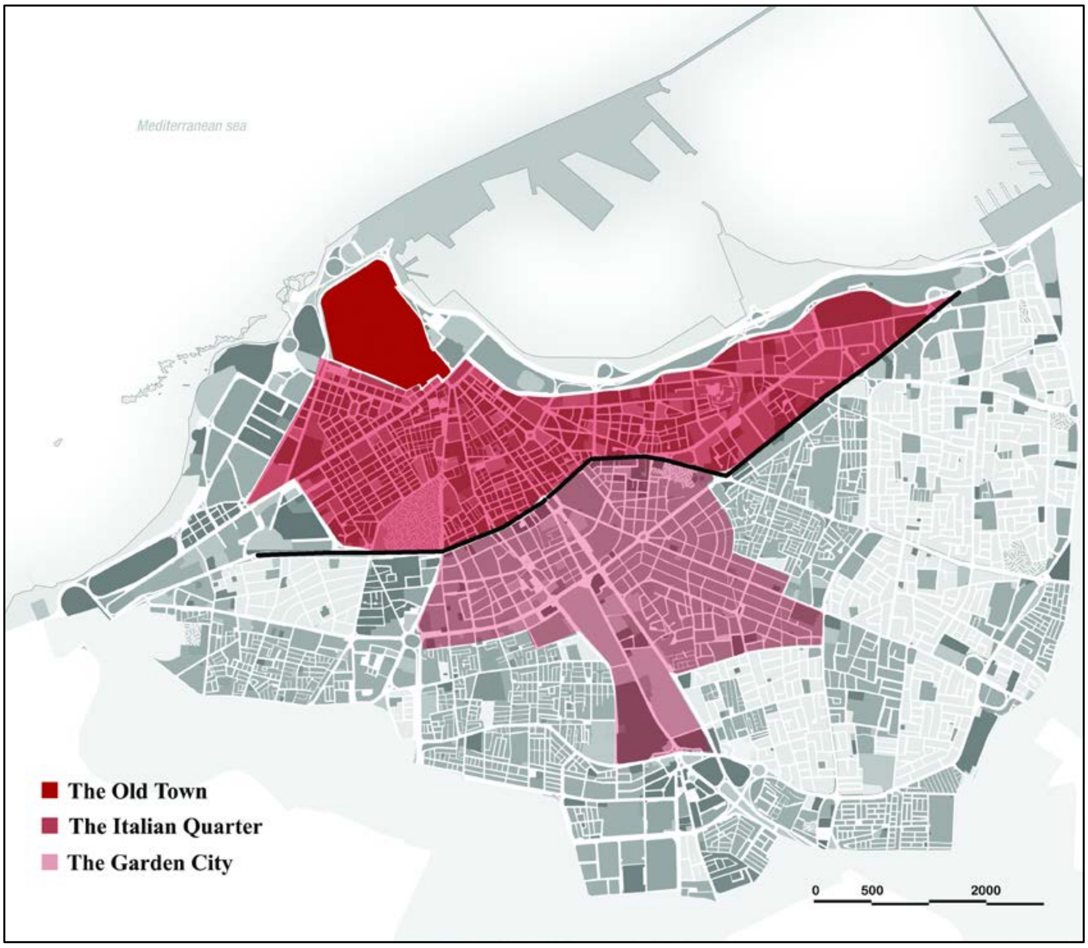


Figure 5.4: The three original urban fabrics in Tripoli's city centre (By the Author)

5.4 The Urban Types: a Qualitative Description

The reasons for selecting the three cases, as stated previously, are based on their domination of the city centre and their applied urban principles. The Old Town represents traditional Islamic principles in developing the built environment, where deep-rooted human factors produced distinct formal and specific type of built environment (Bianca, 2000), while the other two cases show the colonial process of development. The Italian Quarter represents the first master plan ever implemented not only at the scale of Tripoli but at the scale of the whole country. This pre-planned urban form was based on the vision of Luigi Luiggi (McLaren, 2006). During the British administration period (1943-1951) the development process in Tripoli focused on the residential neighbourhoods as the complementary process of the Italian Quarter (Azzoz, 2000). The British Garden City is an outstanding example of such a neighbourhood. These urban fabrics are illustrated in this section according to the authors' personal experience and to local literature.

5.4.1 The Old Town

The Old Town is a typical traditional Islamic urban form, where a large mixture of homogenous low-rise courtyard buildings forms a hierarchical network of narrow streets and dead-end alleyways. Its structure has some similarity to a living organism; like a system of blood vessels, where streets branch out from a central square to become lanes and narrow alleys and finally come to a dead end (Figures 5.5 & 5.6). As each house has a central space, which unites the family by being a neutral zone of contact, groups of houses were organised by clan relationship, ethnic or religious background, to create a quarter (Shaiboub, 1979). The Old Town is organised according to orthogonal streets' layout, which is inherited from the ancient Roman routes. In this dense fabric the buildings occupy most of the space, leaving a small space for road networks and open spaces. Buildings are low in height and streets are narrow in width and often topped by retaining arches supporting opposing façades, creating an atmosphere that is typical of traditional Islamic neighbourhoods, which is distinguished by its orthogonal roads' network (IAU, 2008).

Figure 5.5: The compactness of the traditional urban form (The Planning Bureau of Libya)

Figure 5.6: Main characteristics of the traditional urban form (The Planning Bureau of Libya)

The surviving structure of the old city characterizes the traditional principles and attitudes that stretched between the fifteen to the eighteenth century. The city reflects the physical characteristics of architectural components that shaped the coherent urban fabric without dropping their individual spatial identity. The old town is considered the main part of the city's core, which comprise the public land-use and varieties of functional buildings such as a central mosque surrounded by disunited suqs (traditional markets), hammams (steam baths), Madrasas (schools) and caravanserais (Hotels), which are completely integrated with the mosque and retail shops. This combination of structure is connected to the central mosque in order to create a comprehensive complex of varied constituents, which suit religious elements, educational aims, social activities and commercial purpose. In addition, the courtyard of the central mosque is usually turned into the primary public open space within the central compound of the city's heart.

This kind of compact urban form supplies the visitor with a distinctive feeling of spatial continuity, surpassing the individuality of buildings and linking the compositions of urban public realm. The visitor who passes this context finds an obvious physical guidance with valuable respect to the differences from one sector to another. It is noticeable that each single element of public realm keeps its specific spatial character while interacting with adjacent units through singular architectural devices such as intermediate gateways, internal passageways and communicating doors.

5.4.2 The Italian Quarter

The Italian Quarter of Tripoli was established during the early 20th century after Italy invaded the country in 1911. The first ever masterplan for the city of Tripoli was proposed by Engineer Luiggi a few months after the initial invasion. The main aim of the plan was to formulate the Italian power over the city and create a new city for the metropolitan populations to the southeast of the Old Town. The approach was to preserve the Old Town and integrate the new masterplan with the remarkable Ottoman institutions that have been built outside the walled city in order to apply a new urban fabric (Figures 5.7 & 5.8).

Figure 5.7: The compactness of the Italian urban form (The Planning Bureau of Libya)

Figure 5.8: Main characteristics of the Italian urban form (The Planning Bureau of Libya)

The Italian Quarter is initially based on the idea of rationality in forming a new urban context adjacent to the existing old town. The general layout of the Italian Quarter is generated to preserve the urban context of the Old Town and to modernise the city of Tripoli. This quarter's structure is mainly based on the idea of modernising the city and its streets are characterised by a simple radial structure and engraved within solid forms of commercial and residential buildings. Most of the buildings are four stories high and are occupied by shops, workshops or catering services at the street level, while residential units dominate the upper floors.

This process of development emerged with the continuity and the coherence of the Old Town's exiting urban fabric and offered potential for achieving diversity in purpose and significance (McLaren, 2006). The Italian quarter is regarded as a great mixture of uses in the city centre of Tripoli, although the upper floors are mainly occupied by residential flats, which were introduced for the first time as a new type of accommodation in the city of Tripoli. In the Italian quarter buildings are flexible in use, attached to each other and aligned directly on the walk path; their frontage at the ground floor is principally devoted to commercial facilities.

The Italian Quarter today is regarded as the most prominent area in Tripoli's city centre due to the large variety of services, such as; public institutes, banks, commercial stores and leisure facilities. The streets are mostly vibrant and safe, so that not only the local inhabitants can enjoy walking in them, but also people from other peripheral areas, especially at daytime. In this urban context, the façades of buildings express an eclectic Mediterranean style - a combination between local vernacular and European patterns (McLaren, 2006). A mixed land use dominates the area as most of the buildings follow the basic design concept, where the upper floors accommodate the residential units and the ground floor is occupied by either commercial or leisure activities on the main streets, or other services and small workshops on the secondary streets. Originally, the upper residential units were designed to suit the life style of Italian families, yet after independence many apartments were converted into private offices, which is a dynamic that appears to have been caused by either the low degree of privacy in the upper floors or, in many cases, the inadequacy of this type of housing for Libyan families. However, this urban fabric is considered locally as an ideal neighbourhood in terms of schools, nurseries and other kinds of services (Von Henneberg, 1996).

The Italian Quarter fabric is based on a metropolitan Masterplan that was papered by the Italian engineer Luigi Luiggi in 1912 as a new urban model for the colonial period, with the explicit aim of expanding the city to a larger urban context (McLaren, 2006). The new pattern of urban neighbourhoods was realised as a typical manifestation of European pre avant-garde urbanism, which was then mixed with Fascist patterns after the Nineteen Twenties, founding a relationship between public streets and blocks of an entirely new nature for the place.

The streets of Italian context are characterised by the simple radial structure and introduced, for the first time, the mixed use of residential and commercial activities in Tripoli. The hierarchy composition of the Italian urban block was systematically organised by the network of public spaces, where the importance of a street is underlined by the buildings' uses. Accordingly, the main front streets are usually occupied by trading buildings, where commercial activities are established at the ground floor, while houses and workplaces are located along the side streets. The back streets are mainly designed to be appropriate for the simplest residential dwellings (Shaiboub, 1979).

5.4.3 The Garden City

During the 1940s, the British practice of urban design pursued new types of individual houses as an alternative to the urban residential blocks of the Italian Quarter and courtyard houses of the Old Town. The inter-relationship between these private buildings and the street network is overall indirect. Each private plot in this neighbourhood consists of a main building, which is located at the centre and is surrounded by gardens, stores or a car parking. Based on this methodology of plot design, each dwelling is provided with two entrances; the first one connects the semi-private space (private garden) with the public space (street network), while the second entrance connects the private space of the residential unit with its private garden. As a result of the way dwellings' entrances constitute the street, the inter-relationship between private spaces and public space is considerably indirect. Therefore, the depth value of inter-visibility of doors and windows is equivalent to one since there is one space between the closed private space and the street (Figures 5.9).

Figure 5.9: Main characteristics of the Garden City urban form (IAU, 2008, p34)

In the Garden City, the network structure is based on the same grid regularity of the Italian Quarter. However, the hierarchy and enclosure of streets are not achieved here. The liveability of open spaces as places for community interaction is lost, despite the fact that this neighbourhood provides a highly interconnected network with short links, numerous intersections and few cul-de-sacs.

This planning approach introduced a new pattern in amenities distribution within the city, where few community services, such as; mosques and schools, are dotted around the core of the quarters, while the presence of commercial and leisure facilities is almost moved out in order to make the context quieter and sound for the residents. The shape of buildings, plots and streets comes directly from the Neighbourhood Unit planning ideology (Perry, 1929), a backbone of the discipline since its early formation and up to the modern days (Mehaffy et al., 2010), which introduces the private automobile as a main determinant of the urban form at the local scale (Mehaffy et al., in preparation). This ideology is ultimately conducive to car-dependent layouts that enforce people to travel by automobile to reach shops, services or even for leisure, a dynamic that the Garden City in Tripoli fully exhibits as a daily experience for inhabitants and visitors alike.

The modern movement of the built environment took a new approach to arrange urban blocks in a way that is different from those in traditional urban structure. The modern paradigms deconstructed the coherence of the traditional urban block and reconstructed new roles of division between the public streets and urban blocks, which severed the link between the street and lot. As a result, this approach omitted the indigenous relationship between public and private domain and transferred the urban public realm from socially active to socially passive (Carmona et al., 2003).

5.5 Identifying Centres in the Urban Types: The Case Studies

As stated in chapter two, there are three types of indexes generating the centrality assessment by using the MCA. The three indexes of centrality principally compute the centrality degree, where straightness C^S counts the number of edges that connect each single node and are more likely to be straight. Closeness centrality C^C measures the nearest nodes to each single node within the network structure and captures the notion of accessibility, which gives an indication of the cost of overcoming spatial separations between places, population and activities. Finally betweenness centrality C^B quantifies the nearest nodes to each single node that provide possibility to reach other nodes further away (Porta et al., 2006a, b and Latora & Marchiori, 2007). The various moods of MCA yield serious results describing proximity and adjacency between people and places, which can be important in showing the difference between active and passive places and explaining the movement patterns throughout different parts of a city (Figure 5.10).

General Closeness

Closeness 1600

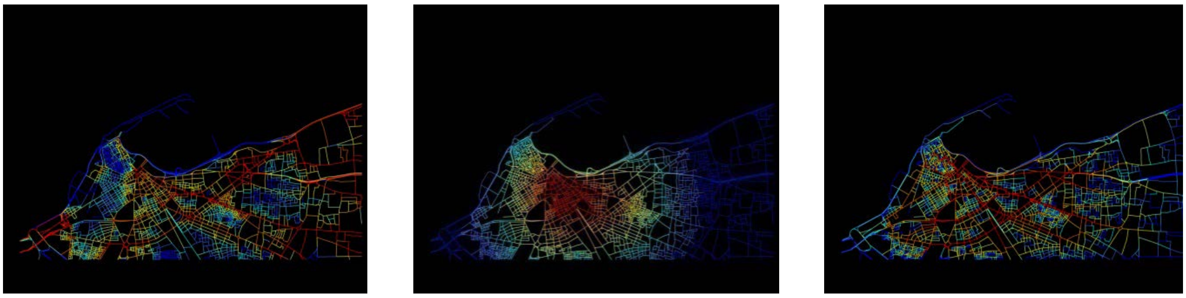
Closeness 800

Closeness 400

Figure 5.10: The analysis of Closeness within the city centre of Tripoli

Porta et al. (2005) state that Integration / closeness index (Figure 5.8) of centrality concentrates mainly on the values at the centre of the image, where geometric property depends on the way of tracing the borders of the study area. They emphasise that this property becomes more visible as the space becomes more fragmented; to the degree that integration / closeness index is found to be unusable if implemented without the axial mapping generalisation process. In this case the analysis becomes meaningless due to the overwhelming impact of what so-called "*edge effect*".

MCA analysis can be used to solve this problem by limiting the closeness mapping to a local scale, where it maintains all its descriptive potential, while it relies on other indices, such as; betweenness and straightness for mapping centrality at the global scale as they are less vulnerable to the "edge effect" than closeness centrality. However, straightness index focuses mainly on the straight streets within the network structure and betweenness index defines the short distance that connects streets to each other and reflects the spontaneous way of connecting people to each other and to the total network (Figure 5.11).



Straightness Closeness Betweenness

Figure 5.11: The three centrality indexes within Tripoli's city centre

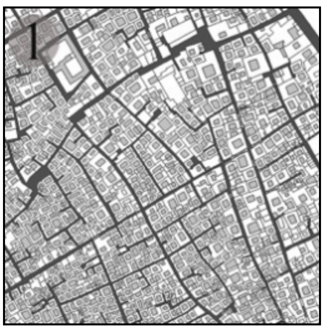
From the definition of the indexes of centrality, closeness index evaluates only the nearest accessible routes to reach public activities, and characterises the number of particular destinations that can be reached from any location in a city. Straightness only exhibits the straight route connecting the adjacent street network. However, the betweenness determines how long people actually move and measures the short distance that connect people to each other and to the total network. The betweenness metric shows the areas that are passed through most often, and thereby shows the most central parts in a city. Stowe Boyd (2010) states that places with higher betweenness are more likely to be liveable and become part of a social network, as the number of incoming and outgoing connections is high. Therefore, the most central routes "betweenness" have the potential to sustain social life and provide accessible roads for people to meet a large number of individuals through shorter paths than any other index.

Following the prior definition of each index of the MCA, closeness counts how close each node is to all other nodes and straightness measures how straight the paths that connect the nodes are, while betweenness measures the shortest paths that link each couple of nodes, which relates directly to the measurement of social life effectiveness. Consequently, this study applies the index of betweenness as the main research objective to make a correlation between urban form and urban life (Figure 5.12).

Figure 5.12: Betweenness analysis of Tripoli's city centre

By running the MCA tool on the three moods of centrality on the whole of Tripoli's city centre, the GIS application detects the centrality of each case study. Although closeness has a higher correlation with diversity of functions than betweenness (Porta et al., 2009a; Wang et al., 2011) betweenness, as a significant tool, is applied in this study to measure the centrality, as well as to show the degree to which nodes participate in creating the shortest paths within the network structure and supporting the pedestrian movement (Freeman, 1979). Betweenness centrality identifies the "*potential through movement*", showing how likely the chosen network is to be a part of the movement for most possible trips from origin and destination (Porta et al., 2009b). Closeness indicates the through movement along main routs passing through the city (Hillier, 2005).

The analysis of closeness takes into consideration a large area of street network within Tripoli's city centre, where the three specific parts that are chosen represent the major three historical neighbourhoods in the city centre (Figures 5.13 & 5.14).



1) The Old Town

2) The Italian Quarter

3) The Garden City

Figure 5.13: The three 400m-edged samples of urban fabric in Tripoli's city centre

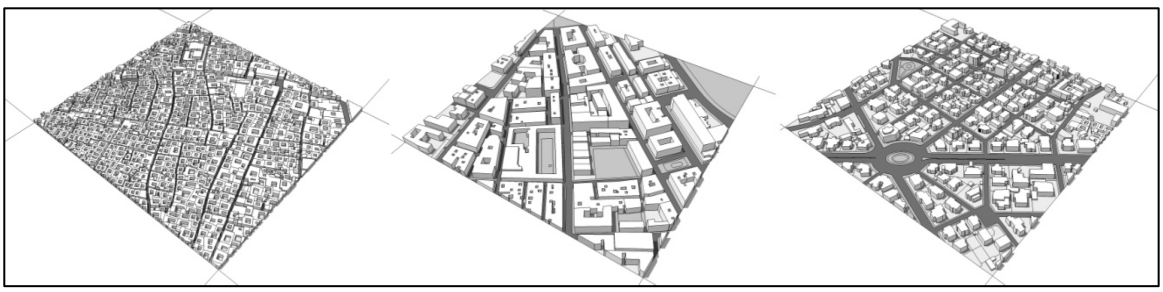


Figure 5.14: The 3D views of the three selected cases

5.6 Land Use

Jane Jacobs (1960) sees streets as the centre of life in cities, rather than mere traffic channels. Therefore, the hierarchy of composition of the traditional urban block is systematically organised by the network of public spaces, where the importance of a street is underpinned by building uses. Movement sensitivity is the degree to which land use relies to passers-by to reach its minimum level of hierarchal visibility (Hillier 1996 and Karimi et al., 2007). In the Old Town, the commercial land use has the greatest movement sensitivity, which is mostly reflected in good access for trade activities and high visibility by the passing people.

In the Old Town, the street network is considered to be an element of the public realm, where people do not only move and pass by, but they participate in different social activities. Streets in the Old Town are a place where children play, people chat and community members gather, thus functioning as places not just a movement channel. The fronts of the main streets in the Old Town are usually occupied by commercial buildings and public institutions, while residential dwellings are located along alleyways and cul-de-sacs.

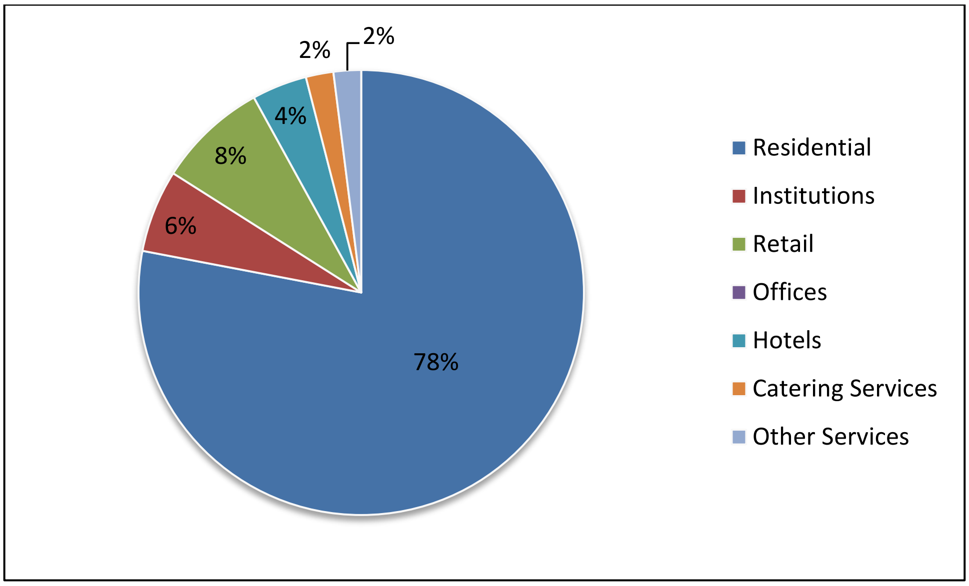


Figure 5.15: The overall percentage of land uses in the Old Town (IAU, 2008)

The land use analysis within the Old Town reveals a direct relationship between activity distribution and movement sensitivity. Service buildings such as mosques, shops and bakeries are located on central streets, while land uses with less public functions such as private houses are situated on less central routes, or cul-de-sacs (Figure 5.15).

The Italian Quarter is a considerably compact urban fabric, in which buildings are connected to one another along the street and accommodate a variety of uses. These contiguous buildings create a continuous wall along the street façade and enclose the public space with different activities. The hierarchy of composition of the Italian urban block is systematically organised by the network of public spaces, where the importance of a street is underlined by the building use. Accordingly, the main street fronts are usually occupied by commercial activities at the ground floor, while workplaces and flat accesses are located along the side or back streets.

The pattern of movement is often considered solely as a means of getting from one place to another, a necessary and unenjoyable means to an end rather than as an experience in its own right (Mitchell, 2003, p104). However, the planning and design of movement within the Italian urban fabric does not only ease the journey from one point to another and make the distance shorter, but it also provides opportunities for interest, commerce and human interaction. "*Well-designed movement patterns at the micro neighbourhood scale will directly make possible the richer social dynamic that is so often undervalued as a component of community*" (Taylor, 2003, p103).

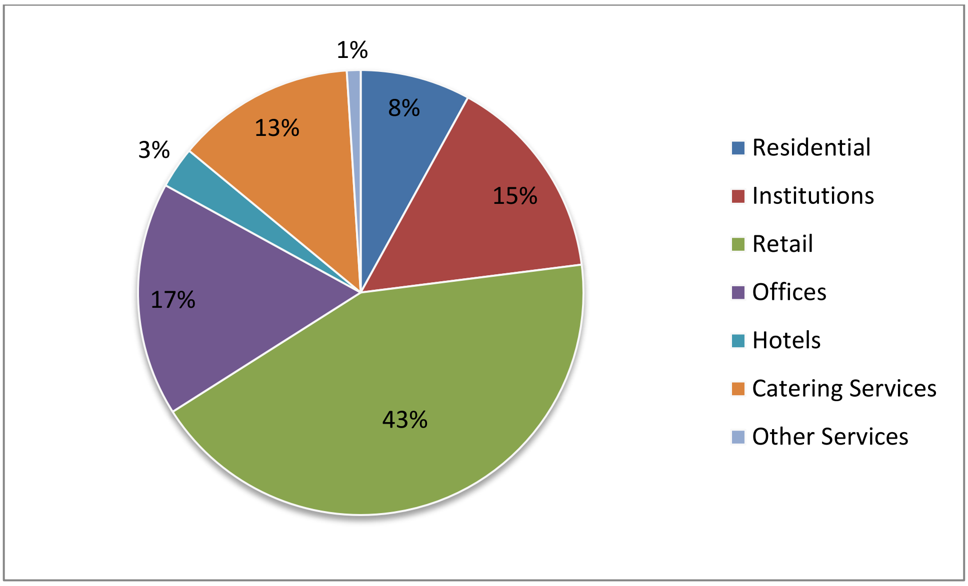


Figure 5.16: The percentage of land uses in the Italian Quarter at the ground floor (IAU, 2008)

Christopher Alexander sees a street as a multi-functional urban unit that should be a place to stay in and not just a place to pass through, that may be expanded into a wider space such as square (Moughtin, 2003). Based on this concept, the street network and squares within the

Italian Quarter are very active public spaces as compared to those located in the Old Town, especially because of the commercial activities located at the ground floor on both sides of the street, where some are provided with arcades that create shaded and covered open spaces (Figures 5.16 & 5.17).

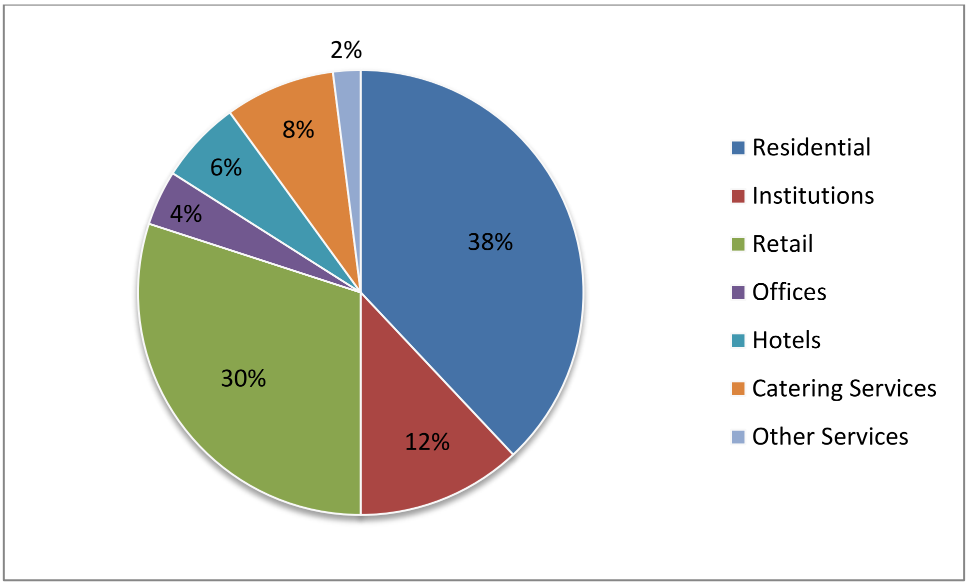


Figure 5.17: The overall percentages of land use in the Italian Quarter (IAU, 2008)

The network of thoroughfares in the Italian Quarter allows flexible access to all uses and activities in the area, since homes are close enough to schools and shops, that walking and cycling become more viable means of transportation within the urban fabric. This network is based on pedestrian-friendly and diversity in functionality. It provides all required facilities, such as: local daily shops, essential health facilities, nurseries and primary schools, along with recreational, workplaces and government facilities. Retail units are represented in the form of individual shops or a larger chain of stores which successfully meet the commercial demands of the whole region. These shops offer items related to fashion, leisure or jewellery. The urban grid is denser and more finely grained in this urban fabric when compared to other modern urban areas.

Moreover, Tripoli's Italian Quarter and the peripheral areas of the Old Town that are adjacent to this urban form contain some streets and squares for everyday market activities. This type of outdoor market attracts customers from the entire region, not just those who live locally. These market areas are located one topological step away from major streets, in order to keep the crowd away from main streets, and also because major streets are already occupied either by institutions or by more specialised and organised stores at both sides. As a result, the Italian Quarter achieves harmonic balance between street network and diversity of land use at the ground floor. These commercial and public services characterise this urban form and improve the liveability of its street network.

The Garden City is provided with a very accessible network and small block sizes. However, the street network is mainly designed for vehicular movement, and the neighbourhood is dominated mostly by residential buildings, with a lack of other necessary activities. Although this context provides a highly permeable network with short links, numerous intersections and minimal dead-ends, the liveability of the urban environment is devoid, with no means of community interaction. (Figure 5.18)

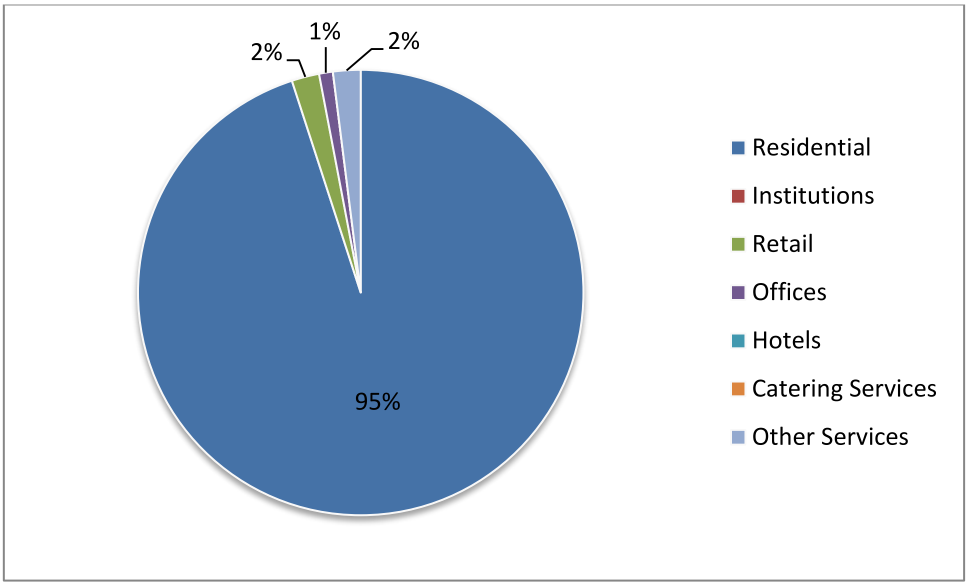


Figure 5.18: The overall percentage of land uses in the Garden City (IAU, 2008)

This modern approach introduces a new method of allocating land use in the city of Tripoli, which depends on an apparent separation between residential and commercial activities in order to make the context quieter for residents. Based on observational analysis, it is obvious that there are only a few mosques and schools scattered within this urban zone, while commercial and leisure facilities are almost entirely removed. In so doing, this ideology of designing land use forces people to travel by automobile to their jobs, shops and entertainment facilities. Although the urban fabric of the Garden City has a good quality of network structure, and accessible streets based on a grid-like pattern, it is hard to find people walking within these streets due to a lack of an adequate distribution of different land uses, which can easily be seen by a prevailing single land-use on the ground floor.

Consequently, this study shows that each urban fabric of the three selected case studies has its own pattern of land use. However, the composition of various activities that are located in these different urban structures has a significant impact on the accessibility, usability and walkability of the street networks within Tripoli's city centre. "*The more accessible an area is to the various activities in a community, the greater its growth potential*" (Hansen, 1959, p73). Although the Old Town and the Garden City are predominantly residential areas, each urban quarter of the Old Town contains different activities at the ground floor, such as; shops, groceries, schools, bakeries and mosques in order to meet residential interests and needs, while the urban structure of the Garden City lacks everyday basics and amenities. As a result, the land use analysis shows that the composition of public land use that integrates with houses in the Old Town is more flexible in providing each individual neighbourhood with local services, and encouraging pedestrians to use the streets more regularly.

The Italian Quarter, on the other hand, is considerably the most accessible network, as the liveability of its streets is motivated by a mixture of land uses on the ground floor. The close proximity of living, working and socialising in both the private and the public realms, makes the public spaces hospitable, and the private dwellings convenient. This fine textured urban fabric makes the city centre of Tripoli not only socially healthy, but also ecologically sound by eliminating unnecessary travel.

This study shows that centrality and street quality are not the only factors that increase street liveability, giving that the land use factor has a vital role in improving social interactions. It is important to note that many studies demonstrate that street centrality remarkably influences land uses, indicating a mutual relationship between street centrality and land use. Introducing different land uses to the urban form of neighbourhood is not achieved through a system of planning, but in fact is an essential development to the domain of social life (Kaiser & Godschalk, 1995).

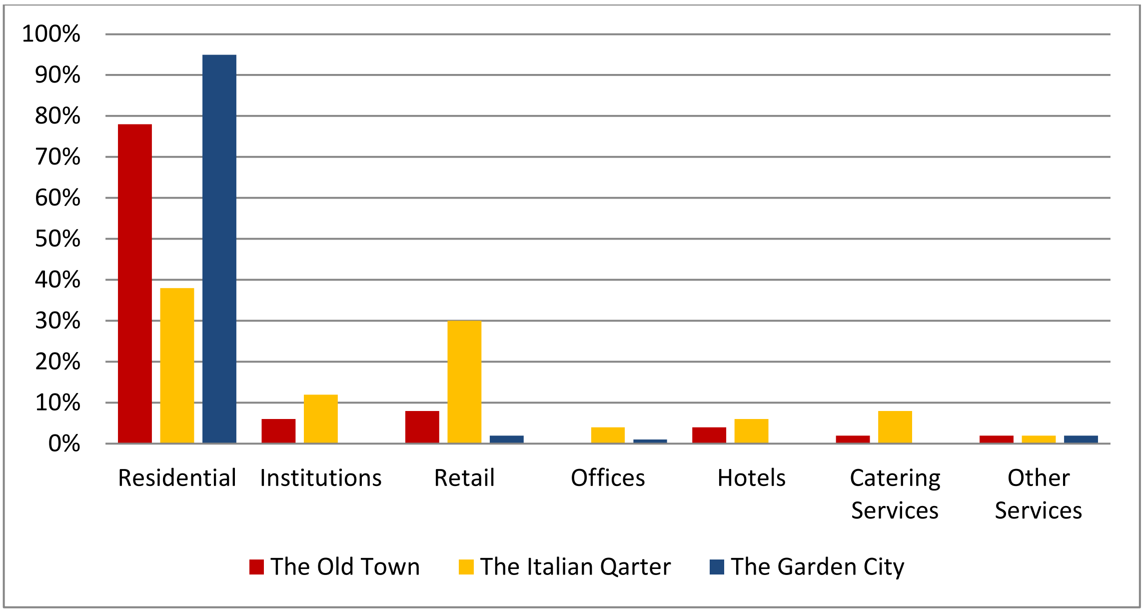


Figure 5.19: A comparison in land use within the three cases (IAU, 2008)

A diversity of functions provides different facilities for both necessary and optional activities that are vital for a sustainable community (Carmona et al., 2003). When looking at the number of units (Figure 5.19), this study shows that the Italian Quarter has a larger amount of units than in the Old Town and the Garden City, thus making the streets in the Italian urban fabric much vibrant. However, this liveability is also a result of commercial activities, as this urban fabric has the fewest of residential units among the three case studies. Around 62% of the total units in the Italian Quarter include a wide diverse spectrum of land uses, whereas residential units only represent 38%, although 43% of the total units at the ground floor are commercial. However, 22% of the total units in the Old Town contain different functions, where about half of them are for commercial use. The Garden City, on the other hand, is dominated by 95% of residential units, with only 5% that accommodate different land use, in which 2.0% represent commercial activities.

The study reveals that the most diversity is found in the Italian Quarter, where 30% of all activities are commercial in nature, followed by the traditional urban fabric where 8% of all activities are commercial and finally the Garden City, where only 2% of all activities are commercial activities.

5.7 Density

A number of studies advocate a link between population density and other measurement tools of network performance. Thus, research has examined the effect of unit density and travel patterns on the formation of an urban fabric. Stead and Marshall (2001) state that population density is directly associated with the structure of the street network and the proportion of public transport trips. However, Frank and Pivo (1994) state that neighbourhoods with high density usually decrease automobile journeys and make the pedestrian movement and public transportation services more accessible within their street network. Moreover, accessible streets provide more opportunities within the transport system, in order to respond to different travel demands of pedestrians and vehicles alike. Based on this, the higher the density the lower the extra travel is required throughout the network system of that urban form.

According to ECOTEC (1993), there are four reasons that can explain the possible connection between density and travel patterns. Firstly, neighbourhoods with high densities provide a range of opportunities to reach local activities and social contacts within a walking distance. Secondly, high densities expand the variety of local facilities that can be accessed without the need of an automobile. Thirdly, urban fabrics that are characterised with high density patterns are likely to reduce the travel distances between residential units and local service, work or leisure destinations. Fourthly, high densities tend to support better policies for improving public transportation and reducing the choice of travelling by private car.

According to the AIU (2008), there are clear differences in gross unit density in each of the neighbourhoods, which had a great impact on the street liveability of Tripoli's city centre. A comparison of density analysis data shows that the chosen cases have different number of units, which has a significant consequence on the character of streets network (Figure 5.20).

The Old Town, as a compact urban form, maintains a high degree of compactness and a relatively high unit density (*262 units per hectare*). Still, this urban fabric does not provide its inhabitants with a motorised network, which is considered to be essential for contemporary life by the most residents. The Old Town has lost some of its importance after erecting the Italian Quarter, yet its network is still more effective than that in the Garden City due to the mixture of land use and a large quantity of units.

There are two major factors that distinguish the Italian Quarter from the other parts of the city and generate it with the highest unit density (*355 units per hectare*) between all three neighbourhoods. Firstly, the fact that this urban context has a large number of shops at ground floor means that it becomes the main destination for shopping, walking, socialising and entertaining, not only at a city scale but also at a regional scale. Secondly, the average height of the buildings is about four stories, including public institutions, which makes this building cause an increase in unit density within this urban context.

The basic network structure of the Italian Quarter and the Garden City have similar features in regards to time consumption and distance of movement, even though the usability of streets and the number of trips within the two urban fabrics are vastly different, due to the variety of density and diversity in land use. However, the scattered urban form of the Garden City is an average two stories high and has a density of about *53 units per hectare* which leads to deserted streets and increases the dependence on automobiles (IAU, 2008) (Figures 5.21).

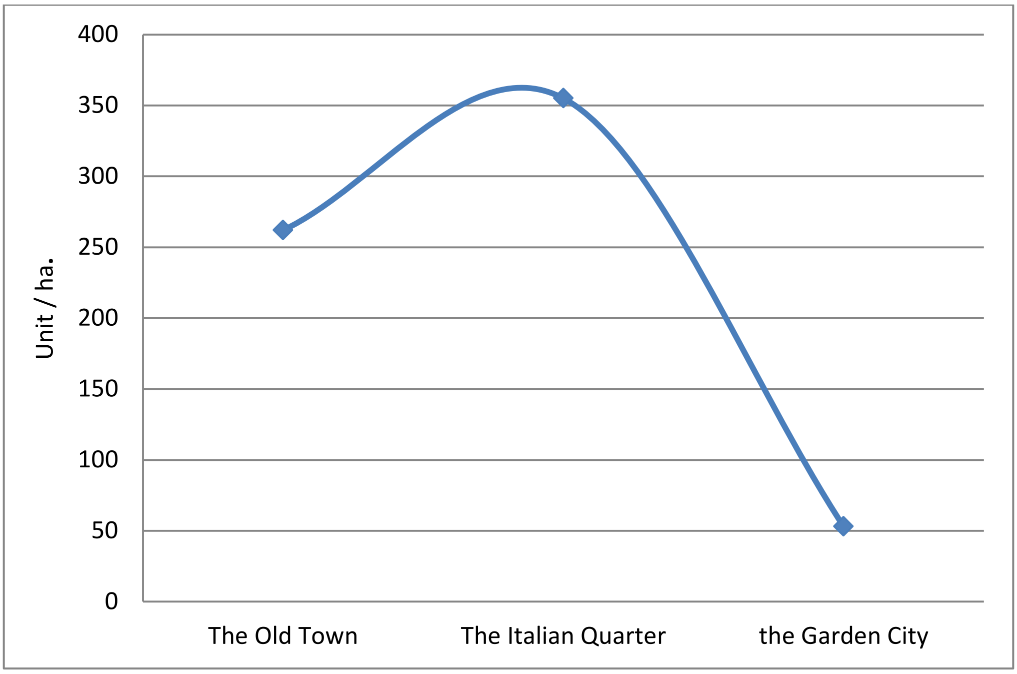


Figure 5.20: The units density within the three cases (IAU, 2008)

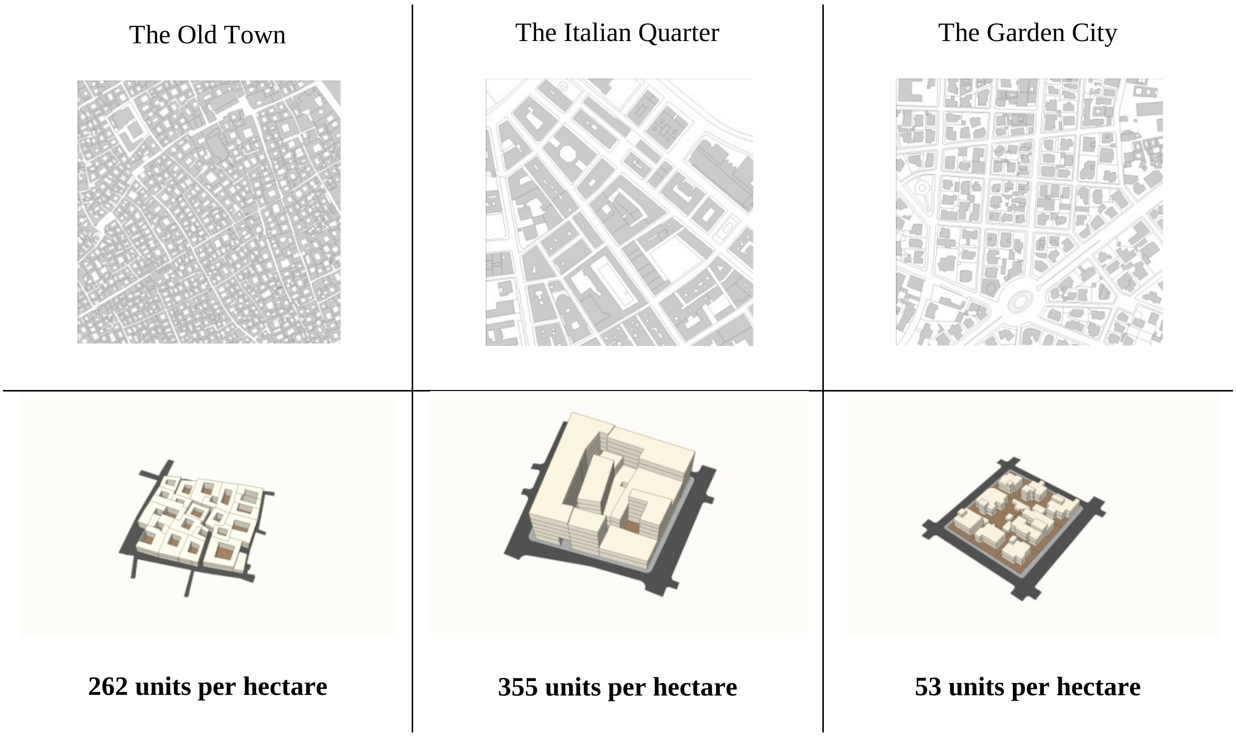


Figure 5.21: The differentiation in unit density within the selected urban fabrics (IAU, 2008)

5.8 Conclusion

The study of a historical evolution of any urban form should be rationally and effectively represented and explored in order to produce a new development for that place. However, Sitte (1965, p151) points out that studying the past forms should not "*republish ancient and trite ideas*" or "*reopen sterile complaints against the already proverbial banality of modern streets*". They should, instead, search for the historical models that succeeded in building meaningful urban organisations, and which responded to their own regional specificities, socioeconomic conditions and cultural background.

The Islamic walled city or the Old Town possesses important environmental and aesthetic characteristics. In the Old Town both residents and visitors alike can experience and enjoy the town's most significant architectural values, its design, style, building materials, skilled workmanship, beauty and uniqueness. A variety of buildings and other features of the Old Town serve to remind people about the past, providing insight into the culture and history of previous generations. These features show the different activities of people who lived and worked in the Old Town through centuries. In addition to its distinctive architectural values, the Old Town has a high spiritual and symbolic significance based upon its history, and the sense of place and continuity through time are well expressed within its walls. The Old Town still hosts many special, long-standing cultural events and celebrations throughout the year which also link people with their heritage (Abu-Lughod, 1987).

The Italian Quarter was introduced to the city of Tripoli as a new urban form to modernise the city. This process of development emerged with the continuity and the coherence of urban form with the exiting Old Town and the atmosphere of the city. It also offered potential for achieving diversity in purpose and significance. McLaren (2006, p148) states that "*The idea of a modern architecture based on the indigenous constructions of the Italian Mediterranean was tied to the tradition of modern European architects, who viewed these vernacular sources as a suitable inspiration for their contemporary works*".

The Garden City is made of residential sectors served by commercial retail on main streets. Nowadays, the Garden City's streetscape is dominated by dull unwelcoming places, where blank fences frame the majority of private plots, making the streets lose their attractiveness and social quality. Although the subdivision of a block is similar to the Old Town, i.e. each plot is occupied by one single-family unit; the relationship between indoor and outdoor spaces is subverted as buildings are isolated within the plot and are entirely separated from the street (Shawesh, 2000). The isolated residential building deprives the fabric of any sense of compactness and the original traditional identity that still permeates both the Old Town and Italian Quarter is lost.

"*Centrality is a key factor in shaping both urban space and urban life. Places that are perceived as central in respect to all others in the system of reference are assigned more value, are easier to reach and are more clearly conceptualised*" (Porta & Latora, 2007b). A place that becomes central potentially has something to provide in different ways to those who pass through or stay in. The street network of such a place has the ability to offer great accessibility, connectivity and permeability, where walkers easily find their own destinations, diversity of land use would develop and social activities take place.

Chapter Six:
Analysing the Neighbourhood: Street and Block Structure

6.1 Introduction

An urban form is a physical structure that promotes the relationship between people, accommodates economic activities and creates the physical dimension in an appropriate shape with the local environmental and cultural aspects. In other words, the notion of the urban form is a composition of urban components that generates the consistency between social, cultural, economic factors within physical urban structure. Accordingly, the urban physical structure expresses a three dimensional space that accommodates in harmony all those factors. The city, as an artefact, is described as the 'wholeness' that is constituted by configuration of urban form components, which could be interpreted separately.

According to the Italian School, Muratori distinguishes between four scale levels: the building, the district, the city and the territory, while the Conzenian School brakes down the morphological structure of settlements into four urban components, which are land uses, building structures, plot patterns and street patterns. Conzen (1960) believes, through one of the essential theories of urban morphology, that the urban form is a production of the street network, land use and the land subdivision (plots). Meanwhile Caniggia and Maffei (2001) consider urban form to be mainly a result of building types, which in turn generate the dimensions of plots and streets. In either method, the main objective is the analysis of the urban plan, particularly the plan of plots, buildings and streets. Therefore, the basic geometrical element of the city structure is an urban block, which includes sub-division of plots along with the connecting routes of the network.

The transformation of the urban fabric over time tends to follow certain patterns, which can be investigated and identified. Growth does not happen randomly, rather it evolves under a particular system (Levy, 1999). Urban designers have to seek evidence in terms of the morphological evolution pattern of urban fabric as a reference and adopt a strong approach for creating new developments (Moudon, 1997). According to Moudon (1997), urban materials develop at different pace with the street network and, therefore, the block structure that is defined by streets becomes one of the most permanent elements. The mutual relationship between the form of streets, blocks and plots has continued to be a matter of growing interest in urban morphology (Levy, 1999). The impact of the Italian School of urban morphology in other countries has been widely acknowledged (Moudon, 1994), while the impact of the Conzenian School has been relevant to the United Kingdom (Whitehand, 2007 and Slater, 1990).

Urban morphology has recently emerged with urban analysis exploring quantitative methods for the description of urban form. This helps to gain an evidence-based understanding of specific evolutionary dynamic, such as; firstly, the repletion and transformation of plots in the city of Lotz by exploring Conzen's ideas, which are related to the burgage cycle in urban building plots of the 19th century, in order to figure out its effectiveness and applicability (Koter, 1990). Secondly, the typo-morphological approach of Chen and Romice (2009) in analysing the fundamental elements of urban forms including street, urban blocks and plots and building-grouping patterns and how they can be implemented by urban designers and policy makers to accomplish homogeneity in the local built environment, and to promote their identity. And finally, a research of Arnis Siksna (1997), as an attempt to provide comparative realistic information about the types, shapes, sizes and arrangements of blocks in North America and Australian city centres and their relative performance in meeting urban purposes.

The body of knowledge constructed in the field of urban morphology has played a key role in the formation of new approaches to the design of cities after the end of modernist urban design (Panerai et al., 2004; Llewelyn-Davies 2007 and Rogers, 1999). These approaches have emphasised the link between the spatial and social dimensions in cities, i.e. the impact of form on collective behaviours and pattern perception (Whyte, 1988; Gehl, 1987; Marcus & Francis 1998; Gifford, 2002 and Newman, 1972). Quantitative and qualitative methods of analysis have been used to study this relationship to benefit scholars, decision-makers and professionals in sustainable urban design and regeneration. This new focus on the quantitative/qualitative analysis of urban form life has widely formed policies and practices of place-making and eco-urban design (ISTP, 2001), (WAPC, 2000a, b & 2007), (LEED-ND, 2008 & 2009) and (UTF, 1999).

This section examines the form of blocks and streets in Tripoli over time by comparing cases that belong to different historical periods, in an attempt to identify what constitutes the traditional structure of the city and to understand its evolution up to the modern days. Tripoli offers a good opportunity to appreciate how different planning ideologies have created substantially different structures from those exhibiting the traditional urban core, with various implications on the social and the economic aspects of urban life. The development of the city in the past forty years shows the need for the formation of a deeper understanding of the city form evolution to drive the growth of a rapidly expanding new metropolis.

6.2 The Link between Street / Block Structure and Social Life

Measuring urban form has been a topic of urban studies research by a number of scholars in the past. In city planning, however, city form in itself has not been at the centre stage since the end of World War II, going through a relatively certain resurgence of interest in recent years, with the shift towards "place making" and "new urbanism" in urban design (Rogers, 1999). Urban designers, such as Evan Jones in Australia (Jones, 2006) and Allan Jacobs in California (Jacobs, 1993) as well as initiatives, such as the LEED-ND (USGB, 2008) have focused on the creation of indices for the quantitative analysis of urban form as explicitly related to collective behaviours and ultimately to various crucial aspects of city life like sociability (Gehl, 1994 and Whyte, 1980), retail attractiveness, safety and popularity (Hillier & Iida, 2005) and (Porta et al., 2006a).

There is an older school of thought regarding the city form called urban morphology, where after a long history of descriptions of cities and prominent buildings by voyagers, grand-tourists and historians, these thoughts were shaped in the 20th Century by two different streams of research: the "Conzenian" tradition of urban geography, after M. R. G. Conzen's move to the UK from Germany in the early 1930s, and the Italian school of urban architecture founded by Saverio Muratori in Venice and then in Rome after World War II (Conzen, 1960 and Muratori, 1960). These two streams, belonging to different disciplines, i.e. geography and architecture, and two different linguistic domains, i.e. German / English and Italian, had very little exchange with each other until the foundation of the International Seminars of Urban Form (ISUF) in the late '80s. Authors from both schools have specifically explored the form of the ordinary fabric of cities at the scales of the district, neighbourhood and block as well as its evolution in time.

Developments focussing on the quantitative examination of urban form eventually developed into urban morphometrics, yet it remains today a relatively limited domain within urban morphology (Morello & Ratti, 2007 and Carneiro et al., 2010). Recent studies in urban morphometrics deal directly with investigating the character of different urbanised areas, measuring the urban form and calculating how the built fabric helps in evaluating the environmental potential of cities (Kropf, 2001; Caniggia & Maffei, 2001; Larkham, 2006 and Whitehand, 2007).

Such thoughts have come mainly from the field of geography, while architects and designers appear to be less engaged with the benefits of quantification and numerical analysis of form. As a result, there is ample opportunity for developing urban morphometrics in two directions; firstly, through linking urban morphometrics to the growing area of generative or form-based coding in urban design, looking at the “DNA of places”, and secondly through linking morphometrics to other disciplinary domains, namely the physics of networks, the biology of evolution and statistics.

The study of street networks aims to understand their density and links, the internal and external connectivity, permeability and accessibility of urban networks through an investigation of links and nodes within the three case study areas (Figure 6.1). In particular, the network analysis focuses on the network’s “architecture”, which has an impact on travel choices and a number of dynamics of local collective behaviour (Cervero & Kockelman, 1997). This kind of analysis is used in urban studies and planning to assess the structural potential of city form and to enhance the formation of service centres and place of identity (Jones, 2006; USGB, 2008; Jacobs, 1993; Southworth & Ben-Joseph, 2003; WAPC, 2000a, b & 2007 and Porta & Romice, 2010).

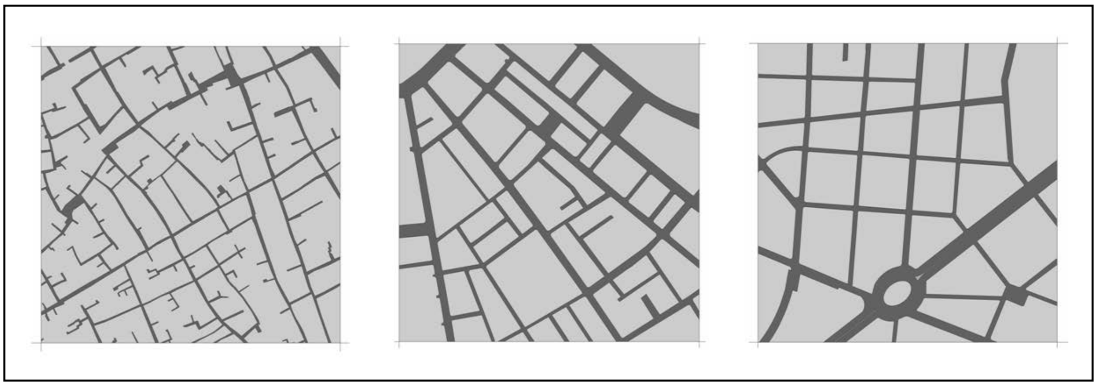


Figure 6.1: The overall structure of street network & urban blocks of the case studies

This section represents an attempt to enter into the domain of urban morphometrics through the study of a range of characteristics at the scale of the *street network* and the *urban block*.

These characteristics are read across the three case studies in the city centre of Tripoli and are related to the street network, properties of density, and urban connectivity (Figure 6.1).

The street structure and block arrangements are known to substantially affect social behaviours As stated by Dill (2004) and WAPC (2000a, b & 2007) smaller urban blocks produce more intersections, shorter travel distances and more choices for the movement between distances, and subsequently increase walkability and liveability of streets. On the wave of a resurgence of interest on urban public spaces as social condensers, urban designers in the 1990s started to investigate measures of scale and connectivity in cities. Allan Jacobs (1993) initially created a simple visual comparison of one square mile of city plans across dozens of cases internationally, associating elementary measures, such as; the sheer number of intersections and blocks, and the average distance between intersections. Two neighbourhoods with the same scale in California exhibit a different number of intersections in one square mile. Los Angeles has 150 intersections and Irvine has only 15, while the same area of one square mile in Venice, Italy, shows 1,500 intersections (Figure 6.2).

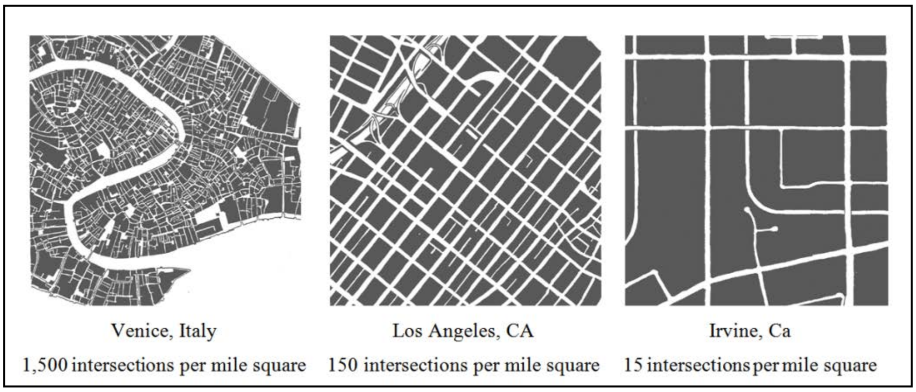


Figure 6.2: The number of intersections in different urban forms (Jacobs, 1993, p221, 225 & 249)

Urban blocks reflect the containment of buildings and land parcels (plots) within a comprehensive urban public space that is constituted by the street system (Marshall, 2005). According to Moughtin (2003) and Meyer (2005), urban blocks can be described as the result of the evolution of the street network, where plot subdivision and buildings define their edges. In this latter case, the formation of a street-oriented structure shows public spaces to be “carved out” from a compact organism of buildings and plots, a typical feature of traditional fabrics. On the other hand, urban blocks can result from an urban growth concentrated in time, and larger in scale, that generates a large part of the block itself, if not the whole of it, in one single coordinated process: in this case, a building-oriented structure, where the plot does not mediate between the block and the buildings in a typical modernist model featuring open landscape and stand-alone buildings. Because of these different generating processes, traditional blocks are more likely to exhibit irregular and internally differentiated patterns, whereas modernist blocks tend to possess a more “abstract” structure (Bentley, 1999). This section analyses in depth the role of the physical form and structure of a city in processing social life. It also investigates the principles that may create a better shaped urban place, which has a positive effect on both the local and global urban structure.

6.3 Measuring the Street / Block Structure: Indicators Defined

The morphological approach emphasises the importance of using mathematical method to understand and describe the logical development of the built environment. Based on this approach, this study measures, assesses and compares different settlements in the city centre of Tripoli and their physical structure. In order to study the characteristics of a specific urban structure, a morphological approach develops a series of analytical tools. These tools use plan analysis and a variety of indicators to quantify different urban fabrics and identify their evolution of growth over time.

Researchers and practitioners who make an effort to measure the urban form of a single city or a whole range of urban fabrics apply numerous indicators in order to understand the structural characteristics of urban form, its spaces and features. A set of indicators is used in order to evaluate the characteristics that are related to the physical quality of street network and urban blocks.

In this work, basic measures of street form and street life also worked out for a number of streets in different world cities, exploring for example the relationship between sidewalk width and pedestrian flow. This method, based on field observation and quantitative comparison, has formed a generation of urban designers, who are trying to establish an evidence-based approach to the relationship between urban form and collective behaviours. The influence of this stream of studies on policies for the place-making agenda has been remarkable. New modelling tools for urban sustainability, such as the LEED-ND 2009 for Neighbourhood Development Rating System in the US in collaboration with Congress for the

New Urbanism and the Natural Resources Defense Council (NRDC, CNU & USGBC, 2009) and new national policies for the compact sustainable city, such as Liveable Neighbourhoods in Western Australia (WAPC, 2007), are all a direct product of this culture. Evan Jones (2001) details the quantitative exploration of street structure at the neighbourhood and district level in terms of connectivity, permeability, accessibility or "Ped-shed", safety, efficiency of land use, diversity of plot size, and other simple indicators of urban form. These indicators, which set the framework for this research on Tripoli, have been consistently applied in recent years in the MSc Urban Design course at University of Strathclyde (Porta & Romice, 2012). The following indicators present a metric method that is used in this study, which provide a definition, a short statement explaining their meaning for urban designers, and specific references of previous studies.

6.3.1 Intersection Density (ID)

<u>Definition:</u> The weighted number of intersections, as defined by:

$$I_d = 3N_4 + 2N_3 - N_1$$

Where: N_4 is the number of four (or more)-way nodes, N_3 is the number of three-way nodes, and N_1 is the number of cul-de-sacs. I_d positively correlates to centrality measures of "Integration" (Hillier, 2005) or "Closeness" (Porta et al., 2012). In Jones (2001) intersections are weighted according to their type, with 4-ways = 1, 3-ways = 0 and 1-way or (cul-de-sac) = -1; the indicator is named "Permeability". However, in this study, intersections are weighted differently, where 4-ways = 3, 3-ways = 2 and 1-way (cul-de-sac) = -1, as a 3-ways node still contributes effectively to the efficiency of street network and plays a major role in promoting connectivity, accessibility and permeability relating to travel behaviour.

<u>Meaning:</u> ID gives a measure of the grain of the street network, with a direct effect on the number and consequently the average size of blocks. The importance of having many small blocks in cities has been acknowledged by Jane Jacobs (1961, Chapter 9: "*The need for small blocks*"). A fine grain of blocks is expected to contribute to higher potential for retail businesses, self-surveillance and pedestrian flow.

References: Seminal work on this subject is done by Allan Jacobs (1993). The indicator "Intersections" appears in 6.3 and 6.4 of this chapter, where the sheer number of intersections, non-weighted, is compared over equally sized (1 sq. mile) extracts of urban maps, redrawn according to a unified graphic standard. This measurement was also applied by Jennifer Dill (2004) in measuring the network connectivity within Portland, Oregon. Cervero and Radisch (1995) measured the effects of street intersections on the pedestrian movement in two neighbourhoods; Rockridge and Lafayette in San Francisco Bay Area. Their study shows the differences between the two neighbourhoods in the total number of intersections per square mile, where they are broken down into four-way intersections, three-ways intersections and cul-de-sacs. Their analysis reveals that Rockridge has a more grid-like and pedestrian-oriented street pattern, which is supported by a much higher share of four-way intersections, with few three-intersections and cul-de-sacs. Similarly, Reilly and Landis (2002) analysed the travel behaviour in six neighbourhoods within the San Francisco Bay Area. Their measurements calculated the number of street intersections per square kilometre, which revealed a direct relationship between block size and the number of street intersections.

6.3.2 Street Density (SD)

Definition: The total length of streets per square area, as defined by:

$$S_d = (SL_{tot} \text{ x } 1000) / A_{tot}$$

Where: SL_{tot} is the total length in meters of all streets included in the sample, and A_{tot} is the total area of the sample itself (400 x 400 m^2).

Meaning: SD measures the number of linear distance per square of land. A higher value would show more streets and thereby indicates good connectivity. In this measurement intersection density and block density are related directly to street density. In addition, street density provides guidance on where more walking trips would potentially occur if improvements in the walking environment were made.

References: In order to analyse the trip characteristics in Northern New Jersey Region by Mately et al. (2001), a study related to street density was conducted to find the potential demand for pedestrian facilities, such as pedestrian-friendliness or walkability at the regional scale. Susan Handy (1996) applied street density indicator to study six neighbourhoods in Austin, Texas in terms of how urban form fits into a more comprehensive model of choices for pedestrian trips rather than a simple test of the correlations between urban form characteristics and travel behaviour. Beside several other indicators, street density was also applied by Jennifer Dill (2004) to measure the connectivity in Portland, Oregon for the purpose of increasing walking and cycling.

6.3.3 Link-Node Ratio (LNR)

Definition: The total number of links divided by the number of nodes within a study area, as defined by:

$$LNR = L_{tot} / N_{tot}$$

Where: L_{tot} is the total number of links in the sample, N_{tot} is the total number of nodes (including cul-de-sacs).

Meaning: The links are street segments that connect nodes, while the nodes are intersections between links (Dill, 2004). The approach of a primal representation of the street network shows that streets are node-to-node links and intersections are nodes between links, including roundabouts, T-junctions and cul-de-sacs (Porta et al., 2006a). As stated by Dill (2004) the use of this indicator shows how the higher value of the link-node ratio the better the connectivity within the urban form, where the length of the link is not taken into account for producing this ratio (Figure 6.3). It is stated by Handy et al. (2003) that a clear identification relating to the number of links and nodes should be conducted precisely before calculating the ratio between them. The measurement of LNR is usually applied due to the simplicity of acquiring the numbers required to find the ratio value. A high ratio values indicates a network that provides more route options and more direct connections (Handy et al., 2003, Handy, 2011 and Ewing, 1996). Each single intersection has the potential to decrease or increase the traffic flow and the movement options within the network structure (Handy, 2011). Ewing (1996) and Handy et al. (2003) state that a LNR with values of 1.2 and 1.4 is a good target for network planning purposes, as these values are likely to produce efficient connectivity in new settlements. On the other hand, in some urban structures, a grid of large blocks will have the same LNR as a grid with small blocks, which means that this analysis does not capture the scale of the grid.

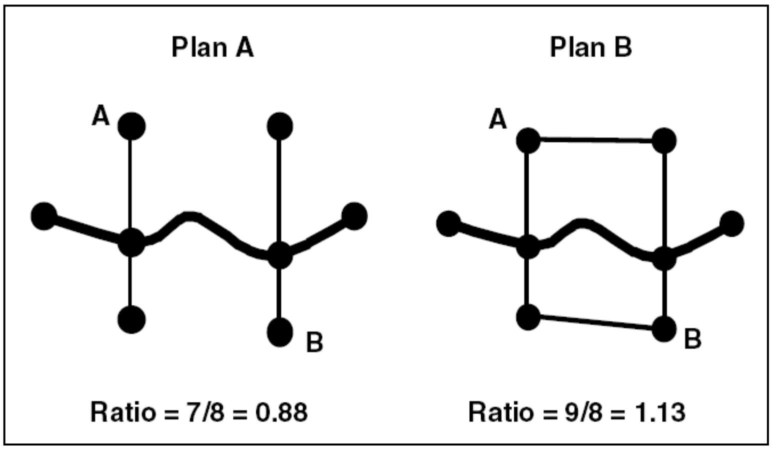


Figure 6.3: Different relationship between Link/Node with the same number of nodes (Dill, 2004, p4)

References: Susan Handy (2011) measures the LNR in the city of Davis, California in order to find out how non-motorised accessibility and connectivity regenerate the pedestrian movement. Jennifer Dill (2004) also applied this indicator along with other indicators to measure network connectivity for cycling and walking in Portland, Oregon. Therefore, applying this indicator should be accompanied with other indicators to study any network connectivity, as it is less intuitive and attractive to be a policy tool (Dill, 2004).

6.3.4 Internal Connectivity (IC)

Definition: The ratio between number of "real" street intersections (excluding cul-de-sacs) and the total number of intersections (including cul-de-sacs), as defined by:

$$IC = (RN_{tot} - N_{cul}) / N_{tot}$$

Where: RN_{tot} is the total number of "real" nodes in the sample, a node being "real" when it has 3 or more converging links (not a cul-de-sac), and N_{tot} is the total number of nodes (including cul-de-sacs).

Meaning: IC represents the number of street intersections divided by the sum of the number of intersections and the number of cul-de-sacs. Therefore, the higher the ratio the greater the internal connectivity (Betanzo, 2009).

References: Betanzo (2009) applied internal connectivity to explore density and liveability relationships within three neighbourhoods; Newtown and Churton Park in Wellington, New Zealand , and Fairfield in Victoria, British Columbia, Canada, where again, the higher the index the higher the internal connectivity (Allen, 1997 and Song, 2003). A study by Song and Knapp (2004) conducted several quantitative measures of urban form for neighbourhoods in the western portion of the Portland Metropolitan Area. Their study found systematic changes in internal connectivity over time within the selected cases.

6.3.5 External Connectivity (EC)

Definition: The mean distance between (ingress/egress) points defined by all the intersections between all streets in the sample and the sample's boundary, as defined by:

$$EC = PL / P_{tot}$$

Where: PL is the total length of the sample's boundary (in the case of this study it is a constant = 1,600 m^2), and P_{tot} is the total number of ingress/egress points.

Meaning: EC represents the average distance between Ingress/Egress (access points), with a shorter distance representing a greater EC. The higher the number of ingress-egress points to the neighbouring urban fabrics, the shorter the distance between these accesses and, therefore, the greater the external connectivity (Betanzo, 2009). The index captures the level of "integration" of the urban area under scrutiny with the immediate urban context.

References: Betanzo (2009) applied EC to explore density and liveability relationships within two neighbourhoods in Wellington, New Zealand, and one in Victoria, Canada. The study shows that the Canadian neighbourhood has the greatest external connectivity as it has the smallest number of cul-de-sacs. Song and Knapp (2004) measure the urban form of different neighbourhoods in Washington County to study the progress of external connectivity over time, which showed that the external connectivity did not improve. At the same time, the land-use mix indicators suggested that the neighbourhoods remained fairly homogeneous.

6.3.6 Grid Pattern Ratio: Strong Pattern (GP_{strong}) and Weak Pattern (GP_{weak})

Definition: These indices measure the extent to which the street layout is "griddy", i.e. it approaches the configuration where streets define all the blocks converge into 4-ways intersections at each block's corners. The algorithm goes stepping block-by-block: if all the intersections at that block's corners are 4-ways then that block is defined "strongly griddy"; if all of them are 4-ways except one that is 3-ways, the block is defined "weakly griddy". In all other circumstances the block is defined "not griddy". This method of analysing the griddiness of street pattern has a strong relationship to block size and intersection density.

Meaning: Once all blocks have been assessed, the ratio of the case's area covered by strongly griddy blocks gives the value of strong grid pattern, while the analogous ratio of weakly griddy blocks gives that of weak grid pattern (Porta & Romice, 2010). Strong (GP_{strong}) and weak (GP_{weak}) grid pattern are:

$$GP_{strong} = A_{strong} / A_{tot}$$
$$GP_{weak} = A_{weak} / A_{tot}$$

Where: A_{strong} is the total area of blocks defined by all 4-ways crossings, A_{weak} is the total area of blocks defined by all 4-ways crossings but one 3-ways crossing, and A_{tot} is the total area of the sample (400 x 400 m^2).

References: Besides density and land use, Marlon Boarnet and Randall Crane, (2001) analysed the influence of gridded street pattern on travel behaviour and how that reduces the cost of non-workers automobile trips in San Diego. Michael Greenwald and Marlon Boarnet (2001) also applied the same method in analysing walking behaviour of non-workers pedestrian and non-work vehicle trip and how that reduces the total amount of driving time in the Portland, Oregon area. In addition, this indicator was applied during the Master of Science Course at the University of Strathclyde in analysing different neighbourhoods in the city of Glasgow, UK (Porta & Romice, 2010).

6.3.7 Ped-shed: Inner Ped-shed (PS_{inn}) and Outer Ped-shed (PS_{out})

Definition: Several of the previous indices measure factors indirectly, like the inner connectivity or griddiness, which have an impact on the ease of navigation in a neighbourhood and in reaching its centre. Ped-shed is a direct quantification of that: it measures the amount of land that it is possible to reach starting from the centre of the sample case and proceeding along all possible streets. It represents the percentage of the land (plots) that is accessible from the adjacent streets within a limited distance. The term “land” is intended here to be the built-up habitable area after excluding streets, large parks, rivers and all other undeveloped area.

Meaning: Ped-shed is a mapping technique that calculates the catchment areas within a five or ten minute walk from an activity, transport stop or node. PS is identified as a percentage of an accessible area that can be reached from a certain point along street network for limited distance in comparison with the area of a circle that has a radius of the same distance (Porta & Renne, 2005). The index calculated here is with reference to a distance from the centre of 200 m and 400 m. (inner and outer circles). Ped-shed, inner (PS_{inn}) and outer (PS_{out}) are:

$$PS_{inn} = BL200_{net} / BL200_{fly}$$
$$PS_{out} = BL400_{net} / BL400_{fly}$$

Where: $BL200_{net}$ and $BL200_{fly}$ are the built-up land accessible in 200 m from the centre respectively calculated along the network of streets and in a bird’s fly, while $BL400_{net}$ and $BL400_{fly}$ are the same but in a distance of 400 m.

References: This indicator is introduced in the study of a Western Australian Planning Commission (WAPC, 2000a and b), which sheds light on walkable catchments within 800 m, 400 m and 200 m. Evan Jones (2001) used this indicator to make a comparison between suburban development and traditional neighbourhood design in terms of walkability. Land Transport New Zealand (2005) included this indicator within several methods that measure walkability. Also Housing New Zealand Corporation (2002) included an assessment of a housing site in relationship to urban amenity. Hess et al. (1999) applied this indicator within twelve neighbourhoods in order to find the relationship between site design and pedestrian travel. Susan Handy (2011) applied this indicator to measure non-motorised accessibility and connectivity in regarding to the pedestrian network in the city of Davis.

6.3.8 Block Density (BD), Block Area (BA_{tot}) and Mean Area (BA_{mean})

Definition: These indices measure the blocks' amount, area and mean area per specific piece of land, where block size contributes the most in finding these factors.

Meaning: Block Density (BD) is the number of urban blocks within the total selected area. It is very simple method that relates to the calculation the number of blocks in a specific piece of land, as defined by:

$$BD = B_{tot} \text{ per } A_{tot}$$

Where: B_{tot} is the number of blocks included in the sample, and A_{tot} is the total area of the sample itself. Because this research chooses samples of the same size (400 x 400 m^2) the area is constant across samples, so this indicator is effectively analogous to the number of contained blocks.

Block Area (BA_{tot}) is the total area of all complete blocks that are located within the selected area, as defined by:

$$BA = A_{block} \text{ per } A_{tot}$$

Where: A_{block} is the total area of all the land developed in blocks, excluding streets, squares, parks, rivers and all undeveloped land, and A_{tot} is the total area of the sample.

Mean Block Area (BA_{mean}) is the total area of complete blocks divided by the number of the same blocks in the selected area:

$$BA_{mean} = A_{block} / B_{tot}$$

Where: A_{block} is the total area of all the land developed in blocks as above, and B_{tot} is the number of blocks included in the sample.

References: Paul Hess, Anne Moudon, Mary Synder and Kiril Stanilov (1999) in their study of several neighbourhoods all show that there is a clear relationship between mean block size and pedestrian volumes. Michael Reilly (2002) in his study that related to the influence of build-form and land use on mode choice in six neighbourhoods, found that block sizes and mean block area are smaller in older cities, larger in communities and huge at the urban edge, and therefore the block density is vice versa. Other authors, including Cervero and Radisch (1995), Frank et al. (2000) and Song (2003), applied block measurements, including block density, block area and mean area of blocks, in order to capture the connectivity capacity of a built environment.

6.3.9 Block to Street Ratio (BSR)

Definition: Block to street (BSR) measures the ratio between the area of blocks and the area of streets, where the blocks and the streets are the fundamental components of an urban structure (Porta & Romice, 2010). The definition of a "block" here relates to every developed land bounded by streets. The smaller the ratio, the greater the connectivity, where not only the street length has a great contribution to this value but also the street width has a significant influence on producing this ratio.

Meaning: The ratio between the urban block area and the street network area that is located with a given urban fabric, as defined by:

$$BSR = A_{block} / A_{street}$$

Where: A_{block} is the total area of all the land developed in blocks as above, and A_{street} is the total area of the land occupied by streets and squares.

References: This indicator is applied during the Master of Science in Urban Design Course at the University of Strathclyde in analysing different neighbourhoods in the city of Glasgow, UK (Porta & Romice, 2010).

6.3.10 Block Perimeter (BP)

Definition: According to Robert Cervero and Kara Kockelman (1997), and Dill (2004), Block perimeter (*BP*) is simply the total extension of blocks boundaries abutting on streets. Jennifer Dill (2004) states that block perimeter containing many shorter blocks provides more intersections, and thereby generates shorter travel distances and a greater number of routes between locations.

$$\sum (BP) = (BP_1 + BP_2 + \ldots\ldots + BP_n)$$

Meaning: The most basic prerequisite in building urban structure is to make a clear distinction between urban blocks and street network and to make these urban blocks easily reachable and accessible from the street network (Llewelyn-Davies, 2007). The block perimeter or edge is where the buildings are usually lined in order to provide good enclosure to a street, generate active frontage along streets, and animate the public realm. Accordingly, measuring the block perimeter is fundamental in studying the characteristics of an urban form. Block perimeter is also the predominant urban form that provides a strong definition between public and private domains (LEED-ND in USGB, 2008).

References: This approach was used by Cervero and Kockelman (1997) in studying the affect on trip rates and mode choice of residents in San Francisco Bay Area. Jennifer Dill (2004) applied this indicator to study the network connectivity in the Portland, Oregon region, as the travel demand is fundamentally shaped by the design of the built environment.

6.4 Findings: the Quantitative Analysis of the Street / Block Structure

In this section the research proceeds to a comparative analysis of results in two different ways: firstly it compares the three case study samples quantitatively as measured with the indices presented in this section (Tables 6.1 & 6.2). Secondly, it moves on to establish a link between the qualitative and the quantitative assessments. Looking at the quantitative comparison of the three cases that are observed, several main trends appear as the analysis proceeds from the Old Town to the Italian quarter and finally to the Garden City.

Measurement	Index	Unit	The Old Town (*)		The Italian Quarter				The Garden City (*)	
			A.V	%	Pedestrian		Vehicle		A.V	%
					A.V	%	A.V	%		
Intersection Density	*Number of cul-de-sacs*	*no.*	72	37	2	2	5	8	1	3
	Number of 3 ways nodes	*no.*	106	54	56	77	53	79	19	51
	Number of 4 ways nodes	*no.*	18	9	15	21	9	13	17	46
	Total number of nodes per unit area	*no.*	196	100	73	100	67	100	37	100
	Weighted number of nodes per unit area	*%*	194		155		128		88	
Street Density	*The total street length (L) per hectare*	*m/ha*	376		292		281		249	
Link-Node Ratio	*Total number of links (l) divided by the total number of nodes (n)*	*l/n*	1.24		1.69		1.73		1.97	
Internal Connectivity	*Total number of intersections (n_{total}) – the number of cul-de-sacs(n_{cal}) divided by the total number of intersections (n_{total})*	*(n_{total})-(n_{cal})/(n_{total})*	0.63		0.97		0.92		0.97	
External Connectivity	*Number of ingress & egress points (N)*	*No.*	24		16		16		17	
	Mean distance between ingress & egress points (d)	*m*	67		100		100		94	
Grid Pattern Ratio	*Strong grid pattern*	*ha*	0.65	7%	0.0	0%	0.0	0%	2.35	30%
	Weak grid pattern	*ha*	0.54	6%	0.89	10%	0.89	10%	0.86	11%
Accessibility	*Inner circle*	*%*		58		59		59		80
	Outer circle	*%*		57		68		68		58

Table 6.1: The quantitative results of the street structure within the three cases

(*) The Old Town exhibits only pedestrian movement while the Garden City does not exhibit any autonomous pedestrian movement, as all streets are shared by pedestrians and vehicles.

According to Table 6.1, and based on a chronological order from the Old Town to the Italian Quarter to the Garden City, the measurements of street network and block structure show the following:

In terms of street network:

- Intersection density decreases.
- Street density increases.
- Link-node ratio increases.
- Internal connectivity increases.
- External connectivity decreases.
- Grid pattern ratio increases.
- Accessibility increases.

In terms of blocks:

- Block density, block area and mean block area decrease.
- Block to street ratio decreases.
- Block perimeter decreases.

The analysis shows that the particular structure of the Old Town is heavily based on cul-de-sacs serving a fine-grained layout of inner plots. This is reflected in the relatively low *internal* connectivity, which is, nevertheless, remarkably countered by a relatively high *external* connectivity. The Old Town structure seems, therefore, to offer a high connectivity at the scale of the district, while preserving the privacy of spaces at the scale of the block at the same time (Table 6.1).

Although the somewhat convoluted layout of traditional pre-modern Islamic urbanism is well known, along with the link between this character and cultural/religious issues of privacy regarding the residential environment, this research proposes here that this popular understanding is appropriately interpretable only if different scales are taken into account. The message of an Old City working quite differently at different scales, i.e. in favour of the privacy at the scale of the block and quite the opposite at the scale of the neighbourhood / district, is further reinforced by the analysis of grid pattern (Table 6.1).

Despite the popular “labyrinthine” image that the traditional Islamic urban fabric has, the observation reveals that the Old Town offers a remarkably consistent level of griddy structure that is actually comparable (in fact slightly higher) to that of the Italian Quarter for the strong “griddiness” indices (Table1). This is surprising if one notes that cul-de-sacs account for the 37% of all intersections in the Old Town, and only the 5% in the Italian Quarter. At the same time, both the Old Town and the Italian Quarter are well below the Garden City in both the strong and the weak griddiness (Table 6.1) (Figure 6.4).

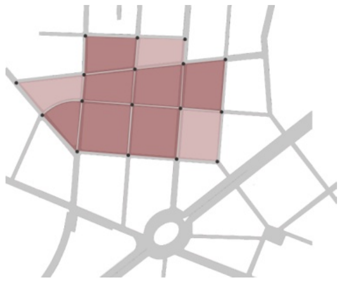
Indicator	The Old Town	The Italian Quarter	The Garden City
Grid Pattern Ratio	 ***Strong grid pattern***= 7% ***Weak grid pattern*** = 6%	 ***Strong grid pattern***= 0% ***Weak grid pattern*** = 10%	 ***Strong grid pattern***= 30% ***Weak grid pattern*** = 11%

Figure 6.4: Diagrams of strong and weak grid pattern

This result suggests that: a) the Old Town presents a consistent structure of griddy streets at the neighbourhood/district scale, which coexists with a cul-de-sac convoluted structure at the lower block scale that provides privacy and quietness. In short, the Old Town supports a double system, i.e. a labyrinthine structure at the block scale and a griddy structure at the district and town scale. And b) the Old Town and the Italian Quarter share several structural elements of traditional urbanism that represent historically the first expression of a different culture in city design, which are in fact lost in the Garden City.

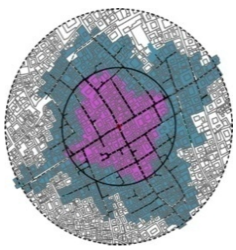
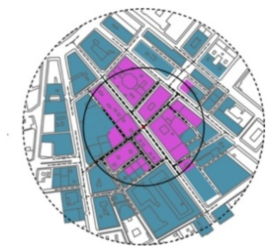
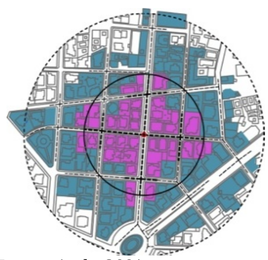
Indicator	The Old Town	The Italian Quarter	The Garden City
Accessibility	 *Inner circle 68%* *Outer circle 60%*	 *Inner circle 69%* *Outer circle 72%*	 *Inner circle 80%* *Outer circle 73%*

Figure 6.5: Accessibility percentage of the selected cases

At the block level, the Ped-shed analysis (Table 6.1) (Figure 6.5) shows that the block structure has an effect on land accessibility that complements the street layout. In the Old Town, where the block structure is dominated by a composition of many small plots, the accessibility is restricted at the edges of the block in order to prevent the block from becoming a public space and increase the private routes. Although the Garden City has the same principles of the Old Town in plot subdivision, the enlargement of plot size increases the accessible land inside the block. The Italian Quarter, on the other hand, has a different approach of designing urban block, where most blocks work as plots at the same time. These blocks are dominated by large buildings, yet provide a great degree of accessibility within the block to reach a large area of the block. In that sense, plot subdivision has a greater influence on accessibility than the structure of network or even the land use (Figure 6.6).

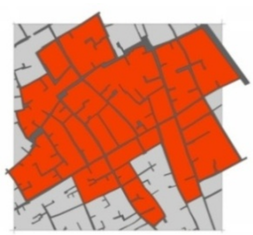
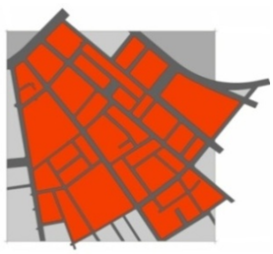
Indicator	The Old Town	The Italian Quarter	The Garden City
Block Density and Block to Street Ratio	 ***Block density***= 22 ***Block to street ratio*** = 6.6	 ***Block density***= 29 ***Block to street ratio*** = 3.2	 ***Block density***= 19 ***Block to street ratio*** = 3.9

Figure 6.6: Block density of the selected cases

Measurement	Index	Unit	The Old Town	The Italian Quarter	The Garden City
Block Density	*Number of blocks per unit area (N)*	*no.*	22	29	19
Block area	*Total block area (A_{block})*	*ha*	8.9 ha	9.3 ha	7.9 ha
Mean Block Area	*Total area of blocks divided by the total number of blocks (A_{block} /N)*	*m^2*	4052.9 m^2	3200.2 m^2	4161.5 m^2
Block to Street Ratio	*Total area of blocks divided by total area of streets(A_{block} / A_{street})*	*%*	6.6 : 1	3.2 : 1	3.9 : 1
Block Perimeter	*Length of blocks' perimeter per unit area (L)*	*km*	8.3 km	7.1 km	4.9 km
Mean Block Perimeter	*Total length of blocks' perimeter divided by the total number of blocks (L/N)*	*m*	337 m	245 m	259 m

Table 6.2: The quantitative results of the urban blocks within the three cases

The same interplay between the different scales of the city emerges if we look at their block sizes. The comparable size of the average block area in the Old Town and in the Garden City is accompanied by a quite significant difference in terms of average perimeter length and number of cul-de-sacs (Tables 6.1 & 6.2). In fact, cul-de-sacs allow access to a much finer structure of small plots directly from inside the block itself.

6.5 Linking Urban Structure and Character: Building the Link

The qualitative analysis of the three cases suggests that they exhibit very different social and economic characteristics: the Old Town is a highly sociable area for the local people while the Italian quarter is mainly a regional commercial hub, whereas the Garden City is a predominantly residential area with a low grade of social life. After a quantitative description of the urban fabric of the same three cases, only some of the formal indicators show alignment with the qualitative observations.

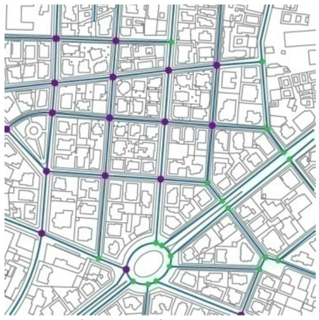
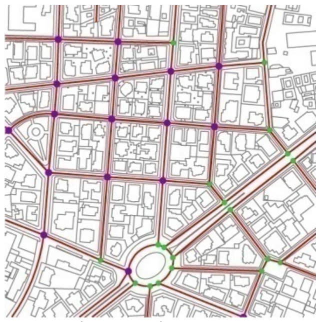
Indicator	The Old Town	The Italian Quarter	The Garden City
Network Layout of Pedestrian Movement	 ***Intersection Density***= 194 ***Total length of Streets*** = 6008 m ***Link-Node Ratio =*** 1.24	 ***Intersection Density***= 155 ***Total length of Streets*** = 4670 m ***Link-Node Ratio =*** 1.69	 ***Intersection Density***= 88 ***Total length of Streets*** = 3983 m ***Link-Node Ratio =*** 1.97
Network Layout of Vehicular Movement	 ***Intersection Density***= 194 ***Total length of Streets*** = 6008 m ***Link-Node Ratio =*** 1.24	 ***Intersection Density***= 128 ***Total length of Streets*** = 4502 m ***Link-Node Ratio =*** 1.73	 ***Intersection Density***= 88 ***Total length of Streets*** = 3983 m ***Link-Node Ratio =*** 1.97

Figure 6.7: Diagrams of pedestrian and vehicle networks

In terms of intersection density (Tables 6.1 & 6.2) (Figure 6.7), total length of streets, external connectivity and perimeter of blocks, the research shows that the Old Town prevails, while the Italian quarter comes second but still high, especially if the pedestrian network is accounted for, whereas the Garden city comes last. However, in terms of grid pattern ratio, internal connectivity and link-node ratio the opposite applies, with the Garden city scoring very high, the Italian quarter staying in between, and the Old Town with the least scores.

These apparently contradictory results are, at least in part, just revealing that city-form can work differently at various scales, which is particularly significant for the Old Town as discussed above. However, they also suggest that while the street layout and the city-form at large scale have an impact on social and economic dynamics that develop over time, other factors complement these relationships. This study suggests that, in particular, *density* and *centrality* play a major role in this. The case of the Garden city is heavily affected by a low density suburban model, which undermines the chances to gain a higher level of sociability in the public realm as well as a wider diversity of uses, despite the fact that elements of the street layout themselves would ensure sufficient potential.

The particular structure of the Old Town highlighted in this analysis shows that it is highly connected at the town/district scale and poorly connected at the block scale. This reflects the nature of its sociability, which presents a flourishing life of a local nature, while the Italian Quarter exhibits a more regional kind of social life. By night, the locally controlled character and the poor local connectivity of the Old Town's neighbourhoods make them less safe for the visitors, yet again other features of the Italian Quarter such as the larger width of the street section or the higher level of public lighting, certainly play a role in this picture.

As privacy is a major concern in shaping the urban fabric of the Islamic cities at the scale of the block, the combination of the street network and block structure of the Old Town creates a labyrinthine layout served by a main *still griddy* network. The finer structure that develops inside the blocks increases their quietness, and in return raises the sense of belonging (Bianca, 2000) and provides a convenient private common place for kids to play and neighbours to gather, keeping away from nuisance and the public nature of main movement. "*Dense residential quarters tend to swallow the street space and to convert it into private access corridors*" (Bianca, 2000, p37).

The high internal connectivity that characterises the Italian Quarter and the Garden City reflects different social and cultural values embedded in the layout of the neighbourhoods. In the same manner the high external connectivity of the Old Town is reflected in the wider section of the main streets, which are designed in order to functionally accommodate a higher variety of human activities and land uses. Moreover, the nature of main streets with regard to function and people's use, expresses Islamic values: following Prophet Mohammad, people "*should leave a road that is wide enough for loads and themselves to pass through*" (Mortada, 2003, p82). On the other hand, lower external connectivity in the Italian Quarter and especially the Garden City, results from the inward-looking tendency of their underlining planning principles, conducive to more self-sufficient urban fabrics.

The street hierarchy also shows relevant differences between the three cases. In as much as the relationship between private and public spaces is essential in the Old Town, the network system is organised at three hierarchical levels; alleyways (connecting a group of houses), local collectors (connecting neighbourhoods), and main roads (connecting districts). On the other hand, the griddy street network in the Italian Quarter and the Garden City only adopt two types of roads, as they were conceived with less attention to privacy issues than the Old Town and designed to suit different social and economic qualities in neighbourhood commerce and service standards.

Finally, the Ped-shed analysis (Tables 6.1 & 6.2) reveals that the three cases have different accessibility values between macro and micro-scales. Although the cases were built at different times to suit different historical circumstances, they show some similarity in terms of designing principles. The Old Town has the same quality of accessibility of the Italian Quarter at the block scale (the Garden City being much higher) while the Italian Quarter shares the same accessibility values with the Garden City at the neighbourhood scale (the Old Town being the lower). Moreover, it is obvious, both in the Old Town and in the Italian Quarter, that the way of arranging urban blocks and their position regarding to the main streets has a great effect on the accessibility.

From the area of blocks analysis, it is so obvious that the Italian Quarter has the smallest number of super-blocks among the selected case studies, where only seven out of twenty nine are larger than 4,000 m^2, while 50% of the rest are between 2,000 m^2 and 4,000 m^2 and the remainder are less than 2,000 m^2. On the other hand, the Old Town has a wide range of block area as its traditional built landscape contains the smallest block area (846 m^2) as well as the largest block area (13,000 m^2), whereas the urban fabric of the Garden City exhibits the largest average block area as sixteen out of nineteen are between 2,000 m^2 and 6,000 m^2 with only two bigger than 6,000 m^2 and one less than 2,000 m^2 (Figures 6.8).

Indicator	The Old Town	The Italian Quarter	The Garden City
Length of Blocks and Mean perimeter of Blocks	 ***Total perimeter of Blocks*** = 8.3 km ***Mean Perimeter of Blocks*** = 337 m	 ***Total perimeter of Blocks*** = 7.1 km ***Mean Perimeter of Blocks*** = 245 m	 ***Total perimeter of Blocks*** = 4.9 km ***Mean Perimeter of Blocks*** = 259 m

Figure 6.8: Diagrams showing the different block frontage of the cases

Throughout this analysis, it is apparent that the gradient in network structure and diversity in land uses plays a prominent role in shaping, sizing and producing urban blocks' proportions. The apparent emergence of cul-de-sacs in the composition of the network street within the traditional urban fabric leads to an increase in the size of urban blocks without adversely affecting the accessibility at the neighbourhood scale and diminishing the publicity around the private dwellings at urban block level. On the other hand, the land use within the Italian urban landscape, especially at the ground floor, enhances the number of urban blocks with the reduction in size and area in order to extend the perimeter of these urban blocks to accommodate the commercial use, where privacy is not very important and the residential use dominates the upper floors in general.

The quantitative study of 400 x 400m^2 area shows considerable variation between the selected urban fabrications; the pedestrian routes analysis shows that the Old Town has the longer length of streets and the highest numbers of nodes and links than the other two urban fabrics, while the street density of the Old Town is the smallest. However, the lowest numbers of nodes and links are found in the Garden City, which has the shortest length of streets, as the highest walkway density is proved to be in the Italian context. With regard to the vehicular analysis, the urban structure of the Old Town eliminates automobile movement from its streets, while the Italian context obtains the higher numbers of nodes, links and street density than the Garden City in terms of vehicular channels.

The quantitative study at the neighbourhood scale shows significant variation between the selected urban fabrications; the block area in the Old Town has the greatest variation, where the numbers of blocks and block to street ratio are higher than other two urban fabrics. The analysis of the Italian Quarter and the Garden City show the closeness in block areas, number of blocks and the ratio between block and network areas.

6.6 Conclusion

This study compares the urban form of three distinct areas in Tripoli’s city centre that have distinct origins in history, emerged through different process of formation and present nowadays social and economic dynamics of a quite different nature. The three areas have been identified as typical 400 x 400m^2 extract of traditional pre-modern Old Town, colonial age Italian Quarter and early modernist Garden City.

The three cases have been firstly described in a *qualitative* way as for their historical process of formation and current environmental and socio-economic condition through relevant literature and direct experience of places. Secondly, the form of their urban fabric has been investigated in a *quantitative* way by means of a set of indices selected with regard to the *street network* and the *urban block structure*. These indices have been drawn from literature reviews in urban analysis and morphology.

Results consistently indicate that the structure of the Old Town works differently at the scale of the block and that of the neighbourhood or district. In the first case it presents a typical convoluted configuration that relies heavily on cul-de-sacs, leading to relatively low internal connectivity and an urban environment orientated towards the preservation of privacy in residential areas. In the second case the Old Town exhibits a remarkable capacity to connect with surrounding neighbourhoods by means of a griddy street system, which offers a structure comparable with that of the Italian Quarter.

A second result suggests that while the Old Town appears at an immediate visual inspection to differ substantially from the later developments of the other two cases, in fact The Old

Town and the Italian Quarter are much closer to one another in terms of structure, with the Garden City standing out on its own featuring a profoundly distinct layout.

Differences in the structure of the urban fabric, however, are found to partially reflect local conditions only in terms of sociability, liveability, safety or economic vivacity as examined through the direct experience of places. While, for example, the Old Town today is a place utilised predominantly at the local level, which finds a correspondence in the labyrinthine configuration of its block structure, the highly interconnected layout of the Garden City appears to be insufficient to ensure an acceptable level of social life and quality to the public realm. This research suggests that factors such as building density and centrality of location, along with the impact of planning ideology behind the first generation of places, play a major role in complementing the spatial structure in supporting the various dynamics of urban life.

As the ongoing development within the city of Tripoli is failing to support the development of local spirit and maintenance of tradition (Akbar, 1988), the results of this study may contribute to the definition of guidelines for future developments, which will be responsive to local characteristics and identity whilst at the same time supportive of all aspects of contemporary life.

Chapter Seven:
Analysing the Street Front: Quality and Social Life

7.1 Introduction

Since morphological analyses measure the effectiveness of the street network and urban blocks, and show quantitatively how the urban fabric of Tripoli's city centre is accessible, permeable and interconnected, the street condition and its relationship with the surrounding building frontages is another issue that must be taken in consideration in order to promote street liveability and quality.

Within the original urban context of central Tripoli, in the traditional Old Town, Italian Quarter and the British urban fabric, as those places were developed in adherence to various urban principles and a rich architecture. The aim is to provide benchmark data for social life that might help to assess the quality of the streetscape and to discover if there is any link between urban structure and active living.

In this chapter, firstly, the selected cases are analysed in terms of their street pattern, with the support of MCA, in order to define the hierarchy of the street network and then the street length in each case study. Secondly, the street edges are determined in order to conduct an observation for assessing the quality of cityscape. This evaluation is used to determine the factor and length of different qualities along three types of streets: main streets, connecting streets and cul-de-sacs, within each individual case study. Thirdly, a survey is performed to understand community interaction, which takes place along certain samples of streets, in relation to human physical activities that are generated by social necessities including walking, standing and sitting. In order to quantify the street quality, this research first finds the length of different street types, based on the application of the Multiple Centrality Assessment, and then applies the quality front indicators in order to analyse the street edges. Afterwards, a multiple of *quality factor* with its *street front length* will lead to the production of what is called the "Quality Amount" in this study.

The relationship between socio-cultural practices and urban form has captured the interest of many researchers from different disciplines, including architecture, urban design, geography, archaeology, sociology, anthropology, psychology and ecology. Scholars are increasingly interested in understanding how the built environment influences human behaviour. The present research postulates that in order to understand any built environment, it is crucial to study the relationship between socio-cultural practices and urban form. An understanding of this relationship can be used proactively to influence particular behaviours, such as enhancing social interaction, which will eventually help in achieving urban form that is sensitive to local culture and patterns of space use.

This chapter starts with a discussion of how human behaviours reflect the surrounding public space. The concept of cultural sustainability is scrutinised in this study. It also considers the social values and their significance in the built environment, and includes a discussion on how the built environment has a communicative role. Moreover, it elaborates on how urban form symbolises and reproduces essential elements of cultural life, and how communicative properties can be manipulated. This section also includes a discussion on how the built environment can affect informal social interaction, and finally, moves on to discuss the interaction of the built environment with psychological concepts of personal space and territoriality. Further, it elaborates on how the built environment can serve to guide and discipline people. Lastly, this section uses the application of the MCA to measure the street centrality, which is later used in finding the relationship between the street centrality, the quality of the built environment and city life.

7.2 Characterising Street Hierarchy

Centrality is a useful tool that can be used to look at the physical urban structure of the city, its street quality and social life. This can provide a clear understanding of how people interact with their surrounding built environment. The MCA provides a flexible method of making a correlation between city form and life. Analysing the selected cases within the city centre of Tripoli helps evaluate how diverse the urban forms of these cases are and consequently, contributes to the understanding of urban morphological evolution. After identifying the historical evolution of Tripoli’s city centre, the MCA reveals the street network and highlights the most central parts of each case study. As stated previously, in Chapter Five, the MCA does not only find the most central parts of each case study, but it also identifies the hierarchy of the street network (Figure 7.1).

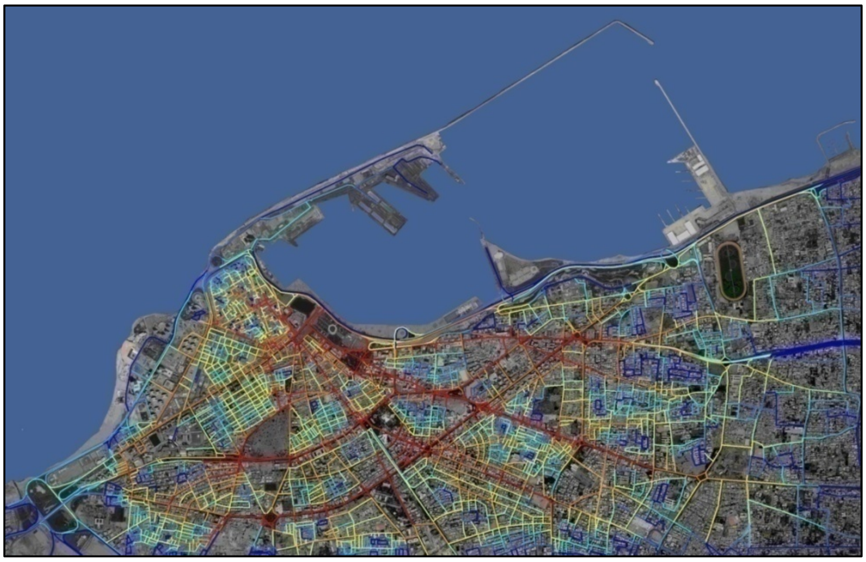


Figure 7.1: Applying the MCA on the existing urban fabric of Tripoli's city centre

The MCA analysis shows street hierarchy, where each street centrality degree has a different colour and therefore leads to determine the centrality of each case study. From the most central parts of the three different fabrics, an area of 400 x 400 m^2 is selected for further investigation in terms of physical urban structure, street quality and social life (Figure 7.2). The initial colours of the street hierarchy formed by the MCA are based on the street's importance within the structure of the overall network. The most significant streets within the network are marked in red and orange, while the moderately important streets are marked in yellow and green, and the least important streets are marked in light and dark blue. In order to make the street hierarchy clear to investigate, these colours are converted into three colour groups depending on the outcome of the MCA.

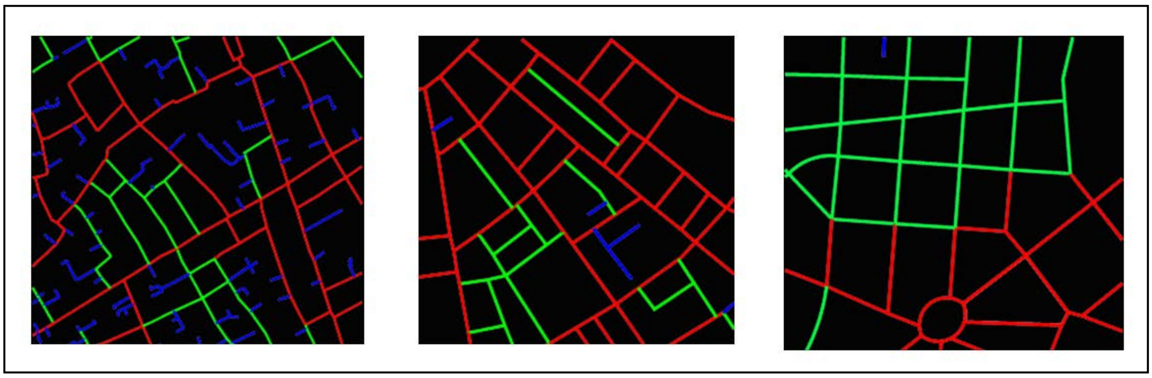
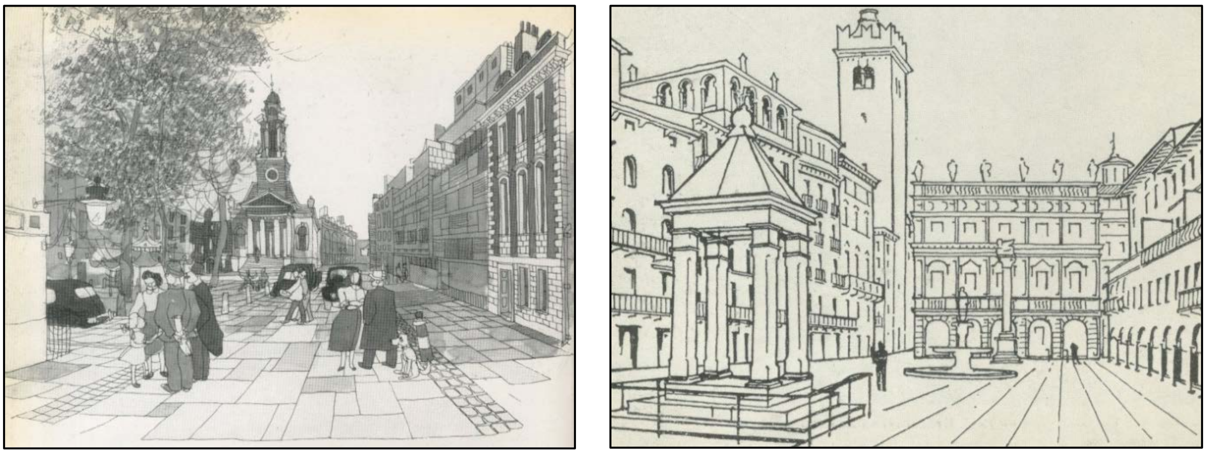


Figure 7.2: The Betweenness analysis

In the research analysis, the red and orange colours, which indicate the primary or main streets, are joined together and become red, the yellow and green, which indicate the secondary or connecting streets, are joined together and become green, and finally the light and dark blue, which indicate the local streets and cul-de-sacs, become one shade of blue.

7.3 Measuring Front Quality: Indicators Defined

From the perspective of urban sociologists, the spatial patterns of urban form are translated into social relations, as stated in the “transcendence of place” (Coleman 1992), and the “placelessness of place, Edward Relph” (Seamon & Sowers, 2008). It also states how place becomes with modernity “phantasmagoric” (Giddens 1990). Modern developments are greatly criticised for their negative effect on social behaviour. In her seminal work, *The Death and Life of Great American Cities,* Jane Jacobs clearly identifies the most liveable neighbourhoods as those which are linked to higher densities, a diversity of uses and have a significant public domain, where people are attracted by the streets and promote community interaction (Woolcock & Narayan, 2000).



a) By Gordon Cullen, 1961, p.122 b) By Camilo Sitte, 1965, p.124

Figure 7.3: Main principles in achieving the relationship between built environment and social life

Gordon Cullen (1961) indicates that the quality of the built environment can be observed through urban morphological and architectural structure. However, the actual physical quality of these spaces is a consequence of social activities and local environment characteristics, which can be observed through the reciprocal interaction between urban spaces and the surrounding edges that form them (Figure 7.3a). According to Henri Lefebvre (1991), communities always have a relationship with the surrounding built environment as a whole, where urban form is developed according to changes of social life. Public spaces, in any city, play a major role in an urban area, as they provide a variety of functions which encourage the usability of public spaces and increase the quality of life.

In addition, and in order to identify the link between the built environment and the surrounding open spaces, Camilo Sitte (1965) states that modern city planning has inverted the relationship between built environment and public spaces. Historically, open spaces, streets and squares, as urban elements, led to create a compact, coherent and liveable urban form (Figure 7.3b), while nowadays the building plots are arranged as regular, self-sufficient shapes, and whatever is left becomes a square or a street. Ian Bentley (1999) notes that by studying three basic components: character, structure and the importance of public spaces, a clear picture of the existing condition of the city can be obtained. The role of these spaces is not only to establish an environmental quality, but also the necessary psycho-social relations in a society.

The space between the building façade and the public sidewalk is an essential part of the image and the character of a street, and is dependent on positive interactions between ground floor uses and the public sidewalk. Urban block edges have to be integrated with their surrounding context in order to enhance the quality of streetscapes, where the relationship between a street and its buildings plays a major role in fulfilling and achieving this task.

The quality of the building façade that edges the pedestrian path is a very significant feature that influences the quality of an urban area. The streetscape quality at the ground floor is the main concern of this section, as it has a direct relationship with the sidewalk and therefore with the people. Rich and detailed building frontages are exciting and interesting for walkers, and provide places where they can enjoy looking, touching and standing activities. Additionally, a variety of activities within buildings that are directly connected to the sidewalk increases the attractiveness of the street edges and enriches the link between indoor activities and those occurring in public spaces. During the night, shop windows play a major role in creating a lively environment and increasing a sense of security by shining a very pleasant light through their windows. Interesting ground floor façades also provide good motivation for walking, standing and sitting.

Since people passing by or using public spaces are mainly attracted by the street edges at the ground floor, the ground floor frontages are much more important than the upper levels of the building façade, in the creation of lively streets. This analysis adopts the approach of Gordon Cullen (1961), Jan Gehl (1987, 2002, 2004 and 2010) and Ian Bentley et al. (1985), whereby several indicators are addressed to quantify the physical fabric of the built environment. These inspired criteria are applied to different parts of Tripoli's city centre in order to assess, measure and understand the quality streetscape within each case study.

7.3.1 Number of Units (S)

Places that provide a wide range of units at the ground floor offer their users more choices and increase the relationship with the public domain, giving these places a quality of robustness unlike places that have fewer units (Bentley et al, 1985). As stated by Jan Gehl (1987), the street frontages become more interesting and attractive when a large number of units with many entries in a short distance are installed. Commonly, more doors and windows on the same wall mean more visibility and accessibility between the street and the interior spaces, allowing mutual improvement between inside and outside spaces (Gehl, 2004).

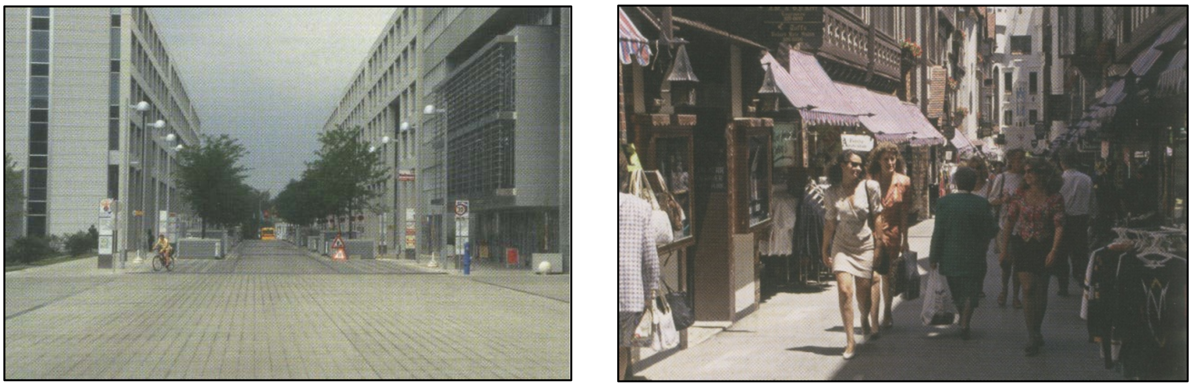


Figure 7.4: Increased street liveability in areas with more street units (Gehl, 2010, p52 & 53)

Just as the number of units positively correlates with the number of users, the potentiality of liveable outdoor spaces is also affected by the number of adjacent units at the ground floor (Figure 7.4). In addition, the number of units at eye level has a great potential to contribute to the activities taking place in outdoor spaces, where there are more doors and higher density of people. This significant contribution provides visual contact and flexible accessibility for users to increase the attractiveness of a place (Bentley et al., 1985).

Figure 7.5: The effect of the quantity of units on social efficiency (Gehl, 2010, p87)

The quantity of units at eye level that are accessible for people who are passing by buildings is an important factor in influencing the attractiveness of a street and consequently, the street's social activities (Figures 7.5 & 7.6). The most motivating frontage is a result of a wide range of uses. The mix of uses is actually the key to delightful streets and establishing liveable city space in order to attract people and increase their stay (Figure 7.7). Regardless of land use, increasing the number of units on a single street will boost the usability and liveability of outdoor spaces, as the majority of users will find the adjacent public space safer and more secure and to eventually become a living public room (Gehl, 1987, 2010).

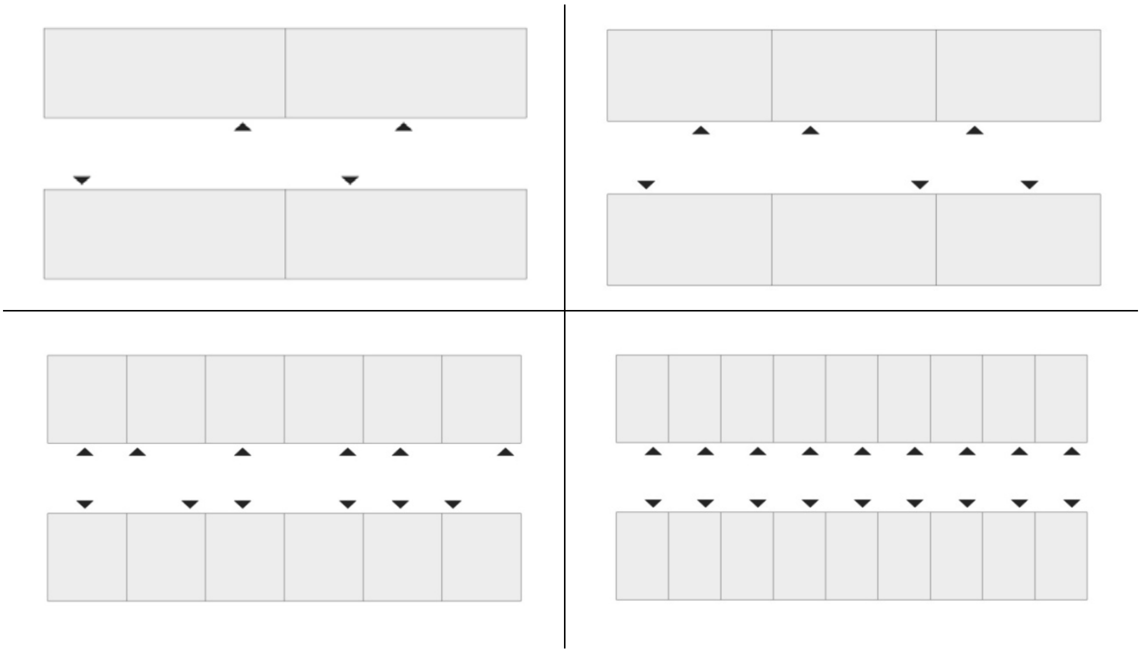


Figure 7.6: How number of units and doors affects street liveability and social efficiency (By the Author)

Figure 7.7: Large and small units along streets (Gehl, 2010, p64)

Within a residential neighbourhood, many small, attached units are valuable in creating a public space that is more liveable than several large units, in terms of generating a public life. This approach of designing the streetscape will increase the presence of people in public spaces, and those people will attract others to further advance the social life and participation in different activities. Children, in addition, tend to play more in public spaces near the entrance of dwellings, where most activities occur, and where the feeling of safety, belonging and supervision exists.

7.3.2 Diversity of Functions (F)

The benefit of ensuring a mix of activities in the urban fabric is the promotion of urban spaces, which create stronger perceptions between the built environment and social behaviour. A well-functioning urban form does not only have a properly connected and accessible street network, but it also provides services and facilities that meet the residents' day-to-day needs within a convenient walking distance, and where a strong sense of place and community is achieved (Whyte, 1980).

The diversity of land use at the ground floor significantly influences the liveability within public domain. Using land use as an indicator to measure the quality of city life is a main factor in understanding the quality of environment and its performance. As stated by Potschin (2009), enhancing the mixture of land use at street level improves the quality of city life.

A mixture of land uses and building design is another matter influencing the collective social behaviour, where diversity provides opportunities for a wide range of people to participate in these spaces. These features will promote different degrees of people's inter-personal interactions, while pursuing their needs and desires, thereby enhancing their sense of personal experience and value (Butterworth, 2000). Jane Jacobs (1961) surveys the reasons for making city street life more lively and vibrant. She emphasises short street blocks, diversity in building type and morphology, density, occupation and usage as key elements in generating a mixture of land use and social lives (Montgomery, 1998).

"*promoting mixed-use development is essential to our planning approach: it brings new life back into our towns and cities, enhances our quality of life and character of place and creates patterns of development that we can sustain in the long run*" (English Partnerships, 1998). Although permeability increases the choices of accessible places and promotes the number of alternative ways through an environment, this great achievement is only realised when this experiential choice is linked with a variety of uses. "*Variety of use is therefore the key to variety as a whole. It must be considered early in design*" (Bentley et al., 1985, p27).

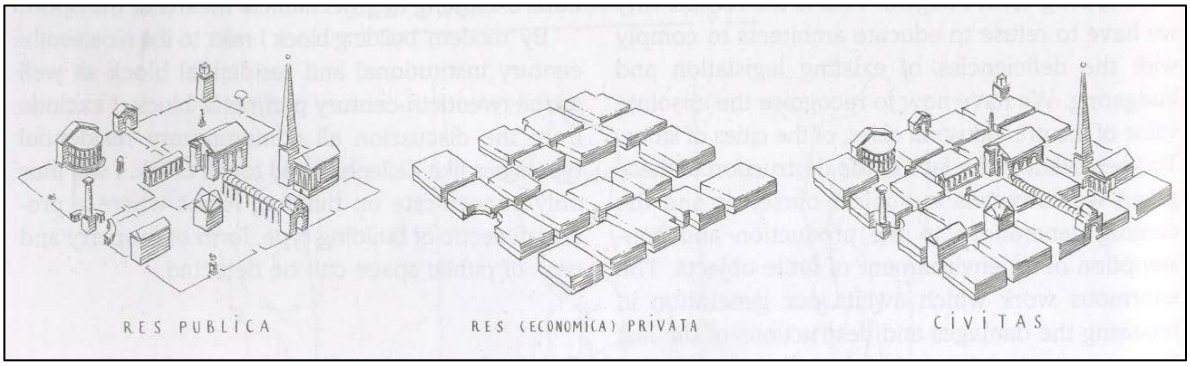


Figure 7.8: Urban components and diversity of uses (Krier, 1984 in Larice & Macdonald, 2007, p242)

A wide range of mixed shops, residences and workplaces creates the most stimulating frontage. Street edges that accommodate different activities improve the degree of interaction with the public domain, which therefore supports the social life in the public space (Figure 7.8). Different indoor activities and a diversity of uses stimulate the associated public spaces and make these open spaces more liveable and convenient for meeting, relaxing, having a conversation with an acquaintance or interacting with people and performing different social activities. Because of the attractiveness of mixed-use environments, people tend to participate in community life by socialising at the edges of the sidewalk instead of just passing by reach their destinations. Moreover, the success of a sidewalk is to connect all the different uses at the ground floor and enhance the attraction of the edges of the fronting buildings (Kent, 2000).

If the built environment is to serve human purposes, one must have a good model of human needs to use as the basis for asking questions about what should be done, what functions should be served in a specific circumstance (Lang, 1994, p215).

Since public spaces are considered to be a stage for city life, that create a sense of community, understanding of place, and a feeling of local identity, the public domain will become even more meaningful for people through its different functions and activities, as well as through people's day-to-day interaction (Carr et al., 1992). Streets are important in structuring public domain because they provide a setting for activities and amenities that attract people to city sectors and encourage social contact. A diversity of uses does not only define the edges of vertical surfaces in outdoor public spaces where people pass through, but it also creates a place for people to congregate and a place for strolling, standing, sitting, chatting or watching the world go by (Clare & Barnes, 1999).

Besides providing a set of physical conditions, William Whyte (1980) indicates that a well-designed public space must be functional and generate public participation and social inclusion. He defines dynamic public spaces as those that are full of mixed-use and that are regularly visited. Communities may engage passively with the environment when people observe others while pursuing their own needs. In other words, functional and physical attributes characterise public spaces and manipulate people's relaxation and enjoyment, as well as influence people's behaviour and experience (Figure 7.9).

Figure 7.9: Diversity of functions along street fronts (Gehl, 2010, p76)

It is important to examine needs, not only because they explain the use of places but also because use is important to success. Places that do not meet people's needs or that serve no important functions for people will be underused and unsuccessful (Carr et al., 1992, p231)

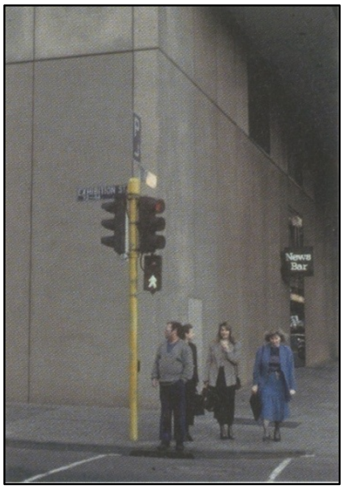
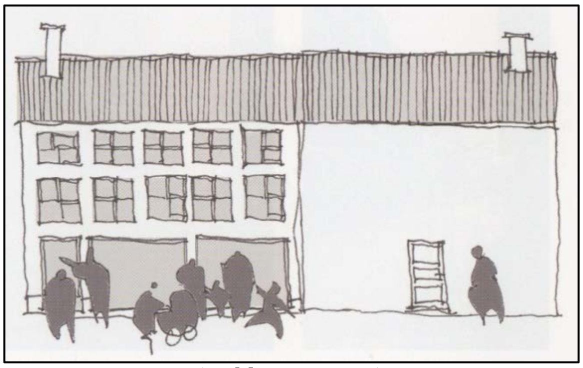


Figure 7.10: The performance of street edges (Gehl, 2010, p80)

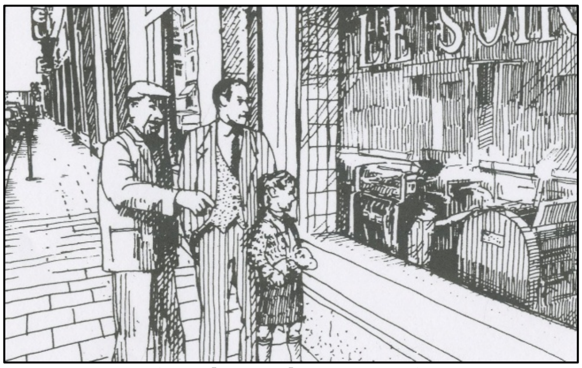
In addition, Pierce et al. (1997) find that creating positive public spaces and active community participation requires a clearly redesigned programme based on people's requirements, while avoiding inappropriate management programmes. This approach is not just to seek out diversity in public use, but also to achieve a degree of attractiveness in these uses, in order to enrich the built environment. Accordingly, the attractiveness of uses and activities is the main reason for increasing the usability of public spaces, whereas if these activities are absent, a place will become deserted and unoccupied (Figure 7.10).

7.3.3 Openness and Interface of Street Front (O)

The interface between public environment and private spaces has a significant influence not only on the liveability of streets, but also on social behaviour. Even though this phenomenon creates a mutual interaction between those spaces, it is too often ignored during the urban design process. The manner of designing the external walls of buildings plays a major role in producing a more structured public domain, not in the traditional sense of street structure, but in terms of a hierarchy of spaces, providing a place and link, leading from public to private and accommodating a range of public activities (Figure 7.11). Defining the boundaries of interior spaces gives a clear indication that a place is completely private, or under private ownership but for public use. These could be shops, cafés and buildings' lobbies. Thus, the liveability of streets is enhanced by the relationship between interior and exterior spaces and their configurations (Anderson, 1991).



(Gehl, 2010, p79)



(Bentley et al, 1985, p58)

Figure 7.11: The effect of transparent edges on pedestrians

The potential for enhancing the liveability of outdoor spaces always depends on what occurs in the adjacent spaces on the ground floor. Some activities that occur within indoor spaces, and at eye level, can contribute to those occurring in outdoor spaces, by increasing the number of openings or transparent surfaces. Also, light shining onto the streets from night uses contributes to a feeling of security and produces genuine safety (Gehl, 1994).

The performance of buildings attached to public spaces at the ground floor is an important aspect in terms of creating interactions between the interior and exterior domains. The transparency of street edges is one of the main determinants in controlling social interactions, which creates a relationship between the usage of indoor spaces and the social life of outdoor spaces. Therefore, the most significant purpose of establishing active edges along the city streets is to guarantee that ground floor façades appeal to pedestrians and produce appropriate lighting and a variety of interesting activities (Gehl, 2002).

Downs and Stea (1973), state that liveability is a combination between indoor and outdoor spaces, as well as social competence. Regardless of the level of activity on a building’s ground floor, the outdoor public spaces are crucial for public life. Zoe (2003), states that a close link between interior and exterior spaces reduces rigorous control and autonomy, and easily offers supervision to the surrounding built environment. In contrast, isolated internal spaces and restricted independent areas, negatively affect this relationship, causing the opportunities for socialising to fade.

The quality of visual contact between indoor and outdoor spaces also influences social interaction, and affects the patterns of individual route choices and movement behaviour within transition spaces (Gibson, 1950 and Chang, 2002). Moreover, a visual connection between indoor and outdoor spaces is a significant matter in increasing visual information and social contact (Chang, 2002).

7.3.4 Façade Modelling and Condition (M)

The condition of buildings and their impact on viewers has been seen as a significant factor that influences street livability (Darke, 1982; Francescato et al., 1979; Kaplan et al., 1998 and Marcus & Sarkissian, 1986). The importance of visual perception for architects, understanding the nature of what one sees and how one perceives it, and knowing about the potential influence of building condition on human thoughts and feelings, has already been highlighted by the architect Walter Gropius (Porteous, 1996).

The quality of street fronts is essentially related to the process of visual perception, which deals with the visual stimuli generated by the condition of architectural elements. It is also the result of physiological processes based on biological principles inherent to human beings (Weber, 1995). Visual perception is dominant when compared to perception through the other senses hearing, smell, and touch (Tarcísio et al., 2012). The condition of the surrounding built environment is one of the most important factors in integrating to the social dimension (Wiesenfeld & Giuliani, 2002).

Buildings that face public spaces are the most essential urban components in structuring built form: their façades increase the attractiveness of a city. Flat façades with abstract surfaces do not enrich the street quality, whereas façades with articulated elements and detailed finishes increase the quality of the public domain. An attractive built environment positively contributes to social interaction, as a result of its appropriateness and effectiveness in serving the requirements of both businesses and public facilities (Davies, 2007). Because building scale and massing is a significant aspect that affects the adjacent public spaces and social behaviour, large buildings could be more attractive to the public realm by preserving human scale at street level, by using techniques for adding visual interest and mitigating a building’s visible mass and scale (Figure 7.12, left) (Krier, 1984).

Marusic et al. (2012) suggest that the richness of the urban domain is enhanced by adjacent façades that are architecturally subdivided and defined at both the ground and upper floors. This form of modulation or articulation promotes visual interest and a comfortable, pedestrian scale, which is meaningful and significant for traditional pedestrian-oriented shopping and residential neighbourhoods. Buildings' ground floors would be more liveable by providing multiple, individual units with a regular pattern of entrances along the street, instead of being dominated by large, individual units (Figure 7.12, right). Articulation of building volumes and changes in fenestration patterns are the best strategies for varying façades and defining distinct modules (Krier, 1984).

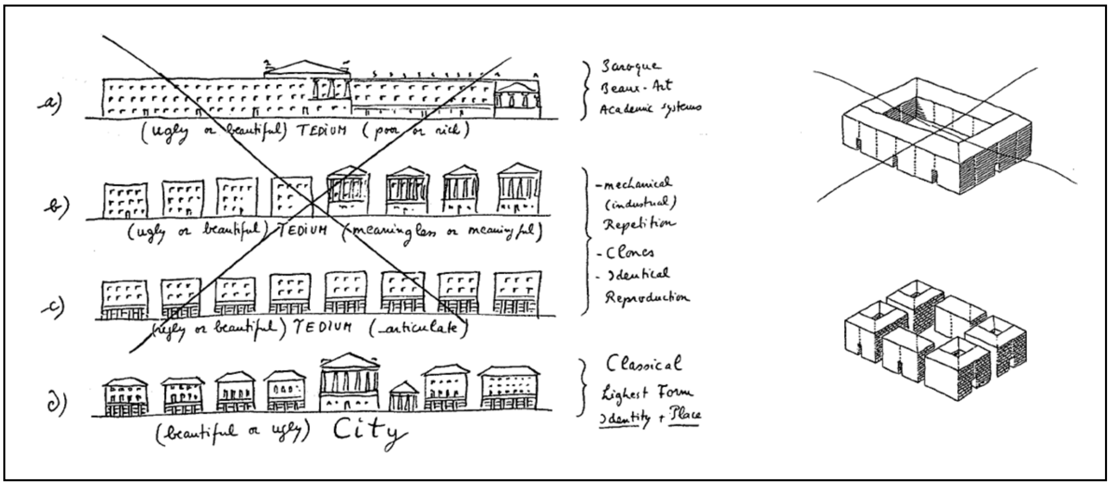


Figure 7.12: The relationship between blocks and streets (Krier, 1984 in Larice & Macdonald, 2007, p248 & 249)

In general people enjoy passing by, looking at, touching or even standing beside rich ground floor façades, especially those with valuable details. Further, streets can be enriched through the positive interaction of activities that occur inside the buildings, and those taking part on the adjacent streets. A relationship between the ground floor and the street could also be achieved during the night, when the responsive light of the shops' windows promote a sense of safety and liveability. Blank, unwelcoming walls, on the other hand, negatively affect the attractiveness of city streets and make the urban fabric a place of monotonous service activities, which is only used by passing cars (Jan Gehl, 1994).

Apart from increasing the architectural quality of the buildings, a qualified view is often a basis for preferences and choices of recreational and residential places, as well as a reason for increasing the economic value of such places (Amedeo, 1999). This seems to be the case, as views to parking plots, blind walls and monotonous façades have caused a negative impact (CIBSE, 1987; Clare Marcus & Wendy Sarkissian, 1986; Lang, 1987b and Nasar, 1994).

7.3.5 Façade Details and Materials (D)

As stated by many urban scholars, the physical environment affects the behaviour and social interaction of the people who reside there or who pass through it. The value of the physical urban space, visual features of the streetscape and building details, all affect the quality of the interaction between urban users. As indicated by Lynch (1960), Weisman (1981), Peponis et al. (1990), Krier, (1984), O'Neill (1991) and Zeisel (1984), architectural legibility, spatial identity and building details manipulate the social behavioural characteristics of a physical setting.

An ideal composition of urban blocks and street networks, for any urban fabric, is not alone adequate to improve the quality of the streetscape, as the extent of outdoor activities and the quality of building frontages also greatly influence the character of an urban fabric. *"just as it is possible through choice of materials and colours to create a certain palette in a city, it is equally possible through planning decisions to influence patterns of activities, to create better or worse conditions for outdoor events and to create lively or lifeless cities*" (Gehl, 1987, p33).

Additionally, through the implementation of vertical architectural elements, the introduction of decorative details and the change of building materials and colours, the variability in street edges, can increase. Jan Gehl (2002) advocates that blank wall surfaces could be valuable elements to the public domain, if their creation and composition lead to maintaining building façades with consistency and character.

The liveability of urban spaces is not only enriched by the primary consistency of main building façades, but also by the articulation, detailing and finishing of all the visible elevations of a building that play a major role in increasing the quality of the public domain. The pattern, rhythm and proportion of these elevations create a harmony in the edges of the public domain, where their materials, colours and details increase and enrich the quality of the enclosed public space. Architectural details, including vertical and horizontal façade variations, materials and window treatments shape a building's visual identity, while the mass of the building already defines the street edge. Buildings may enrich the quality of the built environment by providing appropriate views as a part of the closest level to the pedestrians (Davies, 2007).

The public realm is a space that is created by the external face of buildings, where their architectural quality characterises its spatial domain. Therefore, good public spaces require an appropriate composition of building elements, texture, materials and colours, and reflect function and structural design of a development as a vital part of daily urban life (Figure 7.13). In addition, the appearance and apparent scale of any public space are affected by the composition and detailing of the surrounding building fronts (Sitte, 1945).

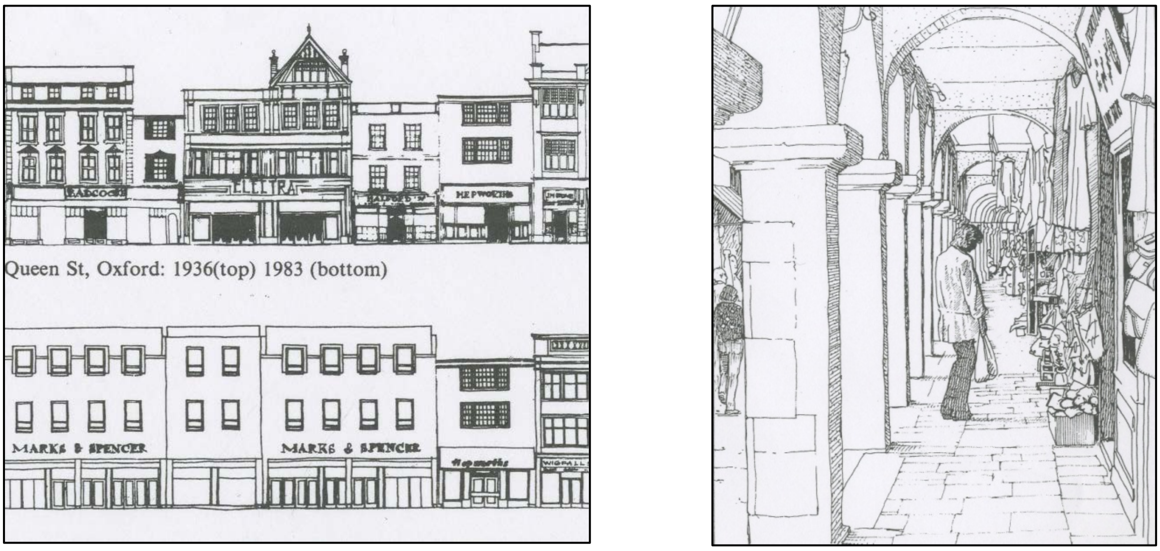


Figure 7.13: The attractiveness of façade modelling (Bentley et al., 1985, p28 & 59)

Because façades are the main elements of establishing a chain of public domains within a single neighbourhood, the main characteristics of this urban fabric could be a result of these façades. The consistency between elevation components such as entrances, display windows, canopies, cantilevers, balconies and architectural details participate effectively in animating external walls, activating the streetscape and establishing a pleasing sense of order and proportion (Gehl, 1987).

The objective of this analysis is to use a subjective measurement in evaluating the visual quality of different urban forms within the city centre of Tripoli. The study focuses on street fronts of different street types, the role they play in shaping public space. The study also includes an analysis of the significance of street façades. The perimeter of an urban block is fundamental in the interpretation of the urban fabric of Tripoli.

7.4 Determining Street Quality

As stated in the previous section, by using the MCA analysis the network of each piece of urban fabric can be classified into three types of streets; main streets, connecting streets and cul-de-sacs. The AutoCAD programme is used to measure the total length of each of these street types (Figure 7.14).

Figure 7.14: Street types in each case study, based on the MCA

From the street length table, it is clear that the Old Town, with 6,008 linear meters, has the longest street network. The Italian Quarter comes second with 4,502 linear meters, and finally the Garden City with 3,983 linear meters. The Old Town has the same percentage of main streets as those in the Garden City, although the actual length of the streets in the Garden City is shorter than the traditional main streets in the Old Town. Within the Italian Quarter, there are more main streets than any other typology: they represent 71% of all the streets in that neighbourhood totalling 3,194 linear meter. The street network of the British urban fabric is dominated by connecting streets that constitute 52.7% (2,101m) of the total. This type of street occupies about one quarter of the street network in the other two cases with 22.4% and 24.5%. As cul-de-sacs are the main component of the traditional street network, their presence exceeds the total length of connecting streets by 6%. However, the presence of cul-de-sacs almost disappears in both the Italian and British urban forms, with only 4.5% and 0.7% respectively, of the total network structure (Table 7.1).

Neighbourhood	Main Streets	Connecting Streets	Cul-de-sacs	Total Street Length
The Old Town	2,715m 45.2%	1,589m 22.4%	1,704m 28.4%	6,008m 100%
The Italian Quarter	3,194m 71.0%	1,103m 24.5%	205m 4.5%	4,502m 100%
The Garden City	1,858m 46.6%	2,101m 52.7%	24m 0.7%	3,983m 100%

Table 7.1: Street length of the case studies

As street quality primarily relates to street edges, rather than the street itself, an analysis is carried out to determine the quality of street fronts of the selected cases. The edges of the street give much of the context and character of the street, and host different activities that occur along the street. Following the MCA analysis in discovering the hierarchy of street network, the street edges of the different street types are identified and delineated using AutoCAD (Figure 7.15).

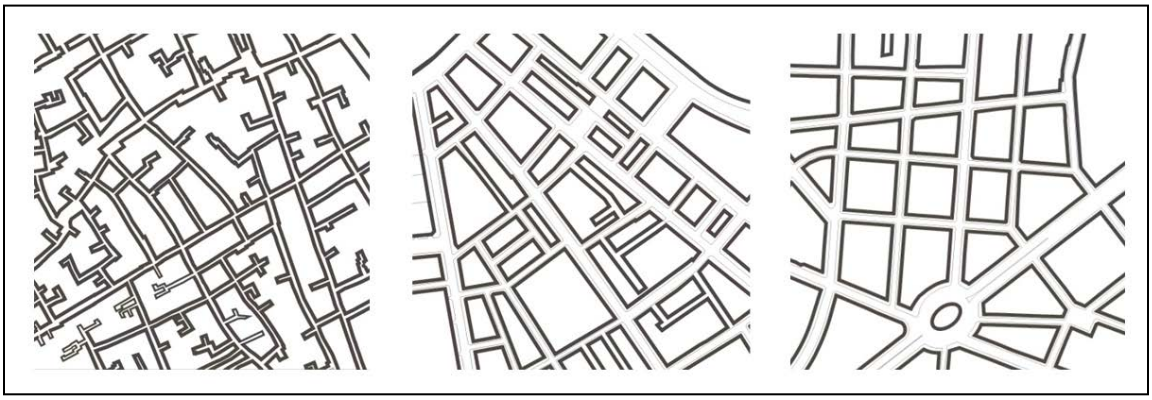


Figure 7.15: The identification of street fronts in each case study

From the table of street front lengths, one can see that the Old Town, with 11,828 linear meters of streets, has the longest street network and consequently the longest street edges. The Italian Quarter comes in second with 7,940 linear meters, while the shortest overall length of the network is the Garden City, with 6,709 linear meters. The main street boundaries in the Old Town and the Garden City constitute a similar percentage of the total, even though the streetscapes of the traditional fabric are double those of the British neighbourhood. In the Italian neighbourhood, main streets have the longest total street edges (6,024 m), which is 67.8% of the total street edges. The British urban fabric has the longest street edges located on connecting streets, with 56.6% (3,798 m). Almost one quarter of street edges in both the Old Town and the Italian Quarter surround the connecting streets, constituting 26.6% and 27.8% of the total, respectively. As cul-de-sacs are the main component of the traditional street network, the length of their street fronts is significantly higher than in the other two cases. This presence of cul-de-sac fronts is very low in the Italian and British neighbourhoods, forming only 4.4% and 0.8% of their total network boundaries (Table 7.2).

Neighbourhood	Main Streets	Connecting Streets	Cul-de-sacs	Total Street Length
The Old Town	5,326m 45.0%	3,146m 26.6%	3,356m 28.4%	11,828m 100%
The Italian Quarter	5,387m 67.8%	2,209m 27.8%	344m 4.4%	7,940m 100%
The Garden City	2,858m 42.6%	3,798m 56.6%	53 m 0.8%	6,709m 100%

Table 7.2: Street front length of the case studies

"*Public spaces and the parts of the community visible from public spaces represent the primary areas of concern for city design, though these places have many features, the noticeable features have the most relevance*" (Nasar, 1998, p26). This analysis adopts the aforementioned standards for determining a *quality factor* along street edges of each case study. These quality standards mainly depend on five indicators: number of units and doors (S), diversity of function (F), interface between indoor and outdoor spaces (O), maintenance and condition of exterior walls (M), and details of street fronts (D). The application of this study uses indicators step-by-step along street edges in order to understand the street front quality. The study observes the number of units and doors, including their land use along these elevations, as well as the interface between interior and exterior spaces, and analyses how these indicators affect the efficiency of street edges at the ground floor. The investigation also focuses on the condition and maintenance of exterior walls, as they play a major role in increasing street attractiveness. Finally, the composition of façades, in terms of colours and details, is included in this study.

Rapoport (1993) states that researchers should examine theoretical hypotheses in a systematic way, in order to avoid biases, and that they should develop observable indicators to compute aesthetic values of selected samples. The method developed here intends to define and evaluate the levels of quality of street fronts, which rely mainly on systematic empirical observations. This systematic study is intended to avoid biases in examining different built environment and evaluating the collected data (Rapoport, 1990). This study approach emphasises the importance of the relations between the building and human perception, as well as between various parts of the building and the surrounding setting. This analysis has considerable value in understanding the nature of individual experience as related to the quality of built environment (Rapoport, 1982).

According to the psychologist Fechner (1876), visual quality could be studied scientifically to disclose a quantitative foundation of likeability. Recent studies have proved that a strong consensus relating to the preferable built environment presents quantifying patterns for design decisions (Kaplan & Kaplan, 1989; Nasar, 1988 and Purcell, 1986). Public policy in the United States has recognised the significance of the quality of built environment and its visual perception to the users. Architect Eric Zube (1980) notes that following a quantitative approach in studying the visual image of the city can provide reliable and practical data for planning, designing and managing desirable built environments.

Through different research strategies and methods, the psychologists James Russell and Larry Ward create four dimensions of measuring the visual image of the built environment: pleasantness, arousal, excitement and relaxation (Russell & Snodgrass, 1989; Ward & Russell, 1981). Meanwhile, Linda Groat and Carole Despres (1990), Jon Lang (1987b) and Joachim Wohlwill (1976) evaluate the visual image of the built environment by applying formal variables in measuring the characteristics of physical properties and relationships. These variables relate to shapes, proportions, rhythms, scale, colour, shading, geometry, hierarchy, spatial relations and order.

Jan Gehl uses these indicators to quantify the built environment in different places in Melbourne (1994 and 2004) and Saskatoon (2011), which led to the production of a variety of quality classifications. These classifications present the evaluative image of façades in different quality dimensions. Jan Gehl’s classification includes seven dimensions: *exciting*, *attractive*, *pleasant*, *average*, *dull*, *unattractive* and *mean*. However, this research only considers and applies five of Gehl’s seven indicators of criteria:

- *Attractive* quality represents small units, many doors (S) and a large range of functions (F). It shows good value of openness and no blind walls (O), with interesting façade modelling and good condition (M), high quality of materials and refined details (D).
- *Pleasant* quality represents relatively small units (S) and a diversity of functions (F). It shows few passive façades (O) and some depth in modelling with good condition (M). It also shows a good quality of materials and reasonably good details (D).
- *Average* quality represents a mixture of small and large units (S) and some diversity of functions (F). It shows a very few passive façades (O) with an average condition and very little depth in modelling building surfaces (M), standard materials and few details (D).
- *Dull* quality represents large units with few doors (S) and little diversity of functions (F). It shows predominantly blind or passive façades (O) and flat building surfaces with poor conditions (M) and few or no details (D).
- *Unattractive* quality represents large units with few or no doors (S) and no range of functions (F). It shows closed or blind façades (O) and monotonous façades with very poor conditions (M) and no details or nothing to look at (D).

Finally, this research also considers *exciting* quality to be more than *attractive* quality, which provides very good floor façades, rich details and is exciting to walk by. This research rates *mean* quality as poorer than an *unattractive* quality; vacant deteriorated buildings surrounding street edges, without function and monotonous to walk by.

Applying the quality front indicators helps develop an empirically measurable method in analysing the quality of visual aspects of a city form or street fronts. The subjective assessments interpret the visual findings or observations that are related to each single indicator as a numeric value. The scale used takes the summation of input data of all indicator values in order to produce the total quality factor in relation to a specific length of street front (Porta & Romice, 2010).

In order to produce a quantitative study, in regards to the quality of streets, numeric values are applied in a hierarchical arrangement in order to classify the quality factor of each single street and make the observation more meaningful and useful for further analysis. This numeric system is graded from 1 to 7, where (1) indicates low values of quality or the absence of street edges, while (7) indicates the aesthetic values with a strong and remarkable presence, which provides attractive attributes at the level of the sight line. A survey is conducted to determine the value of each indicator in a designed table to find the overall quality factor in each selected street. Afterwards, the overall quality factor is classified in regards to the quality classification of this study, where the worst place is regarded as *mean,* and the best as *exciting* (Figure 7.16).

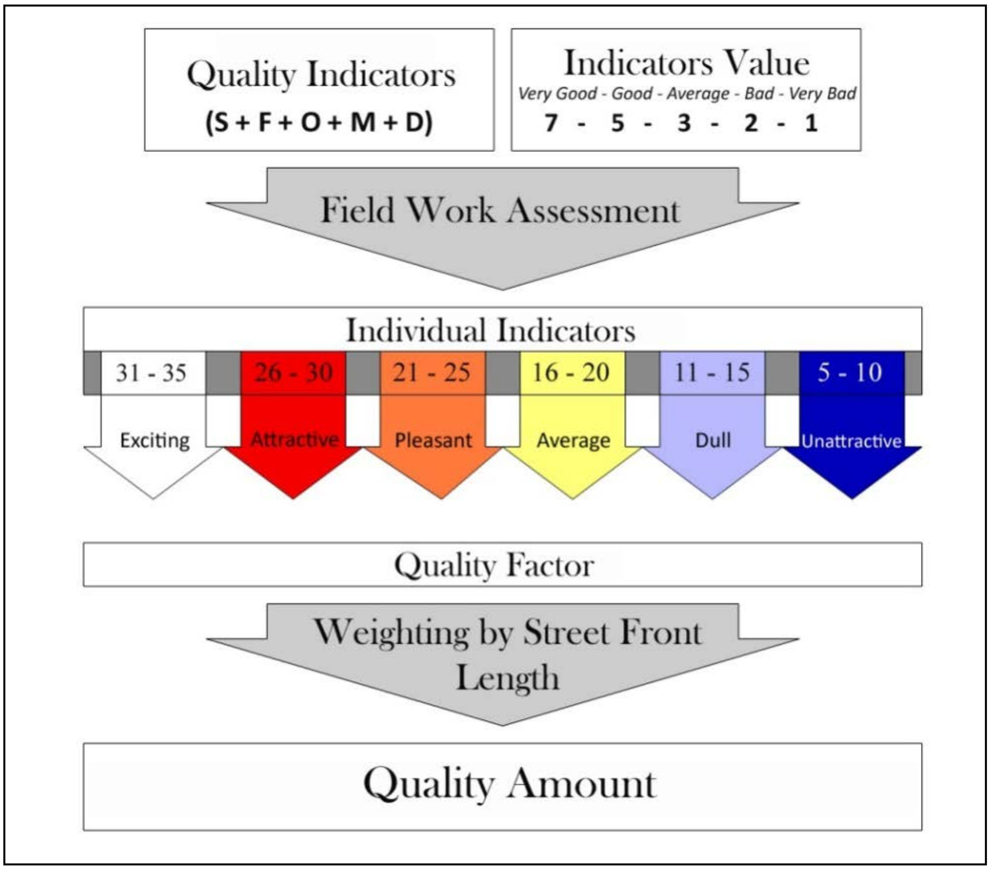


Figure 7.16: The process of producing overall street quality

Based on Jan Gehl (1994, 2002) and Robert Hershberger (1969), a study is conducted to find a space-evaluative factor through the study of exterior walls of buildings. The space-evaluative factor (Quality Factor) is comprised of a scale: *attractive, pleasant, average, dull* and *unattractive*. The overall *quality factor* will be multiplied by the *quality length* of the street front, which has already been identified, in order to find the actual *quality amount* of each individual street within the selected case studies. Finally, this study is applied over all three types of streets; main, connecting and cul-de-sac. After applying the quality front indicators along street edges in each case study, the *quality factor* and *quality length* can be easily identified. Each individual façade is assessed based on Jan Gehl (1994, 2002 & 2010), Nasar (1998) and Cullen’s (1961) criteria of evaluative image.

7.4.1 The Old Town (O.T)

The urban form of Tripoli's Old Town has grown incrementally rather than being developed through planned schemes. Although the former layout of the initial fabric is based on the existence of an orthogonal grid system, the latter urban context is gradually related to more vernacular configurations, which derived from the common utilisation and transformation of public space. This kind of growth has led to the creation of complicated residential access lanes and cul-de-sacs, which reflect the prevailing spontaneous urbanisation model that did not exist in the original Roman-Hellenistic grid pattern. Its streets accommodate a variety of building qualities: main streets express valuable traditional architectural details, while alleyways and cul-de-sacs contain less detailed walls and exhibit simplicity in ornaments and openings.

7.4.1.1 Quality Length of Street Fronts (O.T)

According to the analysis, 72.3% of streetscape attractiveness is located on the main streets, while the rest is located in the connecting streets' edges, as shown in table (7.3) and figures (7.17 & 7.18). Cul-de-sacs, conversely, do not reach the point of being *attractive* places within the traditional urban form, because they were not designed to promote public movement. In addition, 1,091 meters of the main streets constitute 56.7% of the total *pleasant* appearance in the traditional urban fabric, while 833 meters of the other two types of routes provide convergent rates with 27.1% (connecting streets) and 16.2% (cul-de-sacs). Accordingly, 43.1% of the *good* quality length of traditional built environment can be found on main streets, as they play a major role in connecting neighbourhoods, providing accessible routes for loading, and accommod a wide range of important buildings and public facilities and services. These streets obtain a great opportunity for *good quality* length, as the applied methods of preserving the Old Town only renovate important buildings that are situated along them. Only 9.3% of cul-de-sacs can be classified as *good quality* street fronts, although they represent 28.4% of the total network structure within the town. This refers to the humble way of designing their façades, the limited number of users, and the deterioration in structural condition with some ignorance towards the preservation of public procedures. Remarkably, 30.6% of *good quality* length is located on the connecting streets, despite the fact that they represent the shortest portion of the total street network in the town.

	Attractive			Pleasant			Average			Dull			Unattractive			Total street Edges Length		
Main Street Edges	1,150m	21.6%	72.3%	1,091m	20.5%	56.7%	2,441m	45.8%	43.4%	432m	8.1%	24.2%	212m	4.0%	23.5%	5,326m	100%	45.0%
Connecting Street Edges	440m	14.0%	27.7%	522m	16.6%	27.1%	1,605m	51.0%	28.5%	403m	12.8%	22.6%	176m	5.6%	19.5%	3,146m	100%	26.6%
Cul-de-sac Edges	-	0.0%	0.0%	311m	9.3%	16.2%	1,583m	47.2%	28.1%	950m	28.3%	53.2%	512m	15.2%	57.0%	3,356m	100%	28.4%
Total Street Edges' Quality	1,590m	13.4%	100%	1,924m	16.3%	100%	5,629m	47.6%	100%	1,785m	15.1%		900m	7.6%	100%	11,828m	100%	100%

Table 7.3: Quality length of the traditional street fronts

Moreover, *average* quality is the most normal quality length in this urban fabric, constituting 5,629 meter of the total street edges, where the 43.4% of this quality is located along main streets and the rest is divided almost equally between the connecting streets and cul-de-sacs. About 43.5% of cul-de-sacs are classified as *bad* quality, which represents 53.2% of *dull* quality and 57.0% of *unattractive* features of the total street network. The other two types of streets show convergent figures in *bad* quality at the neighbourhood scale. However, the main streets have the smallest amount of *bad* quality (11.1%), while the connecting streets are slightly higher with 18.4%.

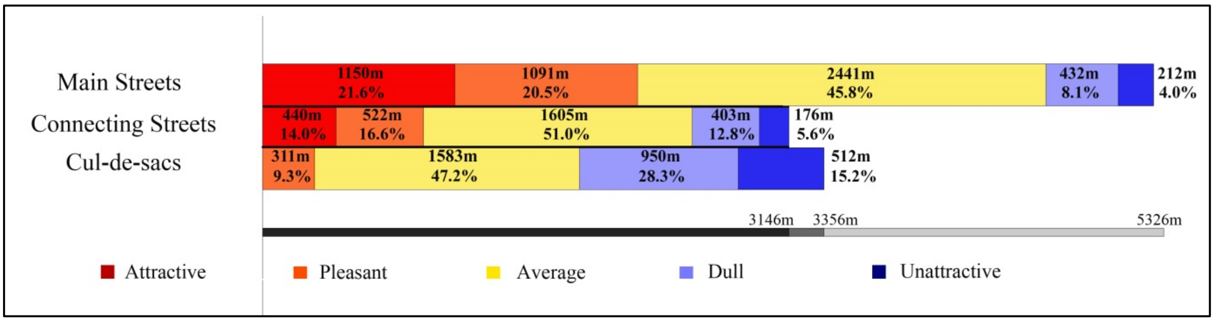


Figure 7.17: Quality length according to the street type in the Old Town

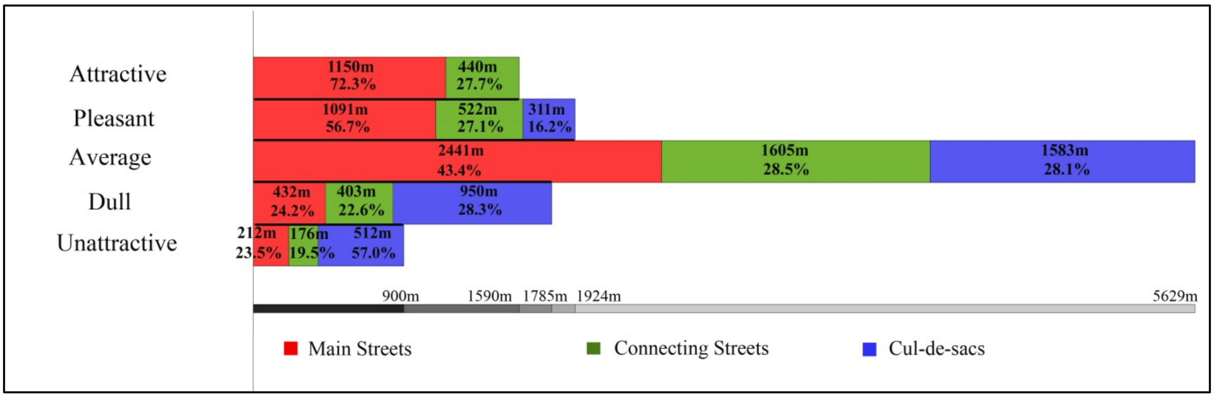


Figure 7.18: Quality length according to Goodness in the Old Town

7.4.1.2 Quality Amount of Street Fronts (O.T)

Applying the quality factors along streets produces different effects of quality, as these factors play a major role in distinguishing the real cityscape's participation in the total evaluative image. In this urban form, the total amount of *attractive* and *pleasant* quality participates similarly in characterising the traditional street fronts. This amount of *good* quality dominates more than half of the main streets' edges. This *good* production quality refers to a diversity of functions, maintenance, and architectural details, which is considered to be very attractive and plays a major part in increasing the quality factor (Figure 7.19).

Figure 7.19: *Good* street edges in the Old Town

Despite the fact that the connecting streets have almost half the amount of quality as those located along main streets, 20.2% is *attractive* and 20.0% is *pleasant*. This is a result of well-maintained façades and well-detailed architectural features. Although the number of units and the diversity of land uses do not influence the quality amount as much, they still sustain a rather pleasant environment along connecting street fronts. The 13.1% of *pleasant* quality in cul-de-sacs is mainly generated by the number of units and the interaction between public and private spaces, as well as the pleasant and well-maintained conditions of the cul-de-sacs.

However, the high quality factor is reduced due to resonable quality of detailing and the lack of mixed-use activities.

In addition, 40.3% of the main street fronts exhibit an *average* amount of quality, which represents 43.4% of the total *average* quality along the entire street network (Figure 7.20). The diversity of functions and pleasant street façades, in addition to modelling and details, greatly increases the quality factor of the main streets. However, the low degree of openness and low number of units negatively affect this quality, producing an *average* overall quality. About 49.1% of connecting streets are *average* in their quality amount, which is the second highest *average* quality amount after that of main streets. The mixed-use of functions and number of units are the main characteristics that increase the quality factor of average connecting streets, while the other indicators have less participation. Although cul-de-sacs contain 54.7% of *average* street fronts, this quality amount is close to that which connecting streets hold. The *average* cul-de-sac's quality amount is mainly powered by the high number of doors and units, and the interaction between indoor and outdoor spaces that is slightly maintained. This type of cul-de-sac shows humble façade modelling with standard conditions and less details.

Figure 7.20: *Average* street edges in the Old Town

The *bad* quality of the main street fronts in the Old Town is the smallest amount compared to *good* and *average* quality amount, where only 4.9% is *dull* and 1.6% is *unattractive.* However, these percentages represent 23.4% of dullness and 24.2% of unattractiveness of the entire street network. This is mainly caused by a moderate contribution of mixed-use and openness, as well as the deterioration of building conditions, humble detailing of street fronts and large unit sizes (Figure 7.21).

Figure 7.21: *Bad* street edges in the Old Town

	Attractive			Pleasant			Average			Dull			Unattractive			Total Quality Amount		
Main Street Edges	31635	29.6%	73.1%	25225	23.6%	58.2%	43075	40.3%	43.4%	5213	4.9%	23.4%	1747	1.6%	24.2%	106895	100%	49.7%
Connecting Street Edges	11642	20.2%	26.9%	11479	20.0%	26.5%	28328	49.1%	28.6%	4803	8.3%	21.6%	1401	2.4%	19.4%	57653	100%	26.8%
Cul-de-sac Edges	-	0.0%	0.0%	6644	13.1%	15.3%	27762	54.7%	28.0%	12241	24.1%	55.0%	4080	8.1%	56.4%	50727	100%	23.5%
Total street Edges Quality	43277	20.1%	100%	43348	20.1%	100%	99165	46.1%	100%	22257	10.3%		7228	3.4%	100%	215275	100%	100%

Table 7.4: Quality amount of the traditional street fronts

A reduced amount of mixed-use with bad building conditions and unattractive elevations generate the *bad* quality amount of bad connecting streets, while unit numbers and inactive edges still participate significantly in increasing the quality factor. These attributes represent 18.4% of the *bad* quality amount along connecting streets and 21.5% of the total *bad* quality amount within the urban fabric. The most unattractive attribute value in this urban fabric is presented by *bad* quality of cul-de-sacs, which represents 54.5% of the total *bad* quality, including *dull* and *unattractive* qualities. This refers to a mixture of small and large units and openness with the domination of one residential use, the deterioration in building conditions, flatness in façade modelling and the lack of architectural details (Table 7.4 and Appendix 5).

According to the observation and the application of indicators, the analysis reaches the stage of generating quality factors, which are related specifically to the characteristics of façades along the network of streets in this urban fabric. These values are an outcome of observations and measurements of the application of the quantitative approach. The street front arrangements, number of units and doors interfacing façade details and building modelling and condition play a major role in generating a specific quality factor for this urban fabric. The outcome analysis shows that the street front quality in each street type has a specific factor (Figure 7.22).

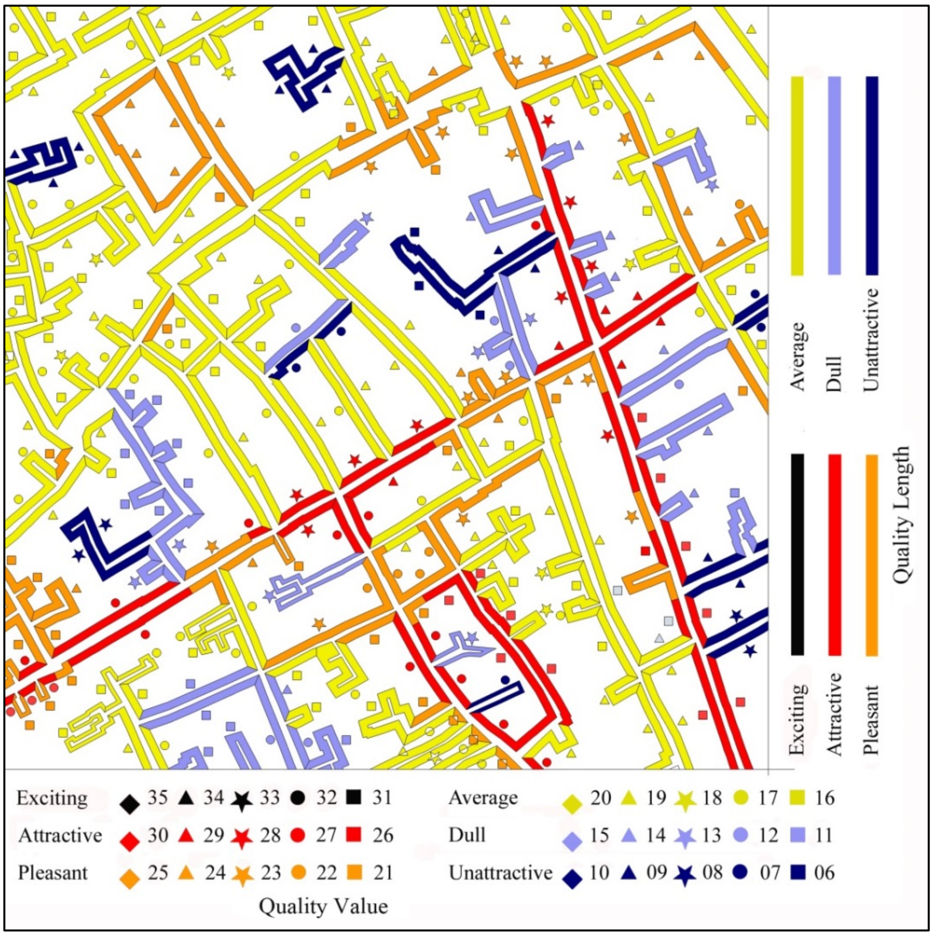


Figure 7.22: Street fronts quality within the Old Town

Consistent with the final results, the main streets maintain the highest *good* quality factors and consequently the best quality amount, while the connecting streets hold the second highest quality amount, as the total length almost equals those produced by the attractive and pleasant factors in the main streets. On the other hand, cul-de-sacs are dominated by the smallest quality factors, which accordingly hold the smallest quality amount. Even so, the dead-end streets are longer than connecting streets. On the other hand, there are no big differences in the *average* quality factors between the three types, as they are all located within the range of in-between zones according to the measurement scale (Figures 7.23 & 7.24).

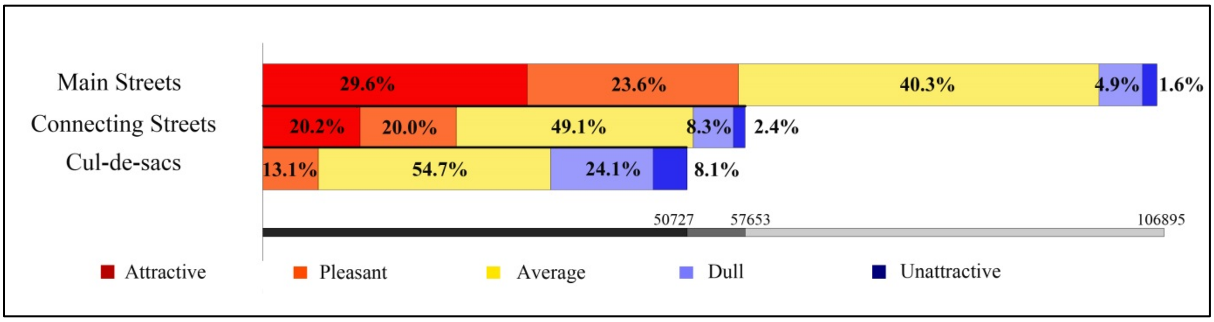


Figure 7.23: Quality amount according to the street type in the Old Town

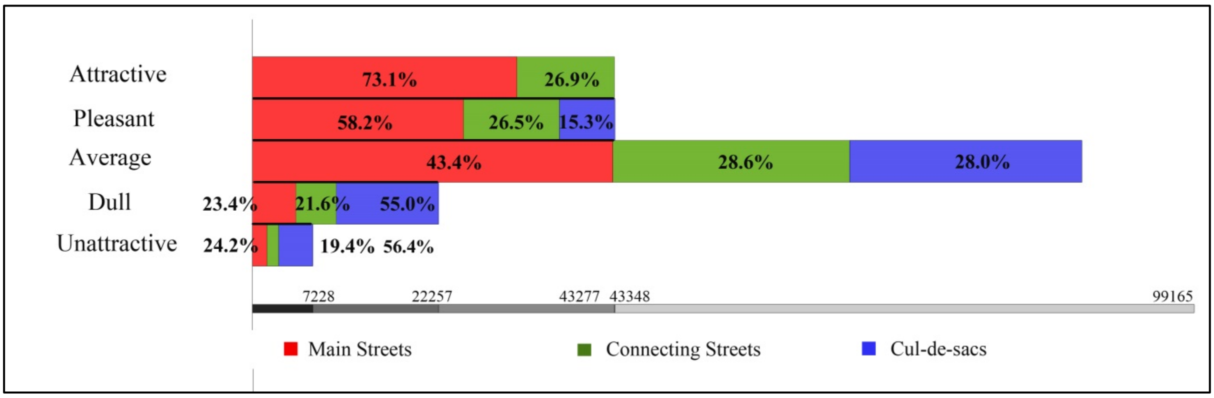


Figure 7.24: Quality amount according to Goodness in the Old Town

Street Type	Main Streets	Connecting Streets	Cul-de-sacs	Total Quality Amount
Quality Amount	**106895** 49.7%	**57653** 26.8%	**50727** 23.5%	**215275** 100%

Table 7.5: Total quality amount of the Old Town

In conclusion, about half of the quality amount is located on the main street fronts, while the second longest streets have the smallest quality amount, as *bad* quality is pervasive along their fronts (Table 7.5). However, there is no big difference in the quality amount between the connecting streets and cul-de-sacs, as the former holds 26.8% and the latter holds 23.5% of the total quality amount. The participation of main and connecting streets in the total quality amount is similar in pattern. The same diagram shows an inverse relationship: as the quality length decreases the quality amount increases. This demonstrates that cul-de-sac quality weakens the total quality amount in the traditional street network (Figure 7.25).

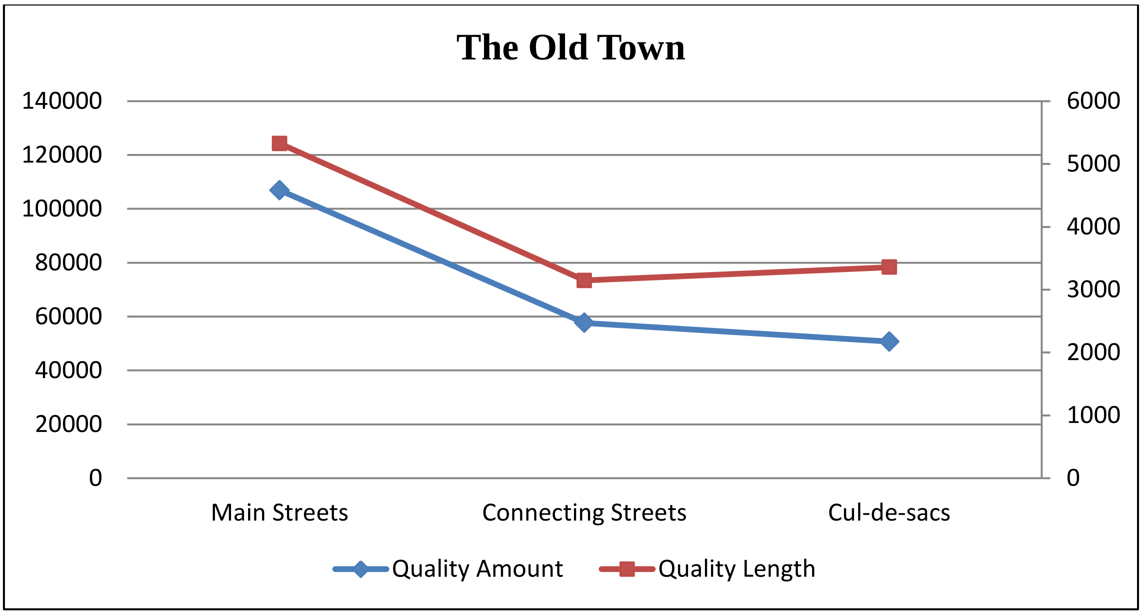


Figure 7.25: Quality amount and length according to the street type in the Old Town

The diagram of the quality length and quality amount shows an inverse relationship between *attractive* quality and *pleasant* quality in their participation in the urban fabric. Where the contribution increases in length, it decreases in amount. The same diagram reveals that the other quality classifications are almost parallel in their relationship, as the quality amount follows the same path of the quality length. This demonstrates that the *good* quality factors play a major role in increasing the total quality amount within the traditional street network (Figure 7.26).

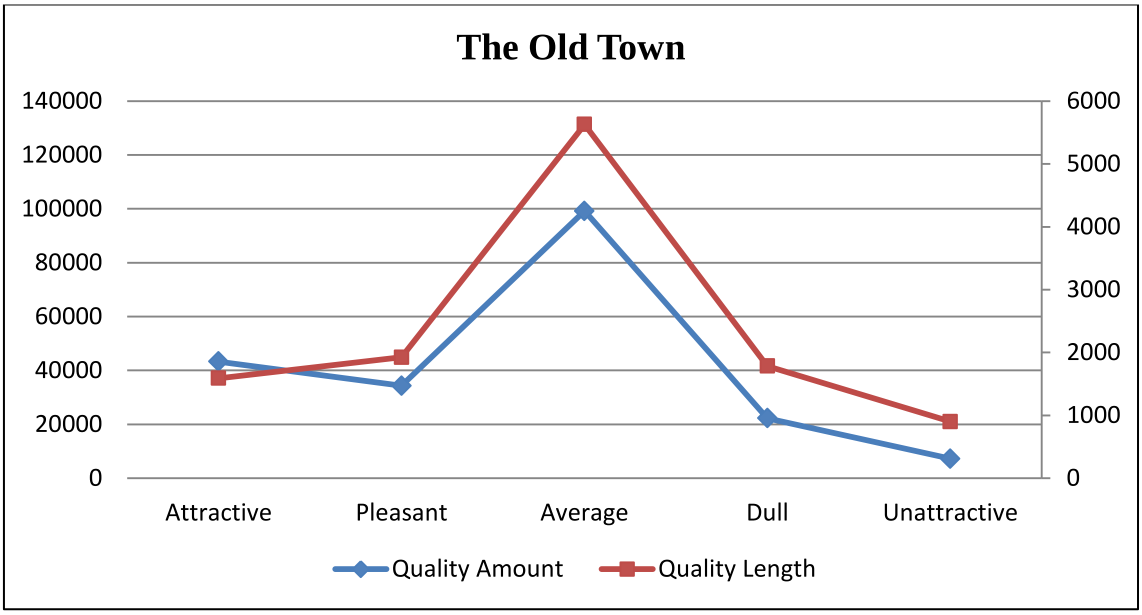


Figure 7.26: Quality amount and length according to Goodness in the Old Town

7.4.2 The Italian Quarter (I.Q)

The Italian Quarter is formed on the idea of rationality in creating a new urban context adjacent to the exiting Old Town. This direction was rooted in both the characteristics of the medieval city and the traditional principles of the Old Town. The general layout of the Italian Quarter has been generated to preserve the urban context of the Old Town and to modernise the city of Tripoli. This quarter was structured according to Mediterranean principles of architecture and urban design, where its streets are characterised by the simplicity of radial structures and engraved within solid forms of commercial and residential buildings. Most of the buildings are four stories high and occupied by shops, workshops or restaurants at the street level and residential units on the upper floors.

7.4.2.1 Quality Length of Street Fronts (I.Q)

Based on the indicators, about one third of the main street fronts are *attractive*, since 95.5% of the urban fabric's attractiveness is located along them, while only 4.5% of *attractive* street fronts are located along the connecting streets. The edges of cul-de-sacs have no sign of attractiveness. In addition, one third of the remaining main streets' edges hold 80.7% of all the *pleasant* form in the Italian urban fabric, where 403 meters of connecting streets provide 18.0% of the *pleasant* environment and 30 meters of cul-de-sacs account for only 1.3% of the pleasing street edges. Accordingly, 87.2% of *good* quality of the Italian built environment is located along main streets, since they play such a major role in holding a wide range of public buildings, shops, cafes and services, as well as pleasant architectural details such as arcades, canopies and shop windows. On the other hand, the 12.1% of connecting street fronts are of *good* quality, although they have only 481 meters of the total street network in the district. Cul-de-sacs in this urban fabric are few in number and mostly *bad* in quality (Figure 7.27 and Table 7.6).

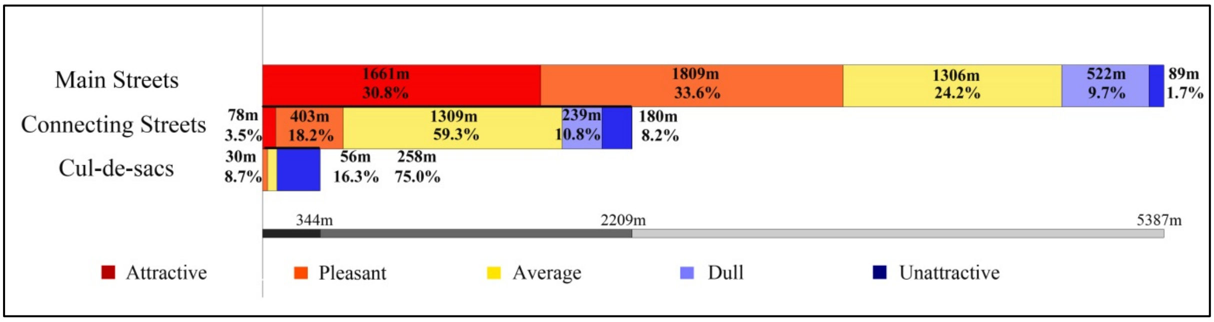


Figure 7.27: Quality length according to the street type in the Italian Quarter

	Attractive			Pleasant			Average			Dull			Unattractive			Total Street Edges Length		
Main Street Edges	1,661m	30.8%	95.5%	1,809m	33.6%	80.7%	1,306m	24.2%	49.0%	522m	9.7%	68.6%	89m	1.7%	16.9%	5,387m	100%	67.8%
Connecting Street Edges	78m	3.5%	4.5%	403m	18.2%	18.0%	1,309m	59.3%	49.0%	239m	10.8%	31.4%	180m	8.2%	34.1%	2,209m	100%	27.8%
Cul-de-sac Edges	-	0.0%	0.0%	30m	8.7%	1.3%	56m	16.3%	2.0%	-	0.0%	0.0%	258m	75.0%	49.0%	344m	100%	4.4%
Total Street Edges Quality	1,739m	21.9%	100%	2,242m	28.3%	100%	2,671m	33.6%	100%	761m	9.6%	100%	527m	6.6%	100%	7,940m	100%	100%

Table 7.6: Quality length of the Italian street fronts

Moreover, of all the street fronts that are *average* in quality, 98.0% can be found evenly distributed between main streets and connecting streets. On the other hand, cul-de-sacs present 2.0% only of the regular quality of street fronts, due to the fact that they representing 4.4% only of the total network in the neighbourhood. Although 11.4% of main streets are *bad* quality, they house just 6.6% of *dull* and 1.1% of *unattractive* features within the whole street network. About 19.0% of the total connecting streets represent a third of the *bad* quality at the neighbourhood scale, divided between 239 meters of *dull* quality and 180 meters of *unattractive* quality. However, the cul-de-sacs have the smallest amount of *bad* quality, as they have a very small presence in the Italian Quarter (Figure 7.28).

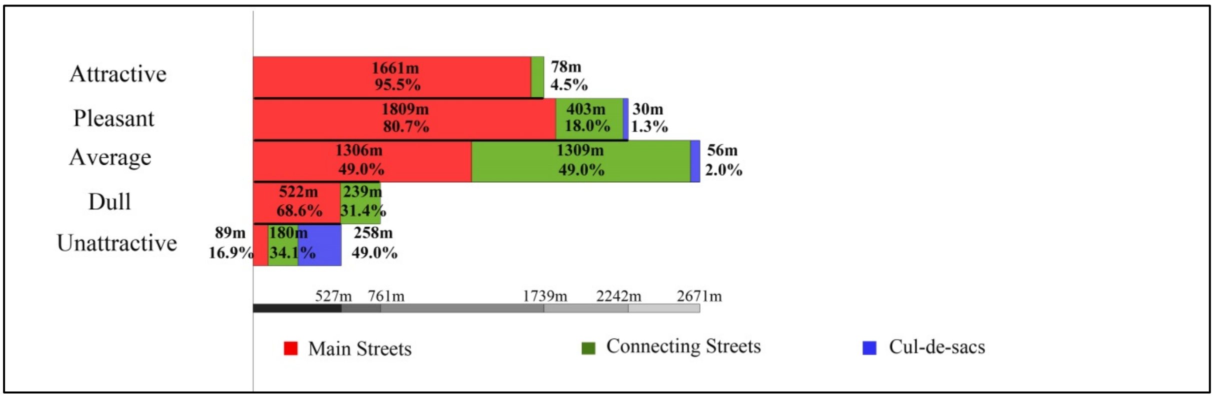


Figure 7.28: Quality length according to Goodness in the Italian Quarter

7.4.2.2 Quality Amount of Street Fronts (I.Q)

In this urban form, the Italian street fronts are characterised equally by *attractive*, *pleasant* and *average* qualities. About 40% of the main streets' quality amount is represented by their attractiveness. This *good* model of the main streets is caused by the attractiveness of most indicators, which play a major part in increasing the quality factor of main streets. The 28.0% of *good* quality fronts on connecting streets is generated mainly by the numerous doors and units, the high presence of mixed-use functions and openness. In addition, this quality is produced by the pleasant factor of façade modelling and condition, and the average factor of street front details and materials placed along these streets. About 18.0% of cul-de-sacs participate just 1.4% in the total *good* quality amount of the street network in this urban fabric (Figure 7.29), where the modest quality façade modelling and condition, average architectural details, as well as the lack of diversity in functions generate the quality of this street type. However, the emergence of many doors and units, as well as the active edges, keeps the quality amount of cul-de-sacs in this urban fabric in the pleasance category.

Figure 7.29: *Good* street edges in the Italian Quarter

In addition, 20.0% of the main street fronts are classified *average* quality amount, which represents 49.1% of the total *average* quality in the entire street network. Despite the fact that the *average* main streets in the Italian Quarter maintain an attractive grade in the number of doors and pleasantness in land use diversity, the quality value of façade modelling and details ranks only as average (Figure 7.30). The highest percentage of the quality amount along connecting streets is *average,* at 59.8%, which shows little difference from the modest quality amount of main streets, but still a much higher than *average* quality amount of cul-de-sacs. The mixed-use of functions and number of units are main characteristics increasing the *average* quality amount of the connecting streets, while the other indicators produce neutral quality amounts. Although cul-de-sacs maintain 24.9% of the *average* quality amount of all the street fronts, this percentage participates just 2.0% in the total *average* quality amount of this urban fabric. Due to the lack of cul-de-sacs in this urban fabric, the in-between quality factors of cul-de-sacs are produced by the pleasant quality of the façade modelling, condition and openness, as well as the modest presence of doors, units and details, while the function diversity quality factor is dull.

Figure 7.30: *Average* street edges in the Italian Quarter

Although the *bad* quality of main street edges is the smallest amount at the scale of this street type, where 5.3% is *dull* and 0.7% is *unattractive*, these percentages represent 66.2% of dullness and 17.4% of unattractiveness at the scale of the total street network. This is due to the pleasant value of land use with a modest quality factor of openness, while other indicators are considered to be dull. A *dull* quality factor of mixed-use, combined with the number of units and openness with the modest quality value of façade modelling and details, generate the *bad* quality amount of connecting streets (Figure 7.31). These attributes represent 12.2% of *bad* quality amount along connecting streets and 34.2% of the total *bad* quality amount within the urban fabric.

Figure 7.31: *Bad* street edges in the Italian Quarter

Although cul-de-sacs do not hold *dull* quality amount, 57.1% of their total quality amount is *unattractive*, which represents 47.4% of the total unattractive street fronts within this urban fabric. The most *unattractive* attribute values in this urban fabric are represented by *bad* quality of cul-de-sacs;, those that hold few units and a low degree of openness with the dominance of a single use, flat façade modelling, and bad building conditions (Table 7.7 and Appendix 6).

	Attractive		Pleasant		Average		Dull		Unattractive		Total Quality Amount	
Main Street Edges	**47444**	**95.5%**	**40576**	**81.0%**	**23768**	**49.1%**	**6264**	**66.2%**	**801**	**17.4%**	**118853**	**73.3%**
	39.9%		**34.1%**		**20.0%**		**5.3%**		**0.7%**		**100%**	
Connecting Street Edges	**2238**	**4.5%**	**8845**	**17.6%**	**23644**	**48.9%**	**3196**	**33.8%**	**1620**	**35.2%**	**39543**	**24.4%**
	5.6%		**22.4%**		**59.8%**		**8.1%**		**4.1%**		**100%**	
Cul-de-sac Edges	**-**	**0.0%**	**690**	**1.4%**	**952**	**2.0%**	**-**	**0.0%**	**2181**	**47.4%**	**3823**	**2.3%**
	0.0%		**18.0%**		**24.9%**		**0.0%**		**57.1%**		**100%**	
Total Street Edges Quality	**49682**	**100%**	**50111**	**100%**	**48364**	**100%**	**9460**	**100%**	**4602**	**100%**	**162219**	**100%**
	30.6%		**30.9%**		**29.8%**		**5.8%**		**2.9%**		**100%**	

Table 7.7: Quality amount of the Italian street fronts

Consistent with the final results, the main streets maintain the best quality factors and therefore 74% of their quality amount is *good*, while the connecting streets hold the second highest quality amount. On the other hand, cul-de-sacs are dominated by the smallest quality factors, which accordingly hold the smallest quality amount as this urban fabric has only four cul-de-sacs. On the other hand, the largest *bad* quality amount is held along main streets (Table 7.8) and (Figure 7.32).

Street Type	Main Streets	Connecting Streets	Cul-de-sacs	Total Quality Amount
Quality Amount	**118593** 73.3%	**38662** 24.4	**3823** 2.3%	**161078** 100%

Table 7.8: Total quality amount of the Italian Quarter

Figure 7.32: Street fronts quality within the Italian Quarter

To summarise, the built environment in the Italian Quarter shows that three quarters of main streets account for 88.2% of the overall *good* quality, whereas the connecting streets represent 11.1% and the cul-de-sacs with 0.7% of the *good* quality amount in this urban fabric. These percentages of *attractive* and *pleasant* quality amount represent 61.5% of the total quality amount in the overall Italian street network. Figure (7.33) shows that based on the street type, the quality amount of main streets is almost three times greater than that located on the connecting streets. However, according to goodness, the *average* quality amount along both of these streets is similar (Figure 7.34). The few cul-de-sacs in this urban neighbourhood represent just 2.3% of the total quality amount, where almost half of the cul-de-sacs are *bad* quality.

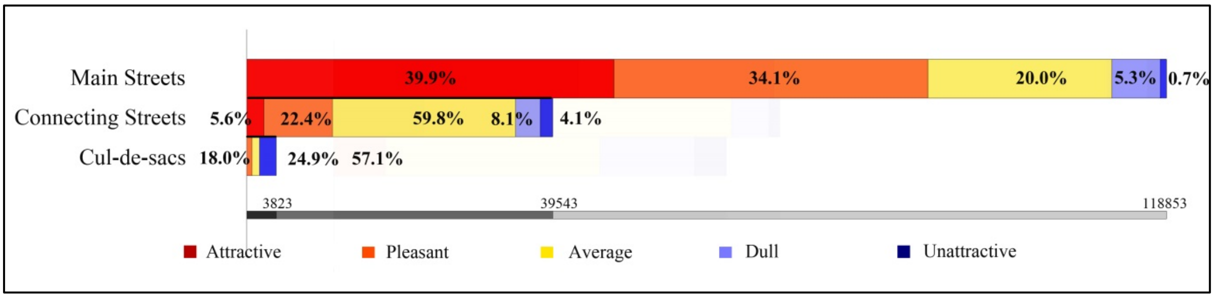


Figure 7. 33: Quality amount according to the street type in the Italian Quarter

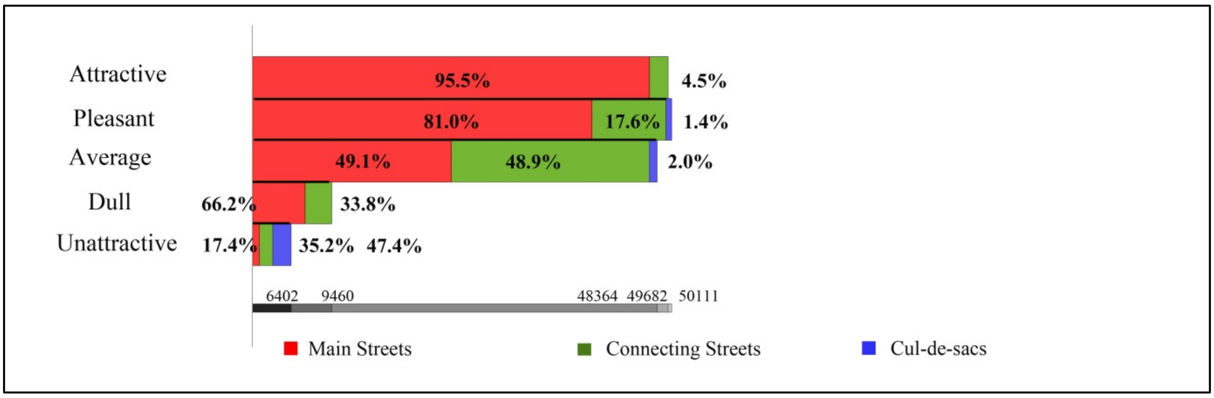


Figure 7.34: Quality amount according to Goodness in the Italian Quarter

The participation of main and connecting streets in the quality length and amount is similar in pattern, with a slight decrease of quality amount on connecting streets. This demonstrates that connecting streets have *good* quality factors when compared to main streets, as main streets have more than twice as many edges than on connecting streets. The same diagram reveals that the quality length and amount approach each other. This demonstrates that the quality rating of cul-de-sacs negatively affects the total quality amount of the Italian street network (Figure 7.35).

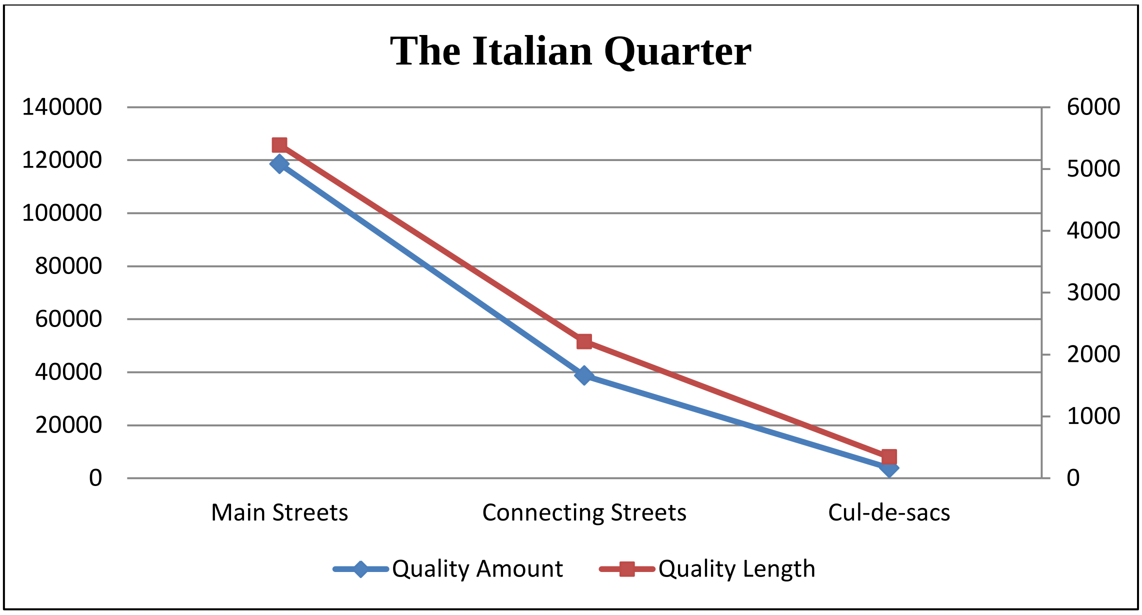


Figure 7.35: Quality amount and length according to the street type in the Italian Quarter

The diagram of the comparison between the quality length and quality amount, according to goodness (Figure 7.36), shows a converse relationship between *attractive* quality and average quality; as this contribution increases in length, it decreases in amount. The same diagram reveals that the other quality classifications are almost parallel in their relationship as the quality amount follows the same path as the quality length. This demonstrates that high quality factors play a major role in increasing the total quality amount within the Italian street network.

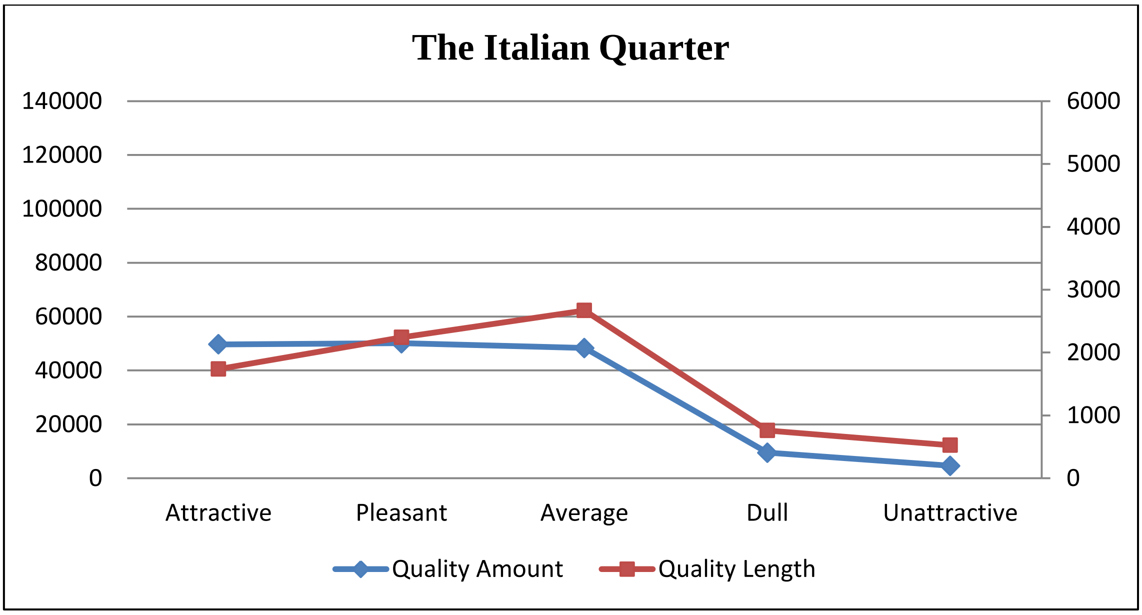


Figure 7.36: Quality amount and length according to Goodness in the Italian Quarter

7.4.3 The Garden City (G.C)

The Garden City has an excellent, accessible network, and small block sizes. However, the street network is mainly designed for vehicular movement and the urban form is dominated by residential buildings with a lack of other significant activities. Although this context provides a highly permeable network with short links, numerous intersections and minimal dead-ends, the liveability of the urban environment is completely devoid with no sense of community interaction. This modern approach introduces a new method of allocating land use to the city of Tripoli, which promoted an apparent separation between residential and commercial activities, in order to reduce disruptive noise for the residents.

7.4.3.1 Quality Length of Street Fronts (G.C)

Based on the five points of standard analysis, there is no indication of attractiveness in the urban form of the Garden City, since most street fronts were built as blank walls. In addition, 31.7% of the total main streets provide 65.5% of the total *pleasant* appearance in the British urban fabric, whereas 34.5% of total *pleasant* street fronts are provided by 478 linear meters of connecting streets (Figure 7.37). Moreover, the *average* quality is the most prevalent as 63.2% of the whole street network is characterised by this quality. Neutral quality is divided only between the main streets and connecting streets: 37.0% is located along main streets and 63.0% is located on the connecting streets, as the latter represents 60.8% of the street network of the urban district. *Bad* quality is mostly located on the connecting streets, with 582m of *dull* fronts and 158m of *unattractive* ones, resulting in a total of 740m fronts of *Bad* qualities. Main streets, on the other hand, have 289m of *Bad* quality, while the only cul-de-sac in the neighbourhood has 53m (Table 7.9 and Figure 7.38).

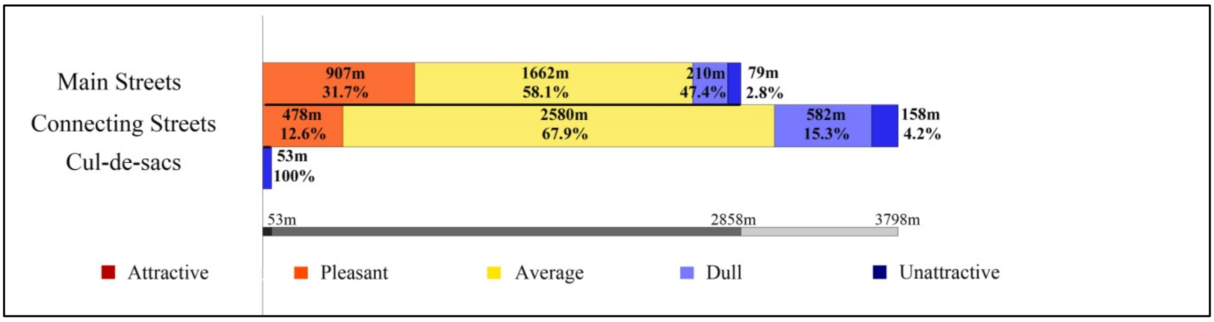


Figure 7.37: Quality length according to the street type in the Garden City

	Attractive			Pleasant			Average			Dull			Unattractive			Total Street Edges Length		
Main Street Edges	-	0.0%	0.0%	907	31.7%	65.5%	1662	58.1%	39.2%	210	7.4%	24.8%	79	2.8%	33.3%	2858	100%	42.6%
Connecting Street Edges	-	0.0%	0.0%	478	12.6%	34.5%	2580	67.9%	60.8%	582	15.3%	68.9%	158	4.2%	66.7%	3798	100%	56.6%
Cul-de-sac Edges	-	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	53	100%	6.3%	-	0.0%	0.0%	53	100%	0.8%
Total Street Edges Quality	-	0.0%		1385	20.6%	100%	4242	63.2%	100%	845	12.6%	100%	237	3.6%	100%	6709	100%	100%

Table 7.9: Quality length of the British street fronts

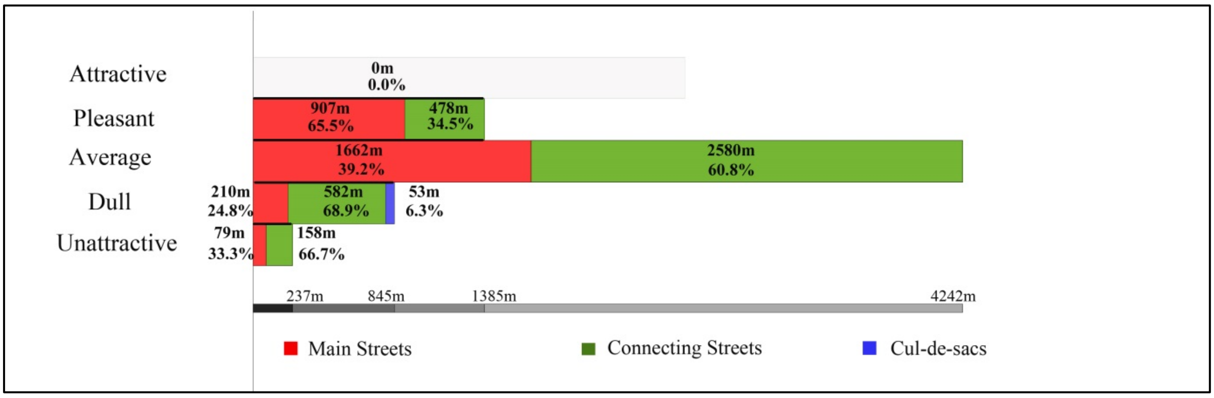


Figure 7.38: Quality length according to Goodness in the Garden City

7.4.3.2 Quality Amount of Street Fronts (G.C)

In this urban form, there is no *attractive* quality amount and 63.4% of the total street fronts of the Garden City are represented by an *average* quality amount. Two thirds of the *pleasant* quality amount is located along the main streets. The *good* model of the main streets is generated by an attractive quality factor of façade modelling and maintenance, diversity of functions and a good amount of units with pleasant architectural details (Figure 7.39). About 16.2% of *good* connecting streets are comprised mainly of average façade modelling, few details and regular materials, while the majority of these streets lack diversity in function, a degree of openness and are dominated by large units.

Figure 7.39: *Good* street edges in the Garden City

Further, 55.3% of the main street fronts exhibit *average* quality amount, which represents 39.5% of the total *average* quality within the overall street network. Despite the fact that the *average* main streets in the Garden City host a good amount of doors, variety in land use and openness, indicators of façade modelling and details are only ranked average. The highest percentage of the quality amount along connecting streets is *average* with 70.6%. The number of units and openness are important characteristics that increase the quality amount of *average* connecting streets, while the façade conditions and details show a neutral quality amount with little diversity in functions (Figure 7.40).

Figure 7.40: *Average* street edges in the Garden City

About 4.9% of main street edges are *dull* and 1.2% are *unattractive*, which together represent 6.1% of *bad* quality on main streets. This percentage, in turn, represents 26.3% of the total *bad* street fronts in this urban from. This is caused by moderate contribution of the façade condition, diversity of functions and openness, as well as flat façades and details and a generally large unit size (Figure 7.41).

Figure 7.41: *Bad* street edges in the Garden City

About 70% of the total *bad* quality amount is located along connecting streets, representing only 7.2% of the total quality amount in this urban fabric. The domination of single usage, few units and few active façades, as well as the modest quality of façade modelling and details, generate the *bad* quality value of connecting streets (Figures 7.42, 7.43 & 7.44). The only cul-de-sac in this urban fabric represents 5.5% of the total *dull* quality amount (Table 7.10 and Appendix 7).

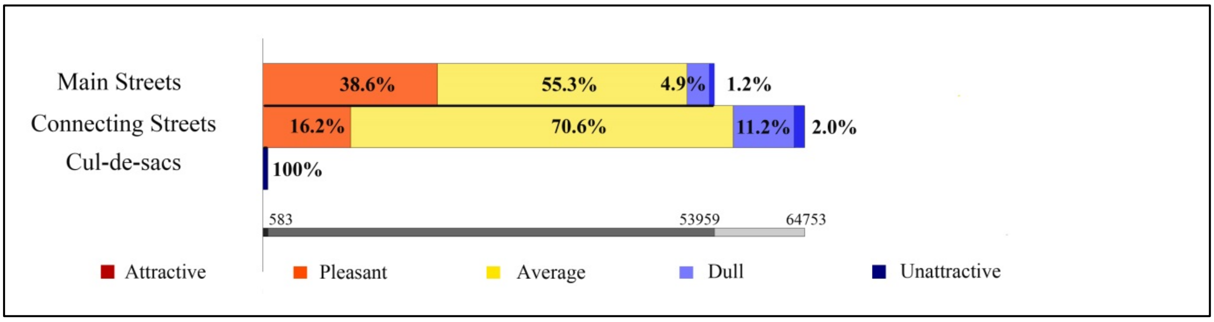


Figure 7.42: Quality amount according to the street type in the Garden City

	Attractive			Pleasant			Average			Dull			Unattractive			Total Quality Amount		
Main Street Edges	-	0.0%	0.0%	20834	38.6%	66.6%	29863	55.3%	39.5%	2630	4.9%	25.1%	632	1.2%	33.3%	53959	100%	45.2%
Connecting Street Edges	-	0.0%	0.0%	10467	16.2%	33.4%	45745	70.6%	60.5%	7277	11.2%	69.4%	1264	2.0%	66.7%	64753	100%	54.3%
Cul-de-sac Edges	-	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	583	100%	5.5%	-	0.0%	0.0%	583	100%	0.5%
Total Street Edges Quality	-	0.0%		31301	26.2%	100%	75608	63.4%	100%	10490	8.8%	100%	1896	1.6%	100%	119295	100%	100%

Table 7.10: Quality amount of the British street fronts

Street Type	Main Streets	Connecting Streets	Cul-de-sacs	Total Quality Amount
Quality Amount	**53959** 45.2%	**64750** 54.3%	**583** 0.5%	**119292** 100%

Table 7.11: Total quality amount of the Garden City

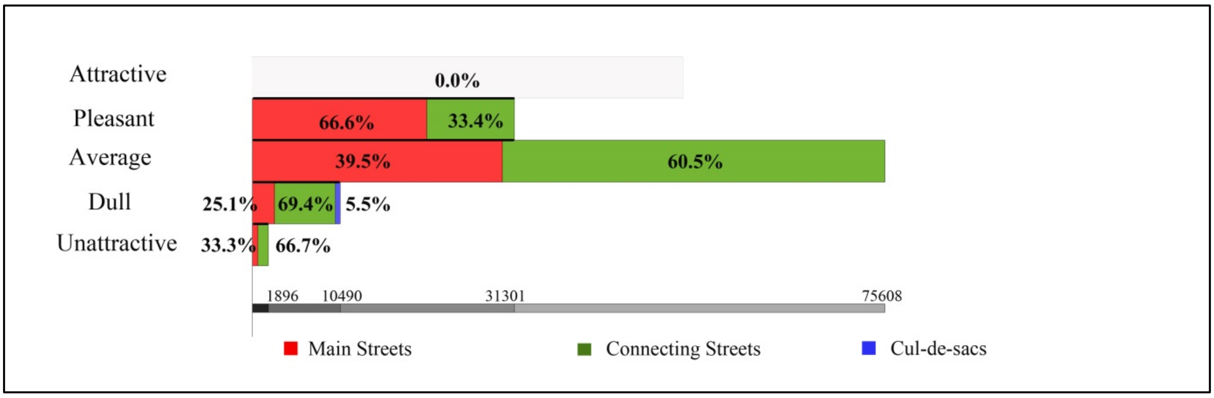


Figure 7.43: Quality amount according to Goodness in the Garden City

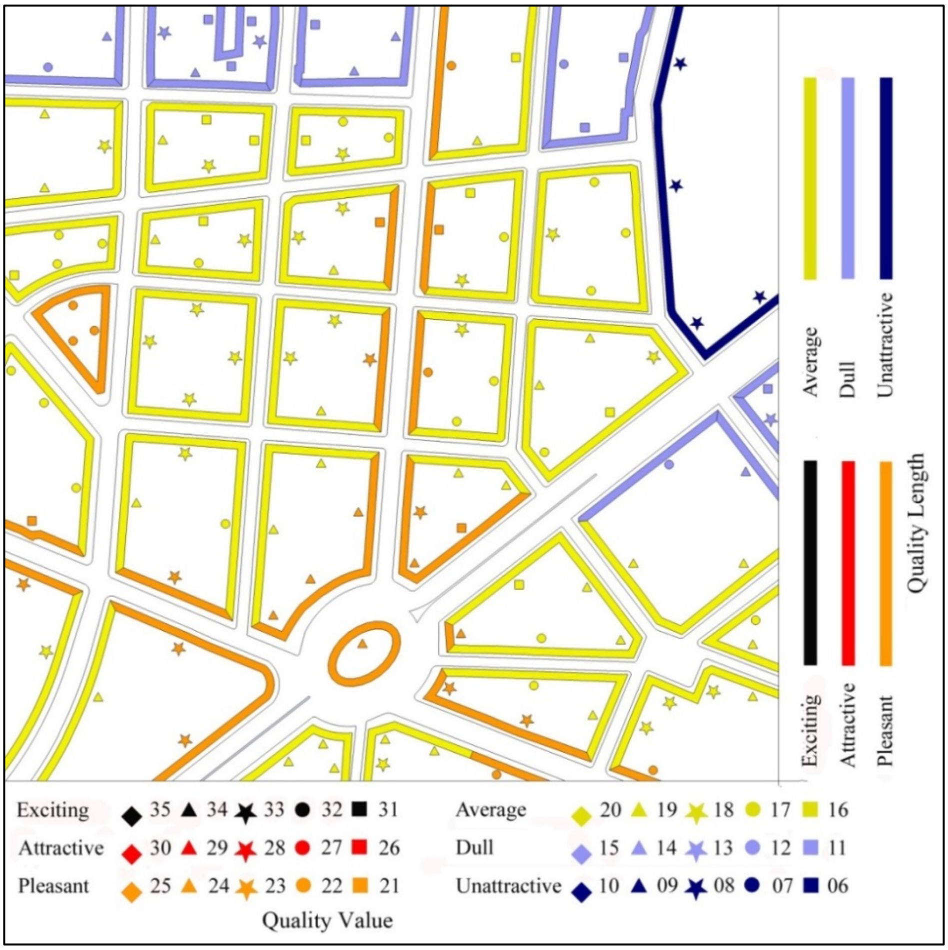


Figure 7. 44: Street fronts quality within the Garden City

Tables 7.10 and 7.11 show that the connecting streets provide more than half of the total quality amount, and the predominant quality in this urban fabric is *average*, representing 63.4% overall. 67.9% of the total length of connecting streets and 58.1% of the total length of main streets are characterised by an *average* quality amount. However, there is no apparent difference in the quality amount between the main and connecting streets, as the former holds 45.2% and the latter holds 54.3% of the total quality amount.

Figure (7.45) shows that the connecting streets have the highest quality amount which decreases slightly at main streets, while the quality length decreases sharply between the connecting and main streets. This is due to the fact that quality factors of main streets play a major role in maintaining a high quality amount. This demonstrates that main streets have better quality factors when compared to connecting streets, although the length of the main street edges is only about two thirds that of the connecting streets. The same diagram reveals that the quality length and amount become close to each other at cul-de-sacs. This demonstrates that cul-de-sacs are not a main structural component in the street network of this urban fabric. However, the only cul-de-sac that exists in this urban neighbourhood contributes negatively to the total indication of quality amount. The participation of main and connecting streets in the quality length and amount is similar in pattern, with a slight decrease of quality amount on connecting streets.

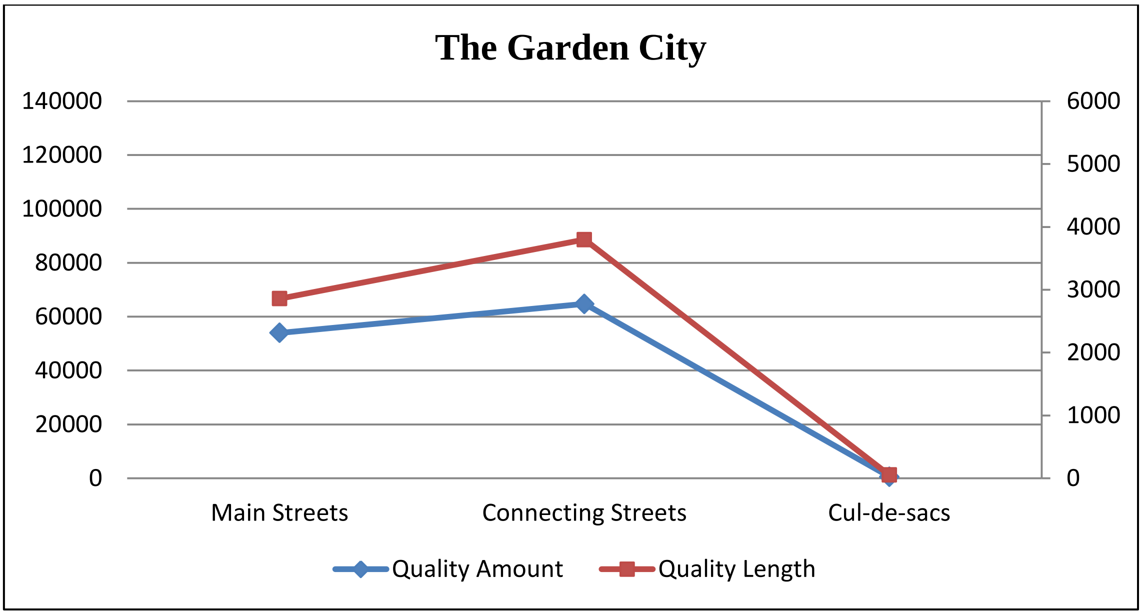


Figure 7.45: Quality amount and length according to the street type in the Garden City

Figure (7.46) shows that quality amount slightly increases in the *pleasant* quality, and significantly differs at the *average*, *dull* and *unattractive* qualities, which prove that these qualities still provide better factors in comparison to the quality length. This demonstrates that the quality factors can participate even in the *bad* quality, and increase the total quality amount among the street fronts in the Garden City.

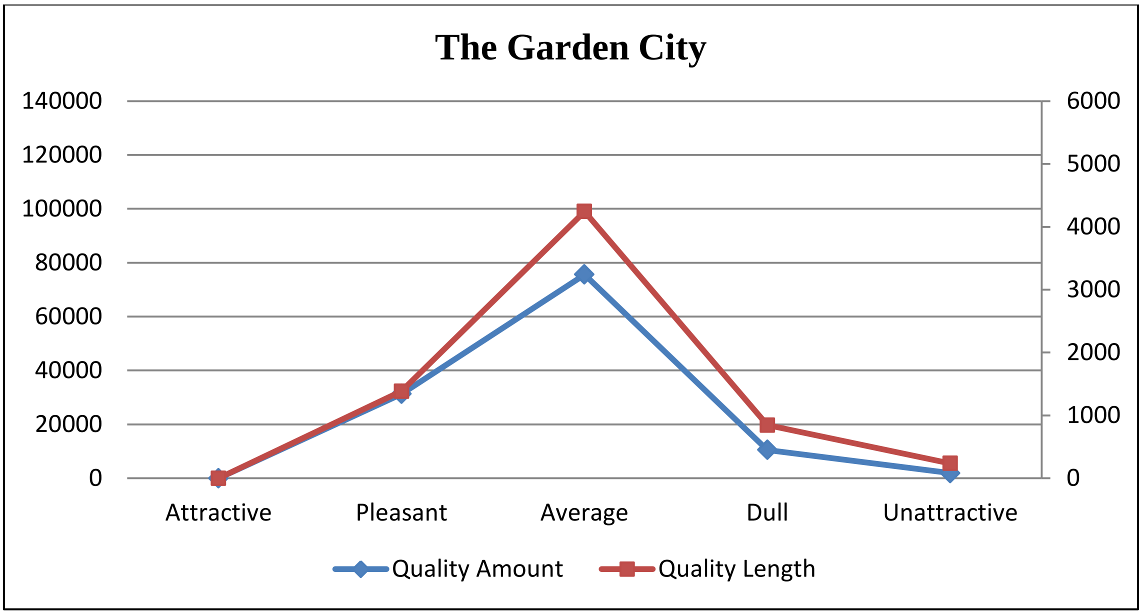


Figure 7.46: Quality amount and length according to Goodness in the Garden City

7.5 Findings: the Quantitative Analysis of Front Quality

Based on the quality measurement criteria of this study and the various case studies, there are no attractive streets in the Garden City, while 20.1% of the streets in the Old Town and 30.6% of those in the Italian Quarter are *attractive*. The Italian Quarter has the longest attractive street fronts, demonstrating higher amounts of attractiveness than the traditional urban form. The *attractive* quality amount within the traditional streets reaches 43277, while that of the Italian urban fabric is 49682 (Figure 7.47).

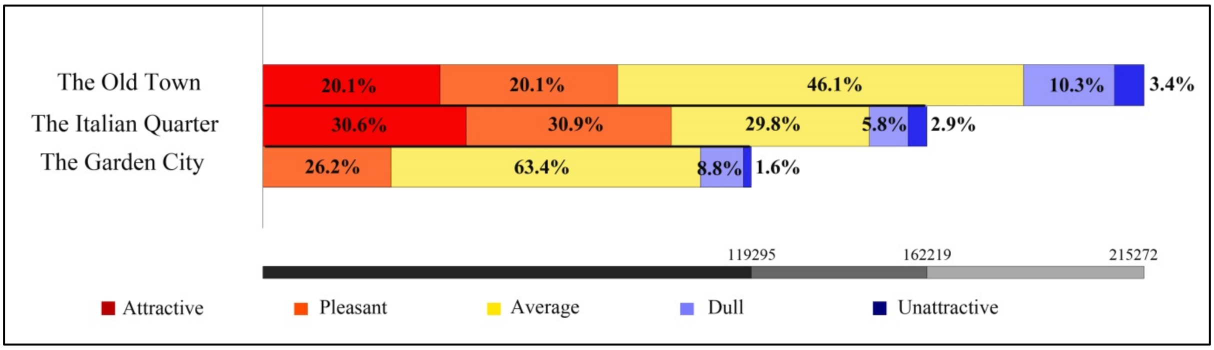


Figure 7.47: Quality amount according to Goodness within the three cases

Quantitatively, the measurements indicate that the Old Town has the longest street edges (11,828 m), while the Italian Quarter and the Garden City have a significantly lower total length of streets than the traditional urban fabric, with 7,940 m and 6,709 m respectively. The Garden City shows some similarities between the percentages of the quality length and amount in comparison to those located in the Old Town. On one hand, the Garden City has only 74% of the total quality amount of the Italian Quarter and even so, 85% of its total length consists of Italian street façades. Finally, the Italian Quarter shows 75% of the total quality amount compared to those located in the Old Town, although it has only 67% of the total street edges length of traditional urban fabric (Figure 7.48).

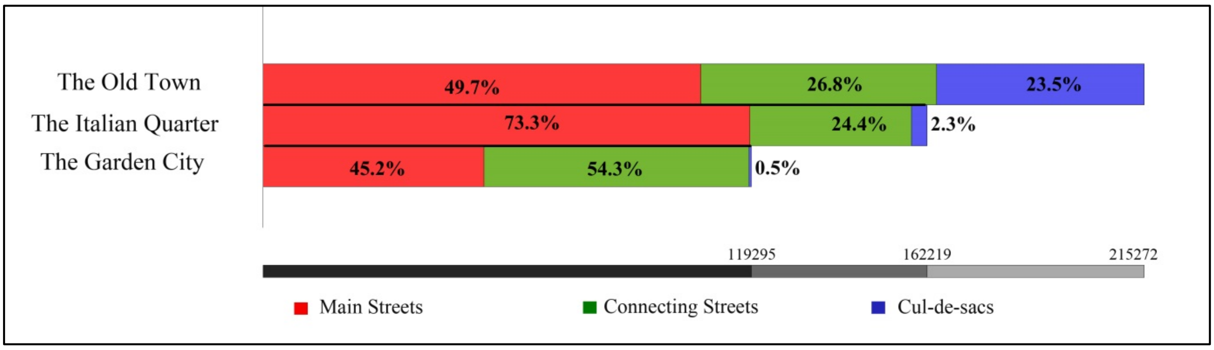


Figure 7.48: Quality amount according to the street type within the three cases

There is an interesting difference in street quality between the traditional urban form and the British neighbourhood. Despite the fact that most streets in the Garden City are *average* quality, with 63.2% of the total length, the Old Town has the longest *average* quality with 5629 linear meters. The *average* quality in the Italian Quarter is only 33.6% with 2671 meters in length. The *dull* and *unattractive* quality of streets is much higher in the Old Town than in the Italian Quarter and the Garden City. This is mainly due to the fact that the Old Town is the oldest urban form in the whole city of Tripoli with the longest street edges.

When comparing the three cases, the Old Town shows a better quality of streets than the Garden City, but less than the Italian Quarter. The average quality of the Garden City constitutes a higher percentage in the total street network, while the same quality is shown less in the traditional connecting streets and the Italian connecting streets. Despite having a large number of cul-de-sacs in the Old Town, compared with a small number of cul-de-sacs in the Italian Quarter and only one cul-de-sac in the Garden City, the *good* quality is still maintained in this urban fabric (Figure 7.49).

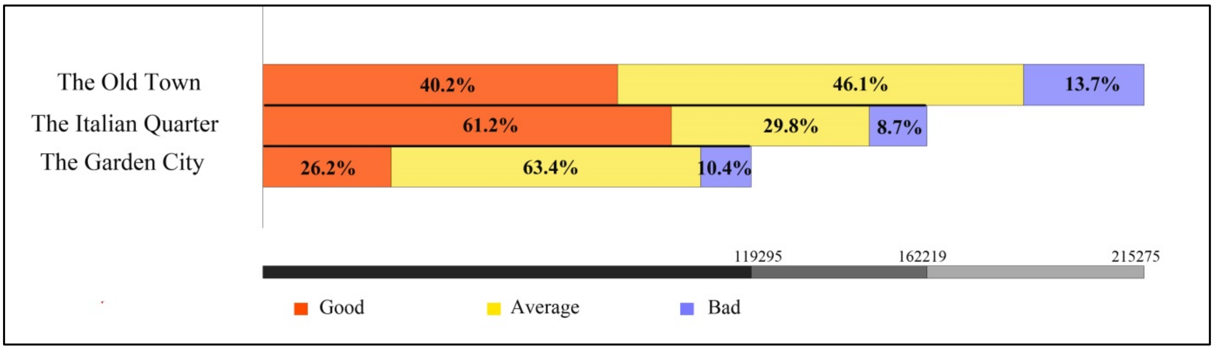


Figure 7.49: Quality amount according to Goodness within the three cases

The Italian Quarter demonstrates a clear distinction between quality amount and length, as the quality factors play a major role in boosting the general quality of the Italian urban fabric. The Old Town shows a similar behaviour, but with a small difference between the quality amount and length, where the quality factors still participate effectively in keeping a reasonable quality related to the traditional built environment. On the other hand, the quality amount is less than the quality length in the Garden City, due to the fact that it has the smallest rates of quality factors, which reduces the general quality of the built environment (Figure 7.50).

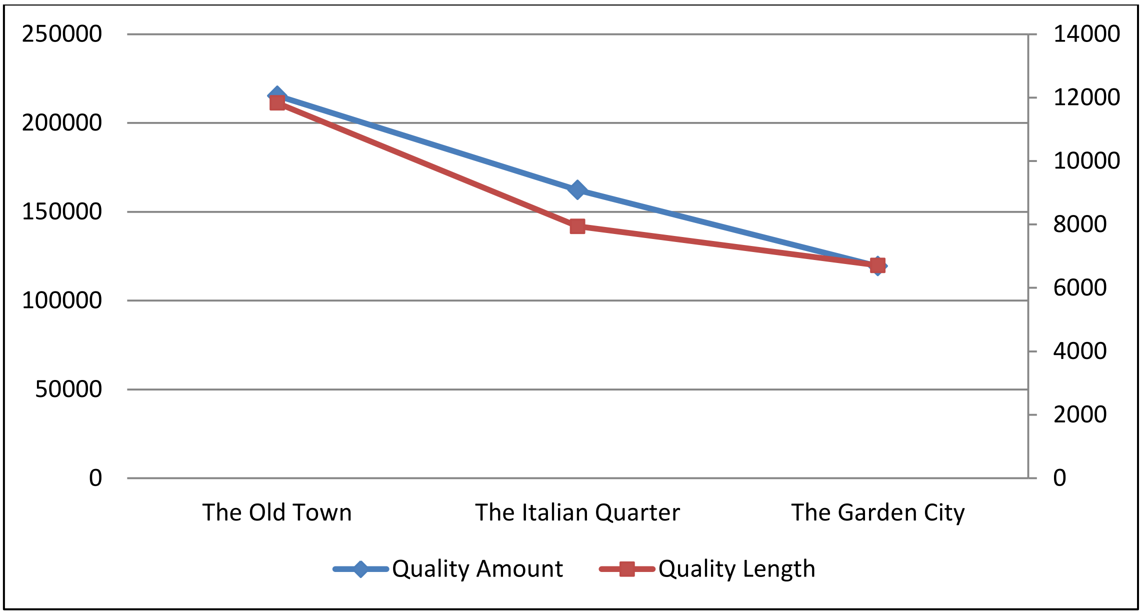


Figure 7.50: Quality amount according to Goodness within the three cases

When dividing the total quality amount by the total quality length in each urban fabric, it can be observed that the Italian Quarter has the best quality value, which represents 2,043 per 100 meters. The Old Town comes second with 1,820 per 100 meters, followed by the Garden

City with 1,778 per 100 meters. Therefore, and regardless of the quality length, the Italian Quarter has a better quality amount and factors than the Old Town and the Garden City (Table 7.12).

The total length of street edges	Attractive Amount	Pleasant Amount	Average Amount	Dull Amount	Unattractive Amount	Total Amount	Average Quality Factor
The Old Town 11,828 m	43277 20.1%	43348 20.1%	99165 46.6%	22257 10.3%	7228 3.4%	215275 100%	18.2
The Italian Quarter 7,940 m	49682 30.6%	50111 30.9%	48364 29.8%	9460 5.8%	4602 2.9%	162219 100%	20.43
The Garden City 6,709 m	0 0%	31301 26.2%	75608 63.4%	10490 8.8%	1896 1.6%	119295 100%	17.78

Table 7.12: Quality amount according to Goodness within the three cases

In general, the Old Town holds the highest amount of *bad* (*dull* and *unattractive*) qualities followed by the Italian Quarter and then the Garden City. The *average* quality takes a different path in the diagram, which represents the highest average quality in the Old Town, followed by the Garden City and then the Italian Quarter. The *good* (*attractive* and *pleasant*) quality shows a different path in the diagram, where the highest good quality is located in the Italian Quarter, followed by the Old Town and then the Garden City (Figures 7.51).

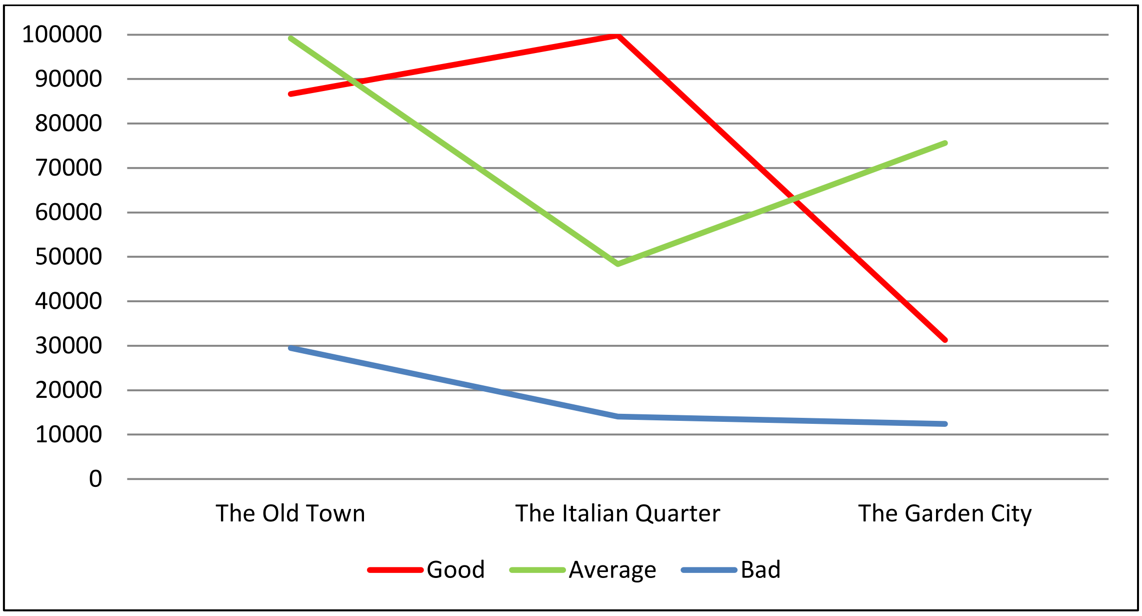


Figure 7.51: Quality amount according to Goodness within the three cases

Finally, the Old Town is represented by a uniqueness of traditional architecture style and details, where the good conditions, of its buildings still play a major role in attracting local people and visitors on the main and connecting streets. However, the deterioration of the majority of cul-de-sacs and many main and connecting streets decreases the liveability of the urban fabric. In addition, the Italian Quarter is considered to be the most attractive urban form within the case studies, due to the Mediterranean approach in organising buildings and creating public spaces with a variety of land uses, as well through the adoption of the traditional building elements of the Old Town. The urban fabric of the Italian Quarter does not only increase street liveability at the neighbourhood scale, but it also enhances the liveability of the whole city centre of Tripoli.

7.6 Measuring Social Life: Selecting and Characterising Cases

This section discusses the concept of city life, a discussion that is later used to build an analytical method of understanding the relationship between social life, street quality and street centrality. Jan Gehl (2010) states that social interactions provide a clear understanding of the microscopic structure of the socio-physics of a neighbourhood. Hillier (2005) indicates that social physics are a link between humanistic and scientific poles of urban discourse. He adds that studying socio-physics can provide a deeper experience of the built environment.

Moreover, an observer-based environmental assessment (OBEAs) is another method of measuring the quality of social aspects and the physical built landscape. This method initially stems from a reaction of policy-makers towards the deteriorating quality of the environment in the late 1960s and early 1970s in order to observe how economic growth affects urban areas. This method identifies the urban fabric quality by assessing several case studies to determine the common physical setting and spatial properties, or to determine the social aspects that may increase or decrease the quality of urban form. Finally, OBEAs are functional tools for the evaluation of environmental quality that are particularly associated with human interaction with the built environment "*OBEAs assist in the development of physical measures of environmental quality, provide data on environmental quality trends from the human perspective, and provide assessments of quality along dimensions with particular human relevance*" (Gifford, 2002, p 85). The nature of such a mechanism suggests a specific method in analysing the models of environment-behaviour interactions within the selected urban fabrics. This method is based mainly on observation and perception surveys, in order to show general attitudes of how people see their environment. In addition, these models must clarify a range of aspects, with the aim of finding a relationship between the quality of the built environment and public life and activities (Rapoport, 1990).

In order to study the relationship between the quality of the urban fabric and social life, samples of streets are selected according to two categories: the first shows the degree of centrality and the connectivity of a street, and the second shows the physical quality of the same street. Accordingly, three types of streets are selected; main, connecting and cul-de-sacs, each with three dimensions of quality; good (attractive and pleasant), average and bad (dull and unattractive). According to Hillier (2005), neighbourhoods are macro-physical objects reproduced and motivated by social life. The aim of this section is to subjectively understand the link between the quality of built environment and social life. The following steps show the selected samples of different streets according to their centrality and quality, in order to better understand the patterns of social life.

7.6.1 The Old Town

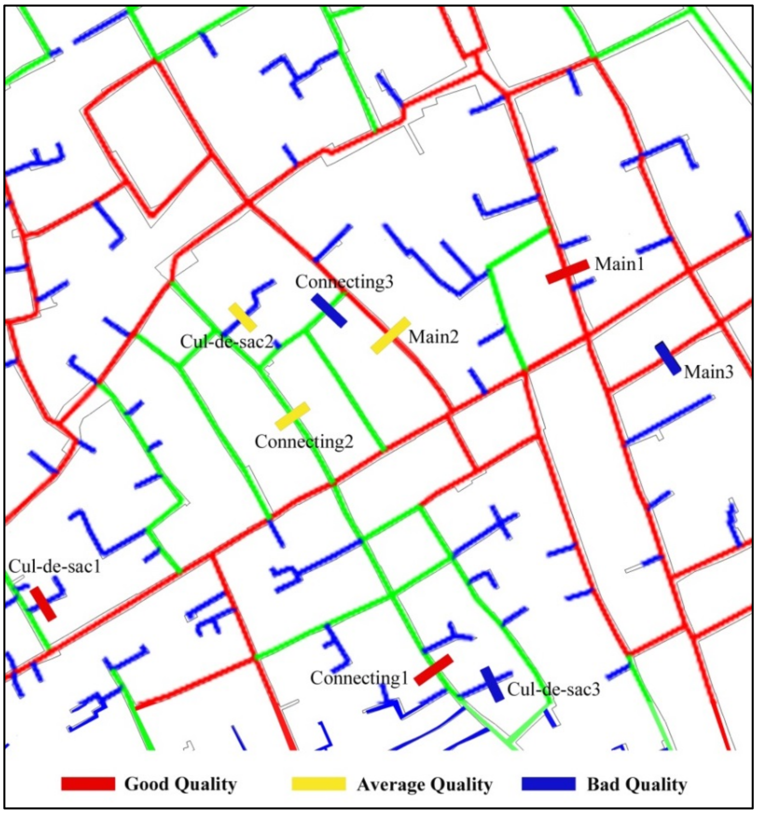


Figure 7.52: The selected street samples of the Old Town

7.6.1.1 Main Streets

In this urban form (Figure 7.52), the *good* models of the main streets show attractive qualities, where the diversity of functions, façade modelling and maintenance, as well as refined architectural details play a major part in increasing the street quality. With few passive façades and a mixture of small and large units, this sample street exhibits attractive characteristics.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Good Example	25	29	F+M+D	O	S			725
	158	28	F+M+D	O		S		4424
	16	27	F+M	O+S	D			432
	52	23	D	F+M	S+O			1196
Total	251							6777

Table 7.13: *Good* examples of main streets in the Old Town

Therefore: overall *good* Quality Amount = 6777/ 251 * 100 = 2700 per 100m

The *average* model of main streets is one that has some diversity of functions and relatively good details. Moreover, it has only a few passive façades, uninteresting façade design in neutral condition, along with a mixture of large and small units.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Average Example	189	19		F+D	S+M+O			3591
	66	17		F	S+O+M+D			1122
	43	16		F	S+O+M	D		688
Total	298							5401

Table 7.14: *Average* examples of main streets in the Old Town

Therefore: overall *average* Quality Amount = 5401/ 298* 100 = 1812 per 100m

Although the different functions and openness contribute moderately in *bad* main streets models, the dullness of this street is a consequence of large units, the flatness of external building walls in bad overall condition and humble street fronts details.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	67	14		F+O		S	D+M	938
	67	12		F	O	S	D+M	804
Total	134							1742

Table 7.15: *Bad* examples of main streets in the Old Town

Therefore: overall *bad* Quality Amount = 1742/ 134 * 100 = 1300 per 100m

7.6.1.2 Connecting Streets

The quality value of *good* connecting streets is mainly a result of well-maintained façades and a good quality of architectural details. On the other hand, the number of units and the diversity of land uses contribute less to the overall quality amount, but still maintain a pleasant environment along street edges.

	Length	Factor	7	5	3	2	1	Total Quality
Good Example	139	27	M+D	F+S	O			3753
	53	21	M	D	S+F+O			1113
Total	192							4866

Table 7.16: *Good* examples of connecting streets in the Old Town

Therefore: overall *good* Quality Amount = 4866/ 192 * 100 = 2534 per 100m

The plain façades, as well as relatively small units, are the main characteristics that constitute the *average* quality of this street, where land use rates between good and bad. In addition, this street sample has little openness and few architectural details.

	Length	Factor	7	5	3	2	1	Total Quality
Average Example	92	19		F+S+M		O+D		1748
	100	17		M+S	F	O+D		1700
	96	16		M+S		O+F+D		1536
Total	288							4984

Table 7.17: *Average* examples of connecting streets in the Old Town

Therefore: overall *average* Quality Amount = 4984/ 288 * 100 = 1730 per 100m

A reduced amount of mixed-use buildings, with passive façades and few or no details, generate the *bad* quality of this connecting street, while the number of units as well as the general façade modelling and conditions still result in an increase quality of this sample.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	59	14		S+M		D	F+O	826
	57	09			S+M		F+O+D	513
Total	116							1339

Table 7.18: *Bad* examples of connecting streets in the Old Town

Therefore: overall *bad* Quality Amount = 1339/ 116 * 100 = 1154 per 100m

7.6.1.3 Cul-de-sacs

A generally *good* cul-de-sac is shaped by small units, many doors and a reasonable interaction between public and private spaces, as well as by the pleasant maintenance and some relief in the façade. Never the less, little attention to details, humble colouring and little diversity in functions reduce its quality amount.

	Length	Factor	7	5	3	2	1	Total Quality
Good Example	65	24	S+O	M	D	F		1560
Total	65							1560

Table 7.19: *Good* examples of cul-de-sacs in the Old Town

Therefore: overall *good* Quality Amount = 1560/ 65 * 100 = 2400 per 100m

The *average* quality amount of cul-de-sacs' is mainly powered by a good number of doors and units, a reasonably good interaction between indoor and outdoor spaces, and pleasant façades. However, there are no obvious details and no visible variation of functions.

	Length	Factor	7	5	3	2	1	Total Quality
Average Example	88	19		O+S+D	M		F	1672
Total	88							1672

Table 7.20: *Average* examples of cul-de-sacs in the Old Town

Therefore: overall *average* Quality Amount = 1672/ 88 * 100 = 1900 per 100m

Finally, the most unattractive attribute value in this urban fabric is represented by *bad* quality of cul-de-sacs, which host large units with few doors and passive façades, including the domination of residential use, the deteriorated conditions of flat building surface and no details.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	62	07				O+S	F+M+D	434
Total	62							434

Table 7.21: *Bad* examples of cul-de-sacs in the Old Town

Therefore: overall *bad* Quality Amount = 434/ 62 * 100 = 700 per 100m

7.6.2 The Italian Quarter

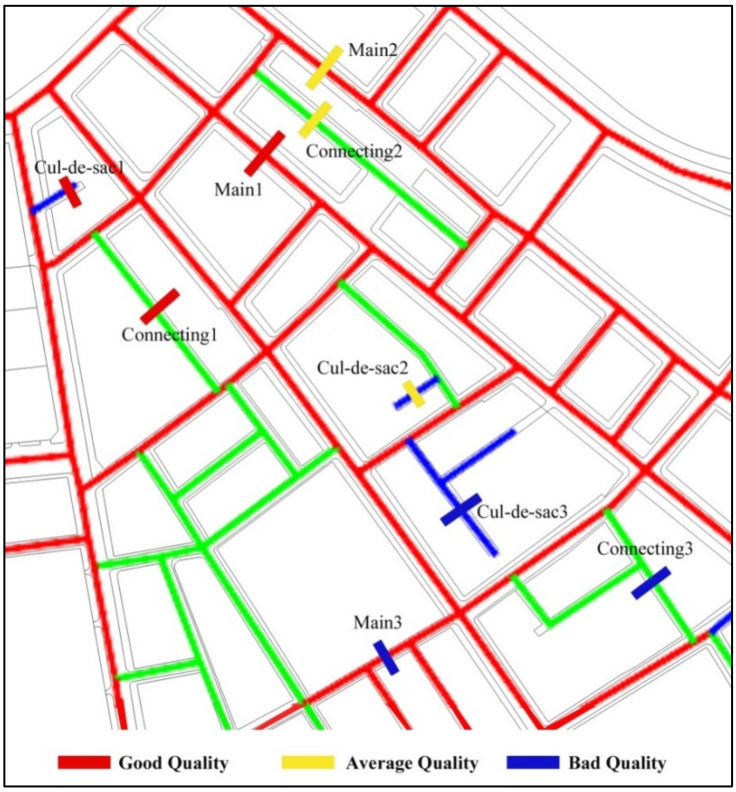


Figure 7.53: The selected street samples of the Italian Quarter

7.6.2.1 Main Streets

In the Italian Quarter (Figure 7.53), the *good* models of the main streets show an attractive quality, where diversity of functions, number of units with many doors and active and attractive façades play a major part in promoting a higher street quality. With pleasant façade modelling in good condition, and with some architectural details, these streets generally maintain an attractive quality.

	Length	Factor	7	5	3	2	1	Total Quality
Good Example	274	29	S+F+O	M	D			7946
Total	274							7946

Table 7.22: *Good* examples of main streets in the Italian Quarter

Therefore, overall *good* Quality Amount = 7946 / 274 * 100 = 2900 per 100m

This model of main streets is generated by a mixture of large and small units, few passive façades and some diversity of functions. Moreover, it has uninteresting façade designs, neutral building conditions and relatively good details, all which produce a generally *average* street quality.

	Length	Factor	7	5	3	2	1	Total Quality
Average Example	30	21	S+O		M+D		F	630
	257	19		F+O	S+M+D			4882
Total	287							5513

Table 7.23: *Average* examples of main streets in the Italian Quarter

Therefore, overall *average* Quality Amount = 5513 / 287 * 100 = 1920 per 100m

Despite the fact that a diversity of functions and quantity of units only contribute moderately in the *bad* main street model, the unattractiveness of this street quality is a result of passive façades, flatness of external building walls with bad building condition and minimal detailing of street fronts.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	162	14		F	S	O+M+D		2268
Total	162							2268

Table 7.24: *Bad* examples of main streets in the Italian Quarter

Therefore, overall *bad* Quality Amount = 2268 / 162 * 100 = 1400 per 100m

7.6.2.2 Connecting Streets

The quality value of *good* connecting streets is mainly a result of small units, the diversity in functions and active façades. On the other hand, façade modelling and condition, together with poor architectural details, contribute less to the quality amount, which helps this sample to sustain an attractive environment along the street fronts.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Good Example	54	29	S+F+O	M	D			1566
	24	28	S+F+O	M		D		672
	25	24	S+F	O	M	D		600
Total	103							2838

Table 7.25: *Good* examples of connecting streets in the Italian Quarter

Therefore, overall *good* Quality Amount = 2838 / 103 * 100 = 2755 per 100m

The *average* quality of this street is maintained primarily by a good number of units, a good variety of land use, modest participation of openness, average façade conditions and modelling, as well as relatively good detailing.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Average Example	200	19		S+F	O+M+D			3800
Total	200							3800

Table 7.26: *Average* examples of connecting streets in the Italian Quarter

Therefore, overall *average* Quality Amount = 3800/ 200 * 100 = 1900 per 100m

The reduced amount of mixed-use, passive façades and large units contribute negatively to the quality of this model, while good façade modelling and condition, as well as average architectural details participate actively in increasing the quality of *bad* connecting streets.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	72	14		M	D	S+F+O		1008
	76	12			M+D	S+F+O		912
Total	148							1920

Table 7.27: *Bad* examples of connecting streets in the Italian Quarter

Therefore, overall *bad* Quality Amount = 1920 / 148 * 100 = 1297 per 100m

7.6.2.3 Cul-de-sacs

The *good* cul-de-sac quality is generated by small units, many doors, the interaction between public and private spaces and the humble maintenance and some relief in the façade, whereas little detailing, little colouring and little diversity of functions reduce its overall quality amount.

	Length	Factor	7	5	3	2	1	Total Quality
Good Example	46	21	S+O		M+D		F	966
Total	46							966

Table 7.28: *Good* examples of cul-de-sacs in the Italian Quarter

Therefore, overall *good* Quality Amount = 966 / 46 * 100 = 2100 per 100m

Additionally, the *average* cul-de-sac's quality amount is mainly a result of passive façade, a mixture of large and small units, and few architectural details with no visible variation of function.

	Length	Factor	7	5	3	2	1	Total Quality
Average Example	55	18		M+O	S+D	F		990
Total	55							990

Table 7.29: *Average* examples of cul-de-sacs in the Italian Quarter

Therefore, overall *average* Quality Amount = 990 / 55 * 100 = 1800 per 100m

Finally, the most unattractive attribute values in this urban fabric are represented by a *bad* quality of cul-de-sacs, which host large units with few doors, passive façades, the domination of a single residential use, a deteriorated condition of flat building surfaces and no interesting details.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Bad Example	52	09			S+O		F+M+D	468
	98	08			S	O	F+M+D	784
Total	150							1252

Table 7.30: *Bad* examples of cul-de-sacs in the Italian Quarter

Therefore, overall *bad* Quality Amount = 1252 / 150 * 100 = 834 per 100m

7.6.3 The Garden City

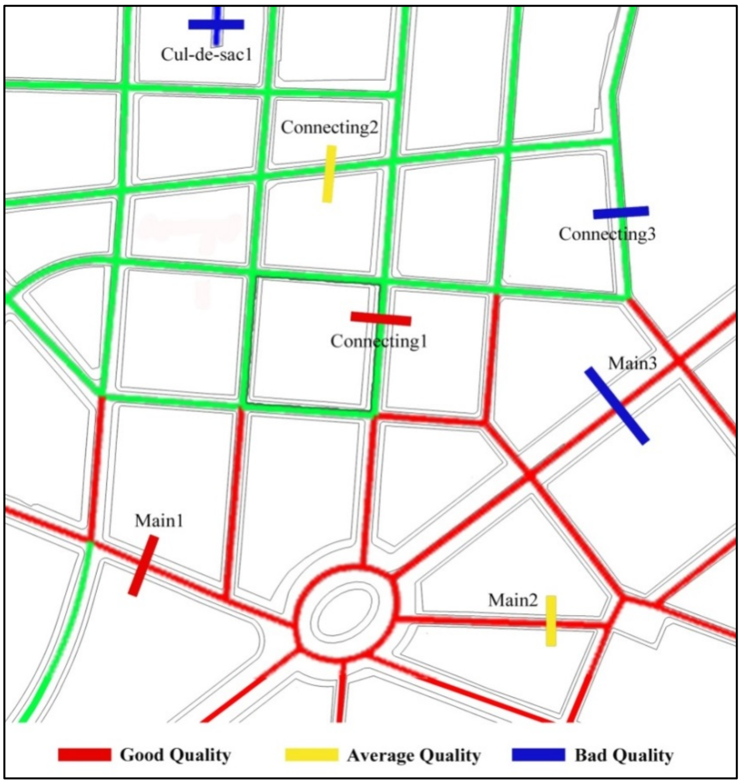


Figure 7.54: The selected street samples of the Garden City

It is important to note that the selected 400 x 400 m^2 within the Garden City has only one cul-de-sac, as cul-de-sacs are not characteristic of the network structure in the Garden City (Figure 7.54).

7.6.3.1 Main Streets

In this neighbourhood, the *good* models of the main streets show an attractive quality in façade modelling and condition with pleasant architectural details. Although the street model has a mixture of large and small units, a degree of passive street edges and some diversity in functions, this street still maintains a generally attractive quality.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Good Example	197	23	M	S+D	O+F			4531
	45	21	M	D	S+O+F			945
Total	242							5476

Table 7.31: *Good* examples of main streets in the Garden City

Therefore, overall *good* Quality Amount = 5476 / 242 * 100 = 2262 per 100m

The neutral model of the main street is caused by pleasant façade modelling and condition, as well as moderate architectural details. Moreover, it has large units, passive street edges and little diversity in functions, thus producing a generally *average* street quality.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Average Example	192	19		M	D	S+O+F		3648
Total	192							3648

Table 7.32: *Average* examples of main streets in the Garden City

Therefore, overall *average* Quality Amount = 3648 / 192 * 100 = 1900 per 100m

The *bad* main street model results from different street qualities aligned along its edges, which range from attractive to dull attributes. Good façade modelling and condition contribute significantly towards increasing this street quality. On the other hand, the unattractiveness of this street quality is a result of few architectural details, a small degree of diversity in functions, and large units.

	Length	**Factor**	**7**	**5**	**3**	**2**	**1**	**Total Quality**
Bad Example	75	21	M	D	S+O+F			1575
	166	16		M	D+O+F	S		2656
	90	12			M+F	O+S+D		1080
	49	11			M	F+O+S+D		539
	88	08			M	O	F+S+D	704
Total	468							6554

Table 7.33: *Bad* examples of main streets in the Garden City

Therefore, overall *bad* Quality Amount = 6554 / 468 * 100 = 1400 per 100m

7.6.3.2 Connecting Streets

The *good* quality of connecting street is mainly the result of the attractiveness of good façade modelling and condition, architectural details and many units and doors. The street fronts in this sample represent an attractive environment, as the general façade activeness and diversity of functions have less participation in the overall quality amount.

	Length	Factor	7	5	3	2	1	Total Quality
Good Example	64	24	M+D	S	O	F		1536
	127	23	M	S+D	O+F			2921
	64	22	M	S+D	O	F		1408
	108	21	M	D	S+O+F			2268
Total	363							8133

Table 7.34: *Good* examples of connecting streets in the Garden City

Therefore, overall *good* Quality Amount = 8133 / 363 * 100 = 2240 per 100m

The pleasant street fronts, with modest participation of façade passiveness, diversity in functions, a mixture of small and large units and relatively good details lead to an *average* quality of this street.

	Length	Factor	7	5	3	2	1	Total Quality
Average Example	58	19		M	D	S+O+F		1102
	121	17		M	D+O+F+S			2057
	63	16		M	D+O+S	F		1008
Total	242							4167

Table 7.35: *Average* examples of connecting streets in the Garden City

Therefore, overall *average* Quality Amount = 4167 / 242 * 100 = 1721 per 100m

A reduced amount of mixed-use activities with passive façades and large units contribute negatively to this model, while façade modelling and condition together with the architectural details still participate actively in increasing the quality of *bad* connecting streets.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	75	16		M	D+O+S	F		1200
	71	11			M+D	O+S	F	781
	158	08			M	D	O+S+F	1264
Total	304							3245

Table 7.36: *Bad* examples of connecting streets in the Garden City

Therefore, overall *bad* Quality Amount = 3245 / 304 * 100 = 1067 per 100m

7.6.3.3 Cul-de-sacs

Finally, the *bad* quality in this model is caused by modest street fronts and details, large units with few doors, passive façades and the domination of a single residential use.

	Length	Factor	7	5	3	2	1	Total Quality
Bad Example	54	11			M+D	O+S	F	594
Total	54							594

Table 7.37: *Bad* examples of cul-de-sacs in the Garden City

Therefore, overall *bad* quality amount = 594 / 54 * 100 = 1100 per 100m

Table 1.13 shows the overall quality of built environment in the selected streets within the three cases. These findings are compared with social life in order to understand the relationship between the street centrality, quality and liveability.

	The Old Town			The Italian Quarter			The Garden City		
Street Quality	Good	Average	Bad	Good	Average	Bad	Good	Average	Bad
Main Streets	2700	1812	1300	2900	1920	1400	2262	1900	1400
Connecting Streets	2534	1730	1154	2755	1900	1297	2240	1721	1067
Cul-de-sacs	2400	1900	700	2100	1800	834			1100

Table 7.38: Overall quality of the selected street samples within the three cases

7.7 Measuring Social Life: Indicators Defined

A sense of society has been described as a feeling of belonging, and a feeling that people matter to each other as individuals and groups, where their mutual trust will be enhanced through their tasks within the homogeneity of a community. The concept of 'community' is traditionally based on a certain area or place, such as a neighbourhood, town or city. A sense of community reflects the symbolic interaction in which people engage as they use different aspects of the physical environment. The sense of community can be improved by the potential of the urban fabric (Figure 7.55). This potential sustains visual coherence, diversity and attractiveness of street edges, as well as providing pedestrian-friendly spaces and maintaining a good quality of streetscapes, in order to promote social interaction and community life (Butterworth, 2000).

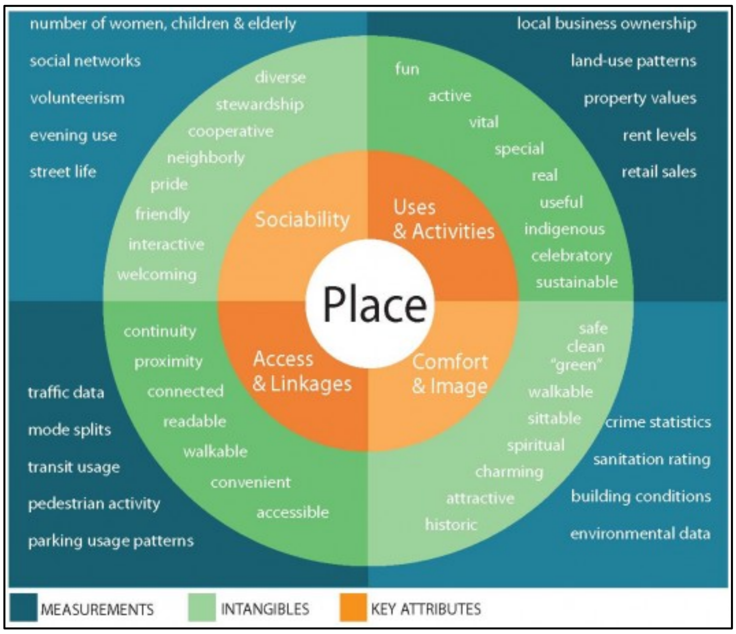


Figure 7.55: Principles of successful places (PPS, 2000)

Jan Gehl (2010) indicates that socialising with others in public spaces is an important prerequisite in improving city life. Therefore, human behaviour is finely controlled by a range of social structures that identify and strengthen the individual's sense of belonging and security. "*Social capital is made up of many different components. It has variously been defined as a feeling of belonging and that community member needs will be met, as the series of social networks that inspire trust and reciprocity among citizens as a psychological sense of community, and as civil society or the world of voluntary and purposeful organisations distinct from government where citizens draw together to socialize youth, take care of the sick, promote cultural and political life, and forward their social and individual needs*"(Ewing, R. & Kreutzer, R., 2006, p89). People's social activities and their direct senses are vital to whether they walk, stand and sit, as well as communicating with each other and enjoying the public spaces of a city, a town or a neighbourhood.

7.7.1 Walking

Walking is a form of experiencing and understanding places: it is not just an absolute movement through a physical setting, but it dynamically plays a part in, and participates in the social and cultural life of a place. On foot, inside an urban space, people can contribute to different patterns of public life (Marcus & Francis, 1998). The amount of pedestrian traffic on sidewalks produces a rhythm of perceiving spatial urban places and practicing the social, cultural, homogenous and natural interactive life. Gehl states that, in addition to being an everyday life activity, walking is a substantial consequence of personal and collective senses in terms of urban places (Gehl, 2010). By walking, people are most likely to be included in different models of interaction which mutually characterise daily social-spatial environments (Whyte, 1980).

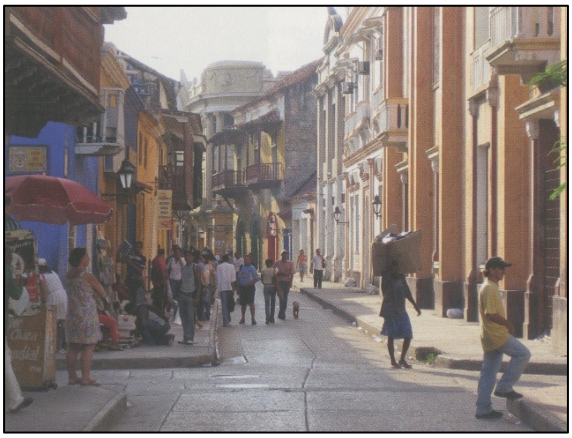


Figure 7.56: Walking activities along streets (Gehl, 2010, p119 & 127)

Jan Gehl (2010) points out that good walking routes are important elements within any urban form during day or night, in order to support pedestrian movement and provide walkers with a feeling of safety and expediency. "*People without cars must have access to what the city has to offer and the opportunity for a daily life unrestricted by poor transport options*" (Gehl, 2010, p109). Therefore, social activities, in general, are a fundamental aspect of creating a well-functioning and attractive city for everyone (Figure 7.56).

7.7.2 Standing

Standing is considered to be a stationary activity, representing only a minor percentage of all necessary activities. An urban standee has a flexible ability to either take a short pause at any time or to glance at a particular action within the public space, or to stop for a long time and admire the quality of architecture or a piece of art, enjoy what is on display in shop windows, chat with friends, wait for an appointment, or just to catch his or her breath from a long distance travelled. Short stops can occur unexpectedly within city space, regardless of the scene and place, while pedestrians who seek out long-time stops are usually required to find a good place to stand comfortably (Gehl, 2002).

In addition, street edges play a major part in enhancing the long-time standing activities in public spaces. People who stand at the edge of a place have an ability to watch everything; as they face the whole scene while their backs are protected, they avoid any surprises from behind. Furthermore, the phenomenon of the edge effect provides a physical and psychological advantage and separates standees from moving pedestrian during their waiting or socialising moments (Gehl, 2010).

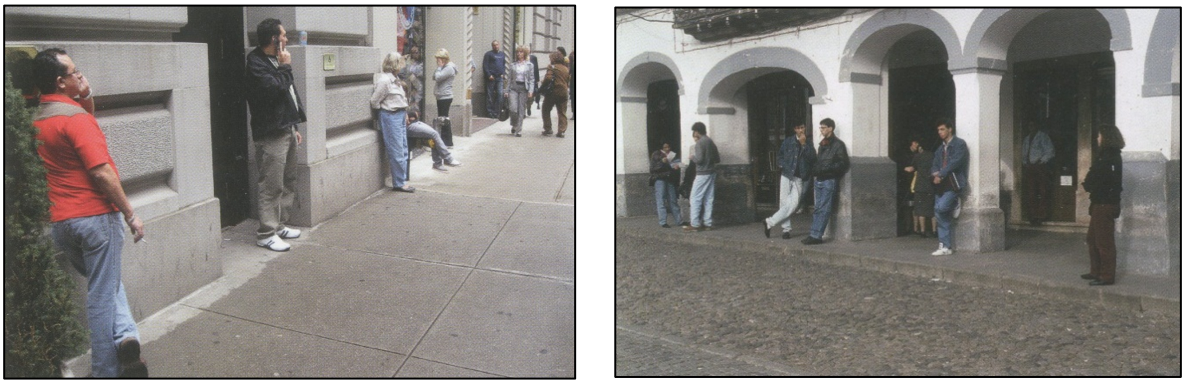


Figure 7.57: Standing activities along street edges (Gehl, 2010, p136 & 140)

Despite the fact that urban edges are potentially popular staying zones and *"city space without edges provides poor conditions for staying"* (Gehl, 2010, p137), the details of these edges still fruitfully influence the performance of this activity (Figure 7.57). Jan Gehl (2010) points out that façades with architectural details such as columns, steps and niches are more likely to provide an invitation for staying, while spaces surrounded by smooth façades and a lack of architectural details weaken the opportunity of staying and encourage moving activities. "*Quite simply, good cities for staying have rough façades and good support points. In contrast, cities without edges or with smooth building façades devoid of detail have little to offer in terms of staying psychology*" (Gehl, 2010, p139).

Consequently, street elements and façades with interesting details have a large role in promoting staying in public spaces, and perhaps the same spaces will become desolate and inconvenient for staying if the irregularity of detailed façades is missing or street elements are removed.

7.7.3 Sitting

Since the attraction of the good quality of public spaces extends the staying duration of users and encourages them to enjoy different social activities such as eating, reading, playing or talking, people find it much easier to sit and perform these activities, rather than to take a short-stop or stand. Generally, sitting activities take place only where a microclimate is pleasant. As more considerations are taken in choosing sitting locations than standing ones, the preferable places to sit are mostly along the edges of public spaces (Figure 7.58).


Figure 7.58: Sitting activities along street edges (Gehl, 2010, p140 & 141)

Even so, standees and sitters prefer to cover their backs and face interesting or good views, but sitting activities require more quietness than standing ones. As the sitting activities are influenced by the choice of a placement, people always look for a proper place with clear views of the surroundings and a comfortable seat to sit and relax (Gehl, 1987).

William Whyte (1980) indicates that secondary sitting options such as steps, flower pots, stones, bollards or pedestals can play a major role in supporting these activities, rather than benches or café chairs. He adds that despite few benches being provided in Venice, the whole city provides other architectural elements for sitting, which contributes to the richness of the urban fabric.

In addition, cafes play a significant role in improving community interactions in the modern city and participating in social activities, by bringing pleasure and enjoyable aspects to city life. Sitting on comfortable seats and watching city life, while having refreshments and socialising in public spaces, encourages a longer stay and makes these activities full of recreation and leisure. Finally, sitting activities are the means to achieving a vibrant enjoyable city, where beauty, entertainment and amusement of places have an important effect on people staying, and length of their stay in public spaces (Marcus & Francis, 1998).

According to Jan Gehl (1994 & 2010), in order to establish a clear pattern that represents the large diversity of activities in public urban spaces, there is a need to arrange the most common human activities based on their degree of necessity. The necessary activities located at one end of this scale, emerge from common activities of city life such as; walking to certain destinations, waiting for someone or a bus and sitting in public spaces. These could be more compulsory activities, like necessarily selling products, resting after a long journey or fixing something. The optional activities are placed on the other end of the scale. These activities are represented by people who take pleasure in being in such space. These activities are the most popular city activities, and usually take place along street fronts that have a good quality, where people enjoy walking for pleasure, standing with friends, watching something amusing, or even sitting on a street bench or on a café chair.

Social human necessities require escorting other people in walking or staying activities, with the aim of achieving a communication between individuals or groups. The quality of public space holds a vital role in improving the life in city space, since the richness of the quality increases life quality, and the absence of quality decreases it. Social activities might be a range of diverse activities, including children at play, greetings and conversations, as well as passive contact, like simply watching or listening.

Initially, and for different levels of these activities, city spaces function as meeting places, where people gather and share their happiness and sadness, using the city as a real meeting place (Gehl, 2010). Jane Jacob (1961), in her book "the Death and Life of Great American Cities", mentions that city space had been functioning as a significant social meeting place during the last century, until the advent of the planning system of modernism and a widespread use of vehicles.

Recent urban procedures, in most developed countries, take into consideration the integration of environmental and social concerns when setting up new developments. In this study, the process of quantifying the quality of social activities is based mainly on the formal methods of Whyte, Marcus and Francis, and Gehl. These models of analysis are directly related to the human social life which emerges from the great diversity of activities in city space. The first method of analysis that is adopted in this study is based on Clare Marcus and Carolyn Francis's (1998) approach, where walking, standing and sitting are considered to be the principal daily human activities in public spaces. In addition, the second method is derived from Jan Gehl's approach (2010) in analysing human activities, which organises the most important categories by their degree of necessity.

7.8 Findings: the Quantitative Analysis of Social Life

This section is an experimental analysis, focusing on the perception of everyday scenes in a real environmental setting, in which public social life takes places. Several scenes are selected as tools of measuring the relationships between social activities and the physical landscape, as the number of scenes included in the study can assist in achieving a more accurate outcome (Gifford, 2002). "*for relatively similar scenes, there is some controversy about the relative importance of person-based and environment-based influences on perception,…… the more scenes differ, the stronger the influence of the environment, the more scenes are similar, the greater the influence of personal factors*" (Gifford, 2002, p26).

Ordinary, everyday human activities are related, and shift either purposefully or unintentionally between walking, standing, relaxing, sitting and chatting, which characterises the life in city public spaces. "*Unpredictability and unplanned, spontaneous actions are very* *much part of what makes moving and staying in city space such a special attraction*" (Gehl, 2010, p20).

This section shows a general indication of human dimensions within the selected cases of Tripoli's city centre. Principle social activities, such as walking, standing and sitting including watching, playing and chatting, will be quantified and measured on different types of streets. The most important objective of this method is to measure the liveability of Tripoli's streets and then calculate any correlation between the different types of streets and the quality of social life.

The objective of this section is to provide a foundation of data and material, in order to quantify and qualify the public space and the pedestrian-related conditions found within Tripoli's urban centre. The baseline data and analysis from this study will be used for future studies, to provide a benchmark to evaluate core action areas and to measure the success of projects, programmes and policies. The data collection and analysis methodology is designed in such a way to ensure that a robust and replicable process is put in place.

This study utilizes a quantitative methodology for recording and understanding public life in an urban context. The analysis is based on ground observations conducted by the Author. The charts, maps, and illustrations in this study are generated from data using a replicable methodology in order to create a baseline for assessing the quality of public life in Tripoli's city centre. Objectively, the study examines different types of streets by quantifying the levels of social and community engagement. Practically, the study investigates the relationship between the hierarchy of streets and individual levels of social life. Data was obtained from observations that measure the frequency of social activities along streets caregtrised by their indeces of centrality. These urban fabrics range from the traditional, mixed-used and pedestrian-oriented, to the modern and car-dependent urban contexts. Within this study, the social activities in public spaces consist of both moving and stationary activities noticeable in the public domain, which mostly cover walking, standing and sitting (Gehl, 2010 and Whyte, 1980). In this study, human necessities in the city life refer to necessary, optional and social dimensions.

Since cities evoke a sense of delight and pleasure, their ambiance arises not only from social and cultural factors, but also from their physical form. "*Good city appearance is not an* *abstract aesthetic phenomenon; it depends on the evaluations of the people who regularly experience the city*" (Nasar, 1998, pVII).

The measurements carried out on the selected urban forms of Tripoli's city centre are to study the quantity and quality of all the social life in all the case studies. Based on the research criteria of analysing social activities, moving and stationary activities are the main target for this study. These include walking, standing and sitting. In order to measure outdoor activities, the total social activities are categorised as necessary, optional or social activities. The first overall observation, which analyses moving and stationary activities, demonstrates that the Italian Quarter is the most active urban form within Tripoli's city centre, for both types of activities. Moving activities within the Italian urban fabric are more prevalent than the other two cases at both peak and off-peak times, while the Garden City shows the least vibrant patterns of both moving and stationary activities.

Snapshot observations were conducted for all cases, on weekdays between the 2nd and the 18th of December 2011. The weather was warm (25-30 C), sunny and bright. Regardless of automobile movement, each snapshot was taken according to pedestrians and social life in the city centre of Tripoli. First of all, the study classifies times in the city according to the patterns of city life. The study finds two different times of the day that are full of social life, and three different times that can be classified as more quiet periods within the city centre. In this analysis, the busiest times, called *peak times*, are the hours between 11~14 and 18~20, whereas the periods with less social life, *off-peak times*, are those between 08~10, 15~17 and 21~23. The selection of streets is based mainly on the assessment of the MCA and the quality street fronts. This analysis is carried out in specific locations along streets that have different degrees of centrality. These sites measure between 30 and 50 meters in length. The study measures the social life that occurs on both sides of the street and does not consider the width of the street in question. The different activities of social life are all measured per hour.

7.8.1 The Old Town

In the Old Town, the selected samples of main streets exhibit a greater city life than the connecting streets and cul-de-sac samples. Main streets that are characterised by *good* quality have the highest amounts of social life, compared to those activities taking place along main streets with *average* and *bad* quality during both peak and off-peak times (Figures

7.59 & 7.60). In general, the observations shows that almost three quarters of the social activities on three types of main streets are performed by walkers. Standees are the second largest group, accounting for between 20% ~ 26% (peak times) of the total social interactions, while sitting constitute the fewest activities with only 2% ~ 4% (peak times) of the total social life of the selected main streets. However, the percentage of standees and sitters among the total city life increases during off-peak times, making these streets more convenient for socialising, although the number of urban users declines dramatically. The number of people socialising along the *good* main streets is the highest, with 44% ~ 52%, while necessary activity comes second with 38% ~ 48%. The optional activities are the least undertaken, with 7% ~ 9% occurring on main streets, and show a significant difference in social life when the quality of the built environment decreases (Appendix 7).

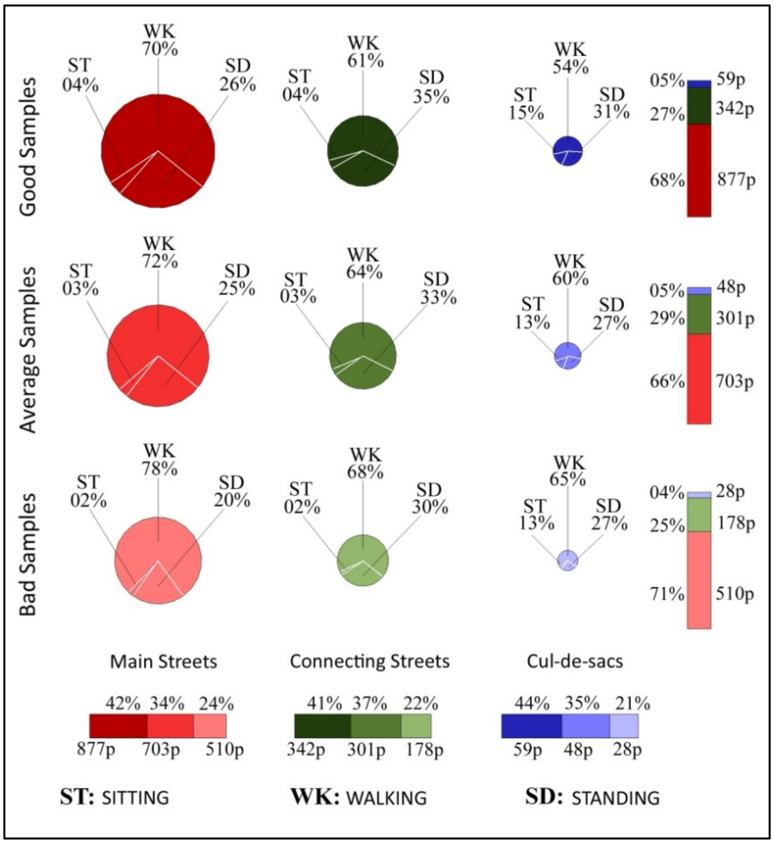


Figure 7.59: Social life according to the physical activities in the Old Town (Peak Times)

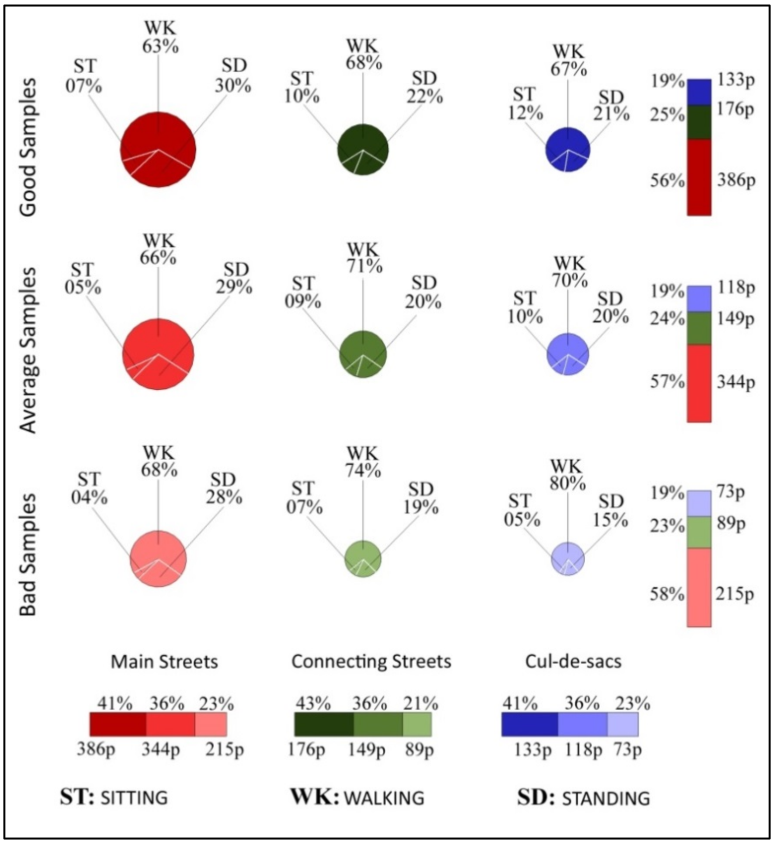


Figure 7.60: Social life according to the physical activities in the Old Town (Off-Peak Times)

Moreover, whether during peak or off-peak times, there is more social life on *good* connecting streets than on *average* or *bad* ones. The overall study along these three types of connecting street qualities shows that walking is the most common social activity, which increases during off-peak times to between 68% and 74% of all activities compared with peak times when it is between 61% and 68%. Standing is second, which represents between 30% and 35% of the total social interaction during peak times, and only between 19% and 22% of the total social interaction during off-peak times. Sitting activities constitute the least quantity of social activities along these streets, presenting just between 2% and 4% of the total social life during peak times and between 7% and 9% during off-peak times. This pattern of city life shows that the number of walkers and sitters increases during off-peak times, while the quantity of standees decreases during the same times (Tables 7.39 &7.40) and (Appendix 7).

Street Type	Quality	Walking			Standing			Sitting			Total
		NA	OP	SO	NA	OP	SO	NA	OP	SO	
Main Streets	Good	299 48%	55 09%	265 43%	35 15%	18 08%	178 77%	05 19%	10 37%	12 44%	877
	Average	258 51%	41 08%	207 41%	34 19%	12 07%	130 74%	05 24%	07 33%	09 43%	703
	Bad	219 55%	28 07%	151 38%	23 22%	06 06%	73 72%	03 30%	03 30%	04 40%	510
Connecting Streets	Good	114 54%	20 10%	76 36%	28 23%	11 09%	81 68%	03 25%	04 33%	05 42%	342
	Average	114 59%	17 09%	61 32%	26 26%	08 08%	65 65%	03 30%	03 30%	04 40%	301
	Bad	76 63%	08 07%	36 30%	15 28%	04 08%	34 64%	02 40%	01 20%	02 40%	178
Cul-de-sacs	Good	10 31%	05 16%	17 53%	06 33%	03 17%	09 50%	01 11%	03 33%	05 56%	59
	Average	11 38%	04 14%	14 48%	05 39%	02 15%	06 46%	02 34%	02 33%	02 33%	48
	Bad	08 44%	02 12%	08 44%	03 43%	01 14%	03 43%	01 34%	01 33%	01 33%	28

Table 7.39: Amount and percentage of physical activities in the Old Town (Peak Times)

Street Type	Quality	Walking			Standing			Sitting			Total
		NA	OP	SO	NA	OP	SO	NA	OP	SO	
Main Streets	Good	128 52%	29 12%	88 36%	16 14%	09 08%	89 78%	03 11%	06 22%	18 67%	386
	Average	125 55%	25 11%	77 34%	18 18%	07 07%	75 75%	02 12%	04 23%	11 65%	344
	Bad	86 59%	13 09%	47 32%	13 22%	04 07%	43 71%	02 22%	02 22%	05 56%	215
Connecting Streets	Good	61 51%	10 08%	49 41%	10 26%	03 08%	25 66%	01 06%	05 28%	12 66%	176
	Average	59 55%	08 08%	39 37%	09 30%	02 07%	19 63%	02 15%	03 23%	08 62%	149
	Bad	39 59%	03 05%	24 36%	06 35%	01 06%	10 59%	02 33%	01 17%	03 50%	89
Cul-de-sacs	Good	34 38%	12 14%	43 48%	09 32%	04 14%	15 54%	03 19%	05 31%	08 50%	133
	Average	37 45%	10 12%	35 43%	08 33%	03 13%	13 54%	03 25%	03 25%	06 50%	118
	Bad	29 50%	06 10%	23 40%	04 36%	01 09%	06 55%	01 25%	01 25%	02 50%	73

Table 7.40: Amount and percentage of physical activities in the Old Town (Off-Peak Times)

Most of the people who socialise on connecting streets are performing necessary activities. Although the percentage of those people is the same at different times of the day, this percentage declines as the quality of the built environment decreases. On the other hand, optional activities are the least common, representing only between 6% and 11% of the total social life along the connecting streets, which responds to the street quality. The performance of human necessities along these streets doubles during peak times when compared to off-peak times (Appendix 7).

In addition, along main streets, there are more people socialise through stationary activities than those who are socialising while moving. There are more sitters who enjoy optional activities at the edges of streets than walkers or standees. There are more people who perform walking as a necessary activity, than those who perform necessary standing or sitting activities along *good* and *average* quality of main streets, while *bad* quality main streets show almost the same quantity of sitters among the three categories of human necessities. Moreover, there are more people who socialise in moving activities, than those who perform social activities while they are stationary. There are more standees, who enjoy the optional activities at the front of main doors and shops than walkers or sitters. There are more people who walk in necessity than those who stand or sit as a necessary activity along connecting streets, regardless of the street quality, while there are more people who socialise during their standing activities than the other two activities. The *bad* connecting streets show almost the same quantity of sitters among the three categories of human necessities (Appendix 7).

The smallest amount of social life occurs on cul-de-sacs, but regardless of street quality, cul-de-sacs become more sociable places during off-peak times. The overall study, within the three qualities of cul-de-sacs, reveals that walking is the most common social activity, which increases during off-peak times from 58~89 person compared to 18~32 person during peak times. Standing is the second most common activity, which constitute between 7~18 person of the total social interaction during peak times, and only between 11 and 28 person of the total social interaction during off-peak times. Sitting activities are the least frequent of all the social activities along these streets, representing only 3~9 person of the total social life during peak times and between 4 and 16 person during off-peak times. This pattern of city life shows that there are more people on the streets during off-peak times than during peak times. The number of people socialising along cul-de-sacs is the highest, with 12~66 person. The necessary activities comes second with 12~48 person, while the amount of optional activity is the smallest with 4~21 person, showing a clear difference in the social life as the quality of the built environment decreases.

In addition, there are more people who socialise through moving activities than those who perform social activities while stationary. The amount of social activities is at its highest along cul-de-sacs, as these public spaces are treated as living rooms for the surrounding units, which shows that the cul-de-sacs of the old town are in general more private than public spaces. There are more people walking for necessary, optional or social activities along cul-de-sacs, than those standing or sitting, regardless of the street front quality. The *average* and *bad* cul-de-sacs show the same quantity of sitters among the three categories of human necessities.

It is also clear that there are more people along main and connecting streets during peak times than during off-peak times. However, cul-de-sacs reveal a different life pattern: the number of users is higher during off-peak times than during peak times, which gives more opportunities for predetermined interactions, like neighbourhood gatherings.

In general, walking is the main activity, when compared to standing or sitting on different types of streets at any time of the day. The percentage of people engaged in this activity increases as the quality of the street edge decreases, while standing and sitting activities follow a different trend. Along main streets, there are more people who walk in groups than alone, which proves that these streets are attractive places for tourist activities and provide good services, not just at the neighbourhood scale but also at the city scale.

According to figures (7.61 & 7.62), necessity human activities are the only activities that increase in frequency as the quality of the street front declines. However, the social and optional interactions increase with the enhancement of public space quality, even in cul-de-sacs, during off-peak times when the liveability is higher than peak times. Standing as the second most prevalent physical activity is mostly performed within the traditional urban fabric, where the majority of this activity occurs in front of main building doors, shops and at street intersections. This activity shows a higher percentage of social interactions in different streets and physical qualities. There are more people who stand optionally than those who stand out of necessity.

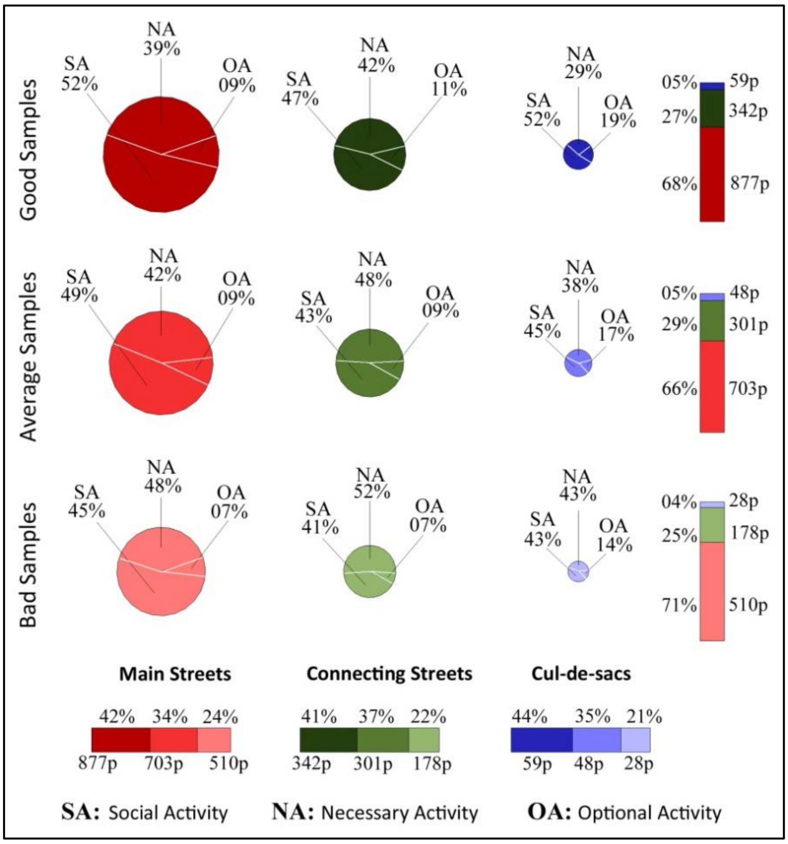


Figure 7.61: Social life according to the degree of necessity in the Old Town (Peak Times)

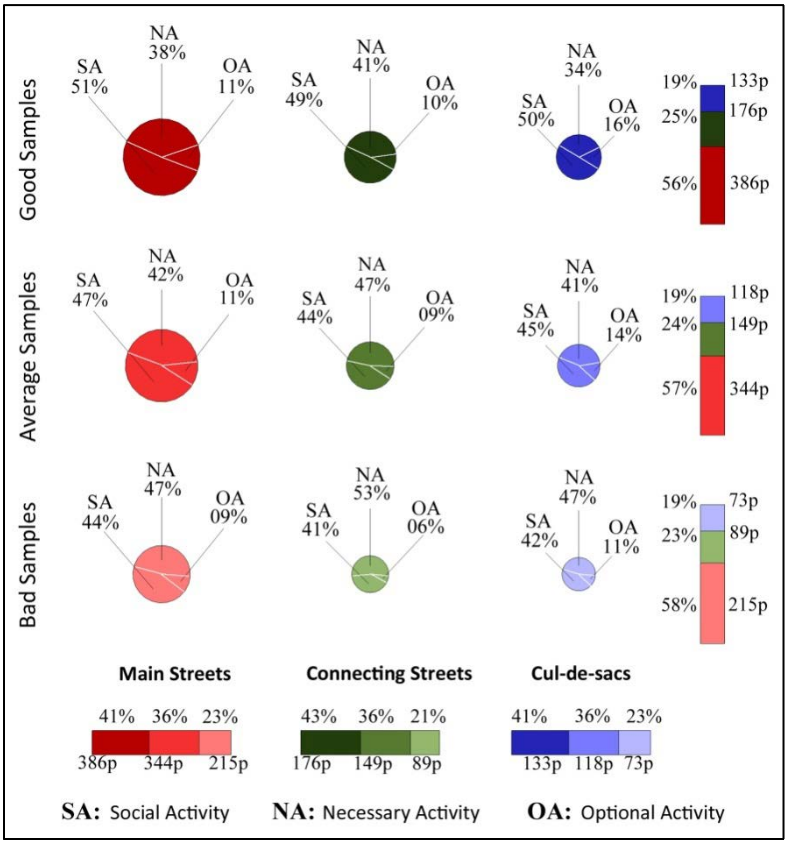


Figure 7.62: Social life according to the degree of necessity in the Old Town (Off-Peak Times)

Street Type	Quality	Necessary Activities			Optional Activities			Social Activities			Total
		WK	SD	ST	WK	SD	ST	WK	SD	ST	
Main Streets	Good	299 89%	35 10%	05 01%	55 66%	18 22%	10 12%	265 58%	178 39%	12 03%	877
	Average	258 87%	34 11%	05 02%	41 68%	12 20%	07 12%	207 59%	130 38%	09 03%	703
	Bad	219 90%	23 09%	03 01%	28 76%	06 16%	03 08%	151 66%	73 32%	04 02%	510
Connecting Streets	Good	114 79%	28 19%	03 02%	20 57%	11 31%	04 12%	76 47%	81 50%	05 03%	342
	Average	114 80%	26 18%	03 02%	17 61%	08 28%	03 11%	61 47%	65 50%	04 03%	301
	Bad	76 82%	15 16%	02 02%	08 62%	04 30%	01 08%	36 51%	34 47%	01 02%	178
Cul-de-sacs	Good	10 59%	06 35%	01 06%	05 45%	03 27%	03 28%	17 55%	09 29%	05 16%	59
	Average	11 61%	05 28%	02 11%	04 50%	02 25%	02 25%	14 64%	06 27%	02 09%	48
	Bad	08 67%	03 25%	01 08%	02 50%	01 25%	01 25%	08 67%	03 25%	01 08%	28

Table 7.41: Amount and percentage of human necessities in the Old Town (Peak Times)

.Street Type	Quality	Necessary Activities			Optional Activities			Social Activities			Total
		WK	SD	ST	WK	SD	ST	WK	SD	ST	
Main Streets	Good	128 87%	16 11%	03 02%	29 66%	09 20%	06 14%	88 45%	89 46%	18 09%	386
	Average	125 87%	18 12%	02 01%	25 69%	07 19%	04 12%	77 47%	75 46%	11 07%	344
	Bad	86 85%	13 13%	02 02%	13 68%	04 21%	02 11%	47 49%	43 45%	05 06%	215
Connecting Streets	Good	61 76%	10 14%	01 01%	10 55%	03 17%	05 28%	49 57%	25 29%	12 14%	176
	Average	59 84%	09 13%	02 03%	08 62%	02 15%	03 23%	39 59%	19 29%	08 12%	149
	Bad	39 83%	06 13%	02 04%	03 60%	01 20%	01 20%	24 65%	10 27%	03 08%	89
Cul-de-sacs	Good	34 73%	09 20%	03 07%	12 57%	04 19%	05 24%	43 65%	15 23%	08 12%	133
	Average	37 77%	08 17%	03 06%	10 62%	03 19%	03 19%	35 65%	13 24%	06 11%	118
	Bad	29 85%	04 12%	01 03%	06 74%	01 13%	01 13%	23 74%	06 19%	02 07%	73

Table 7.42: Amount and percentage of human necessities in the Old town (Off-Peak Times)

In addition, standing optionally is more common on the main and connecting streets, as people admire the special buildings and the traditional architectural styles. Sitting in front of shops and building doors has a significant correlation with interaction along different streets, regardless of their type or quality. Main streets are more advanced in this activity, as some of them are provided with traditional seats along street edges, which give a better place for long conversations, not just for locals, but also for those who pass by (Tables 7.41 & 7.42).

A profound look at city life along the streets of the Old Town reveals that the state of pedestrians, who are either engaged in stationary or moving activities, generate an extensive growth of social interactions, as movement on foot is the only way to travel from one place to another. This is because most of the shops are located along main streets and venders put samples of their products in front of their shops in order to attract people who are passing by. Despite the fact that these streets are occupied mainly by adults rather than by children, during peak times, the places become more attractive for adults and children alike during off-peak times (Figure 7.63).

Figure 7.63: Common social activities within the Old Town

Finally, optional activities tend to grow as you progress from “bad” to “average” to “good” street quality, while the contrary applies to necessary activities. This applies throughout the dataset, irrespectively of the type of activity (walking, standing or sitting), the centrality of streets (main, connecting streets and cul-de-sacs) and the moment (peak and off-peak times).

7.8.2 The Italian Quarter

In the Italian urban fabric, the selected samples of main streets are considered to be more liveable, not just in comparison with the connecting and cul-de-sacs samples of the same urban fabric, but also at the scale of the whole city. Distinctly, the main street that is characterised by *good* quality has the highest amount of social life compared to those taking place along *average* and *bad* quality streets, during both peak and off-peak times.

In general, the observations along the three types of main streets show that the percentages of walkers constitute 75% ~ 85% of the total social activities, while the standing and sitting activities are performed by a small number of people. The percentage of standees ranges between 15% ~ 19%, and the sitters between 2% ~ 6% of the total social interaction in peak and off-peak times. The percentage of walking activity increases as the quality of streets decreases, whereas the overall number of standees and sitters positive correlates with the quality of the environment. Along all qualities of main streets, necessary movement activities are the most common, with between 384 to 955 person. Social activities are the next most prevalent, with between 217 to 658 person, while optional activities are the least in number with between 70 to 518 person. The frequency of this movement mainly responds to the quality of the built environment.

Additionally, most of the people who socialise along main streets are performing moving activities rather than stationary ones. There is no significant variation in the number of sitters who enjoy all degrees of human necessities, which indicates that this urban fabric contains good sitting facilities. There are more standees, whether performing social or optional activities, than those who stand for necessity. There are more people walking in necessity than those who performing optional or social activities while moving (Figures 7.64 & 7.65 and Appendix 8).

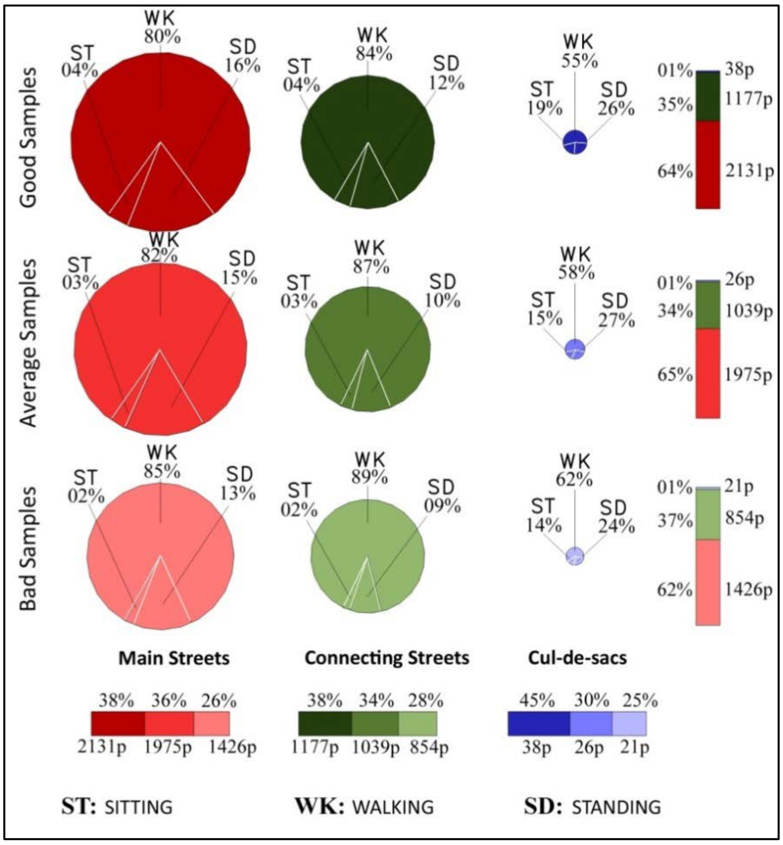


Figure 7.64: Social life according to the physical activities in the Italian Quarter (Peak Times)

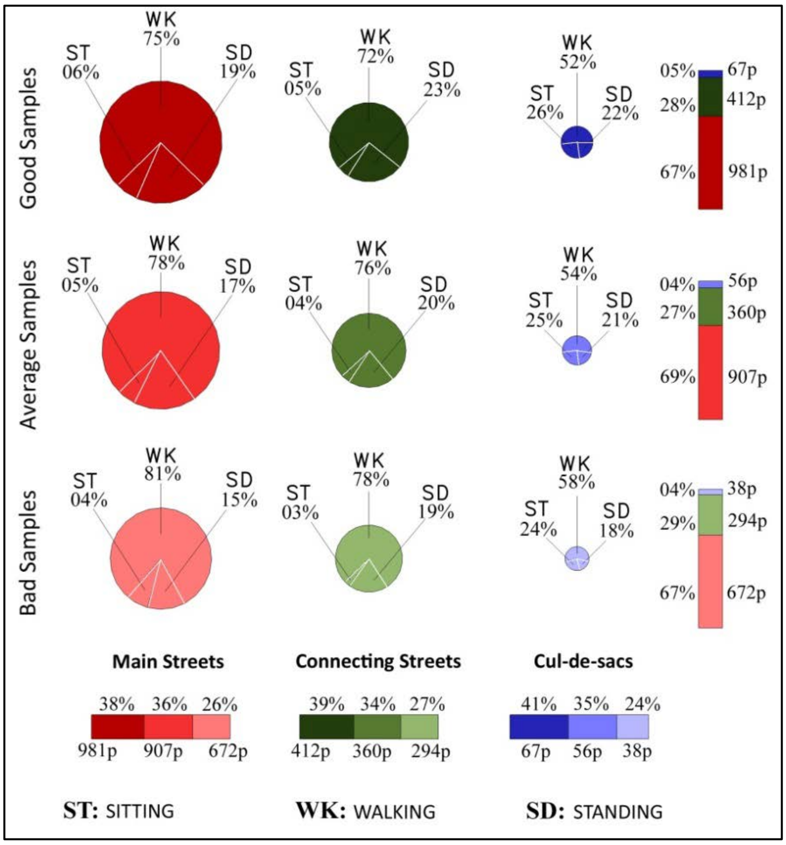


Figure 7.65: Social life according to the physical activities in the Italian Quarter (Off-Peak Times)

Despite the fact that on connecting streets, the percentage of walking activity during peak times is higher than off-peak times, the same is not true for standing activities. There is a consistency in the number of sitters at all times of the day. However, it is noticeable that the total quantity of people is affected by street quality. The connecting street that has a *good* quality shows the highest amount of social life when compared to those that occur along *average* and *bad* quality streets.

The overall study along the three types of connecting streets exhibits that walking is the most frequent of all social activities, although there are less people walking during peak times than during off-peak times. Standing comes in second, showing less people sitting in connecting streets during peak times than during off-peak times. Sitting is constitutes the lowest portion of city life along these streets. The study reveals that the number of sitters is doubled during peak times than off-peak times, with little difference in their percentages. The number of people who socialise along connecting streets at different times of the day is less than those who perform necessary activities. The former ranges between 106 and 423 person, while the latter ranges between 146 and 556 person. On the other hand, the optional activities that range between 42 and 198 person represent the smallest quantity of all social life along the connecting streets, while their frequency declines dramatically during off-peak times, the percentages are maintained (Tables 7.43 & 7.44).

Street Type	Quality	Walking			Standing			Sitting			Total
		NA	OP	SO	NA	OP	SO	NA	OP	SO	
Main Streets	Good	867 51%	366 22%	465 27%	59 17%	128 38%	153 45%	29 31%	24 26%	40 43%	2131
	Average	859 53%	324 20%	437 27%	62 21%	107 36%	127 43%	21 36%	14 24%	24 40%	1975
	Bad	679 56%	218 18%	315 26%	46 25%	63 34%	76 41%	12 41%	07 24%	10 35%	1426
Connecting Streets	Good	513 51%	145 15%	336 34%	31 21%	46 31%	71 48%	12 34%	07 20%	16 46%	1177
	Average	497 55%	127 14%	280 31%	25 24%	31 30%	48 46%	11 35%	06 20%	14 45%	1039
	Bad	440 58%	91 12%	228 30%	21 27%	22 28%	35 45%	07 41%	03 18%	07 41%	854
Cul-de-sacs	Good	12 57%	03 14%	06 29%	01 10%	05 50%	04 40%	01 14%	01 14%	05 72%	38
	Average	09 60%	02 13%	04 27%	01 14%	03 43%	03 43%	01 25%	01 25%	02 50%	26
	Bad	08 62%	02 15%	03 23%	01 20%	02 40%	02 40%	01 34%	01 33%	01 33%	21

Table 7.43: Amount and percentage of physical activities in the Italian Quarter (Peak Times)

Street Type	Quality	Walking			Standing			Sitting			Total
		NA	OP	SO	NA	OP	SO	NA	OP	SO	
Main Streets	Good	432 58%	71 10%	235 32%	28 15%	53 28%	107 57%	23 42%	08 14%	24 44%	981
	Average	431 61%	64 09%	212 30%	29 19%	40 26%	85 55%	21 46%	06 13%	19 41%	907
	Bad	348 64%	43 08%	152 28%	23 23%	24 24%	54 53%	13 48%	03 11%	11 41%	671
Connecting Streets	Good	152 51%	35 12%	110 37%	13 13%	31 33%	51 54%	05 25%	04 20%	11 55%	412
	Average	148 54%	30 11%	96 35%	12 17%	23 32%	37 51%	03 21%	03 21%	08 58%	360
	Bad	133 58%	23 10%	73 32%	11 20%	17 30%	28 50%	02 22%	02 22%	05 56%	294
Cul-de-sacs	Good	19 54%	06 17%	10 29%	03 21%	06 43%	05 36%	01 06%	04 24%	12 70%	66
	Average	17 57%	05 17%	08 26%	03 25%	05 42%	04 33%	01 07%	03 21%	10 72%	56
	Bad	13 59%	03 14%	06 27%	02 28%	03 43%	02 29%	01 11%	02 22%	06 67%	38

Table 7.44: Amount and percentage of physical activities in the Italian Quarter (Off-Peak Times)

In addition, there are more people who socialise through moving activities than those who perform social activities while stationary. Standees enjoy social activities at the front of shops and street corners, which is more common than those who stand for necessary and optional activities. Walking in necessity is more usual than those who perform walking as social activities, where the optional activity is the least along connecting streets with a little response to street quality. There are more people who sit for socialising than those who perform sitting as a necessary or optional activity, where both of them are performed with almost the same frequencies at different times of the day (Figures 7.66 & 7.67).

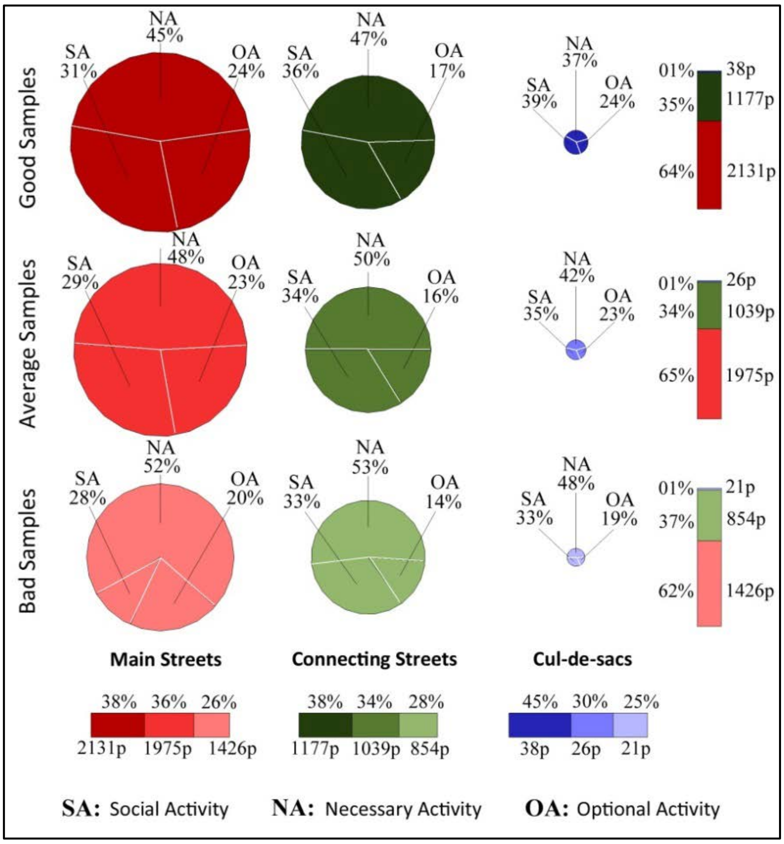


Figure 7.66: Social life according to the degree of necessity in the Italian Quarter (Peak Times)

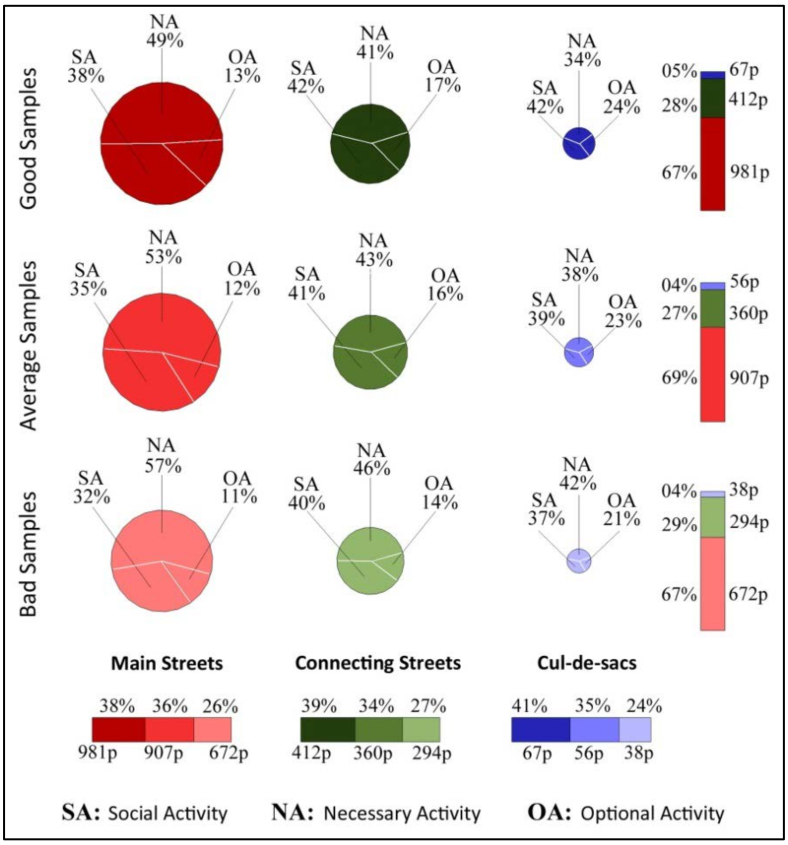


Figure 7.67: Social life according to the degree of necessity in the Italian Quarter (Off-Peak Times)

The lowest concentration of social life occurs in cul-de-sacs, but regardless of street quality, cul-de-sacs are more social places during off-peak times than peak times (Tables 7.45 and 7.46). The overall study along the three types of cul-de-sacs reveals that walking represents more than half of the total social activities. Standing activities are the second most common during peak times, but become third during off-peak time. Sitting activities are the least common during peak times, but the second most common during off-peak times. There are almost the same amounts of people who perform necessary activities and those who socialise at different times of the day. Optional activities represent only one quarter of the total social life along the cul-de-sacs. In addition, there is no obvious difference between people who socialise through moving activities or those who perform social activities while stationary. Social activities, rather than necessary or optional ones, are more common along cul-de-sacs, as these spaces perform as private spaces rather than public ones. Most of the people on cul-de-sacs perform necessary activities while they move, rather than while they stand or sit. The majority of standees are engaged in optional or social activities, while most of the sitters are enjoying social activities.

The majority of people counted were engaged in walking activities, rather than standing or sitting ones in the Italian Quarter. Additionally, most of the people counted walking were on the main streets. There were more people recorded in the Italian Quarter than in the Old Town or the Garden City, regardless of street quality and centrality, during both peak and off-peak times. On main streets, the majority of people documented walking were engaged in necessary activities, and the minority were engaged in optional activities. The majority of people documented standing were engaged in social activities, while the minority were performing necessary activities. The majority of people documented sitting were engaged in social activities, and the minority in optional activities.

Finally, the Italian Quarter neighbourhood provides better conditions for moving activities; it invites more people and most importantly, encourages city life. Italian streets are revealed to be active places that do not only invite people to walk, but also to participate in a variety of social activities (Figures 7.68).

Street Type	Quality	Necessary Activities			Optional Activities			Social Activities			Total
		WK	SD	ST	WK	SD	ST	WK	SD	ST	
Main Streets	Good	867 91%	59 06%	29 03%	366 70%	128 25%	24 05%	465 71%	153 23%	40 06%	2131
	Average	859 91%	62 07%	21 02%	324 73%	107 24%	14 03%	437 74%	127 22%	24 04%	1975
	Bad	679 92%	46 06%	12 02%	218 76%	63 22%	07 02%	315 79%	76 19%	10 02%	1426
Connecting Streets	Good	513 92%	31 06%	12 02%	145 73%	46 23%	07 04%	336 79%	71 17%	16 04%	1177
	Average	497 93%	25 05%	11 02%	127 77%	31 19%	06 04%	280 82%	48 14%	14 04%	1039
	Bad	440 94%	21 04%	07 02%	91 78%	22 19%	03 03%	228 84%	35 13%	07 03%	854
Cul-de-sacs	Good	12 86%	01 07%	01 07%	03 33%	05 56%	01 11%	06 40%	04 27%	05 33%	38
	Average	09 82%	01 09%	01 09%	02 33%	03 50%	01 17%	04 45%	03 33%	02 22%	26
	Bad	08 80%	01 10%	01 10%	02 40%	02 40%	01 20%	03 50%	02 33%	01 17%	21

Table 7.45: Amount and percentage of human necessities in the Italian Quarter (Peak Times)

Street Type	Quality	Necessary Activities			Optional Activities			Social Activities			Total
		WK	SD	ST	WK	SD	ST	WK	SD	ST	
Main Streets	Good	432 89%	28 06%	23 05%	71 54%	53 40%	08 06%	235 64%	107 29%	24 07%	981
	Average	431 90%	29 06%	21 04%	64 58%	40 36%	06 06%	212 67%	85 27%	19 06%	907
	Bad	348 90%	23 06%	13 04%	43 62%	24 34%	03 04%	152 70%	54 25%	11 05%	671
Connecting Streets	Good	152 89%	13 08%	05 03%	35 50%	31 44%	04 06%	110 64%	51 30%	11 06%	412
	Average	148 91%	12 07%	03 02%	30 54%	23 41%	03 05%	96 68%	37 26%	08 06%	360
	Bad	133 91%	11 08%	02 01%	23 55%	17 40%	02 05%	73 68%	28 26%	05 06%	294
Cul-de-sacs	Good	19 83%	03 13%	01 04%	06 38%	06 38%	04 24%	10 37%	05 19%	12 44%	66
	Average	17 81%	03 14%	01 05%	05 38%	05 38%	03 24%	08 36%	04 18%	10 46%	56
	Bad	13 81%	02 13%	01 06%	03 38%	03 38%	02 24%	06 43%	02 14%	06 43%	38

Table 7.46: Amount and percentage of human necessities in the Italian Quarter (Off-Peak Times)

Figure 7.68: Common social activities within the Italian Quarter

7.8.3 The Garden City

In general, the observations of the Garden City show little difference in the frequency of city life along different types of streets and street qualities, even though there are more people who use these streets during off-peak times than those who engage in social activities during peak times. The selected models of main streets are considered to be slightly more liveable in comparison to the connecting and cul-de-sac samples. Main streets that are characterised by *good* quality have the highest amount of social life when compared to those places along *average* and *bad* quality streets, both during peak and off-peak times (Figures 7.69 & 7.70 and Appendix 9). The observations along the three types of main streets show that the percentage of people walking constitutes more than half of the total social activities, while the standing and sitting activities are performed by fewer people. Regardless of street quality, standing and sitting activities are more frequent during off-peak times on the main streets.

There is no significant difference between the number of standees and sitters who enjoy all degrees of human necessities, where the street network in general shows little difference in the frequency of social life, regardless of street quality. There are more instances of walking for necessity than those performing optional or social activities while moving, along main streets. On the connecting streets, the percentage and amount of walking activities during off-peak times is higher than during peak times, while standing and sitting activities are more prevalent with a reduction in percentages at different times of the day. However, the total number of people present is affected by the quality of the streets. Connecting streets with *good* quality show the highest amount of social life during off-peak times, compared to that occurring along *average* and *bad* quality streets (Tables 7.47 & 7.48).

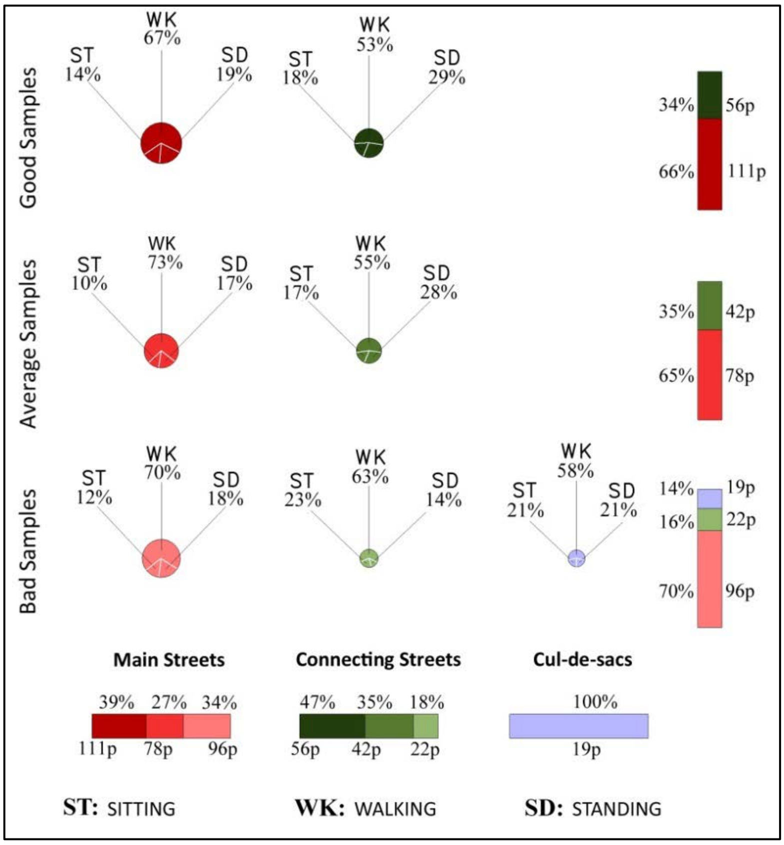


Figure 7.69: Social life according to the physical activities in the Garden City (Peak Times)

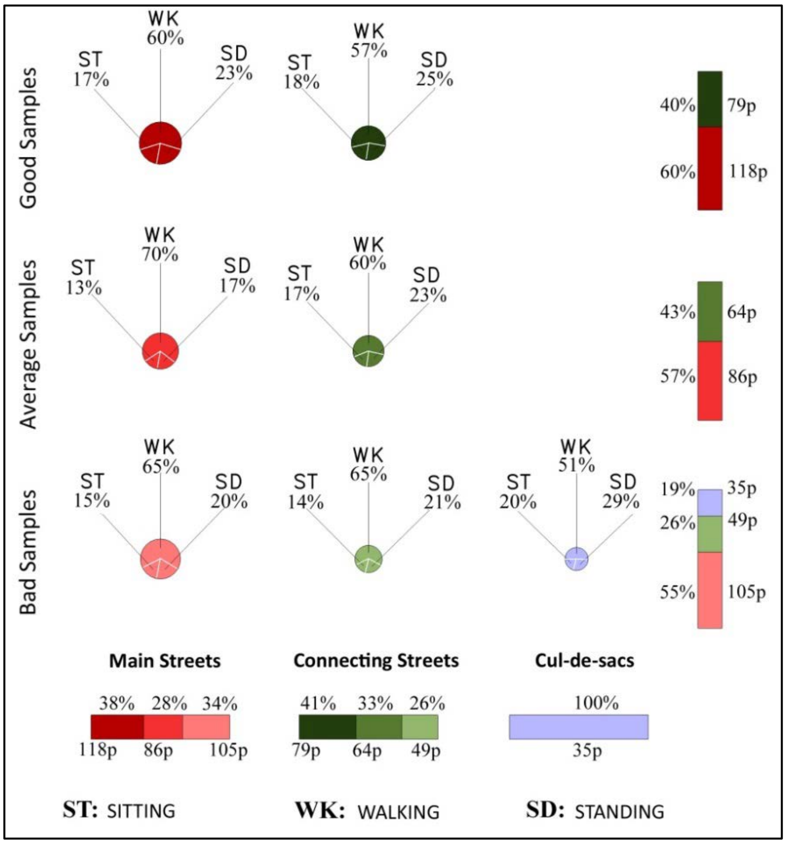


Figure 7.70: Social life according to the physical activities in the Garden City (Off-Peak Times)

Street Type	Quality	Walking			Standing			Sitting			Total
		NA	OP	SO	NA	OP	SO	NA	OP	SO	
Main Streets	Good	38 51%	14 20%	22 29%	05 24%	07 33%	09 43%	06 38%	03 19%	07 43%	111
	Average	34 60%	10 18%	13 22%	04 31%	04 31%	05 38%	03 38%	01 12%	04 50%	78
	Bad	35 51%	13 19%	20 30%	05 29%	05 29%	07 42%	05 42%	02 16%	05 42%	97
Connecting Streets	Good	16 54%	04 13%	10 33%	01 06%	07 44%	08 50%	01 10%	04 40%	05 50%	56
	Average	13 57%	03 13%	07 30%	02 16%	05 42%	05 42%	02 28%	01 14%	04 58%	42
	Bad	08 57%	01 07%	05 36%	01 34%	01 33%	01 33%	01 20%	01 20%	03 60%	22
Cul-de-sacs	Good										
	Average										
	Bad	06 55%	01 09%	04 36%	01 25%	01 25%	02 50%	01 25%	01 25%	02 50%	19

Table 7.47: Amount and percentage of physical activities in the Garden City (Peak Times)

Street Type	Quality	Walking			Standing			Sitting			Total
		NA	OP	SO	NA	OP	SO	NA	OP	SO	
Main Streets	Good	30 42%	06 08%	35 50%	06 22%	03 11%	18 67%	02 10%	05 25%	13 65%	118
	Average	39 65%	04 07%	17 28%	05 33%	01 07%	09 60%	02 18%	02 18%	07 64%	105
	Bad	40 59%	05 07%	23 34%	05 24%	03 14%	13 62%	02 13%	04 25%	10 62%	86
Connecting Streets	Good	26 58%	06 13%	13 29%	01 05%	06 30%	13 65%	01 07%	04 29%	09 64%	79
	Average	23 60%	04 11%	11 29%	02 13%	04 27%	09 60%	01 09%	03 27%	07 64%	64
	Bad	20 63%	03 09%	09 28%	02 20%	03 30%	05 50%	01 14%	02 28%	04 58%	49
Cul-de-sacs	Good										
	Average										
	Bad	10 56%	02 11%	06 33%	02 20%	02 20%	06 60%	01 14%	02 28%	04 58%	35

Table 7.48: Amount and percentage of physical activities in the Garden City (Off-Peak Times)

Necessary activities dominate during peak times on both *average* and *bad* main streets, but constitute a significantly smaller proportion of activities on *good* quality streets. Optional activities decrease dramatically during off-peak times, while social activities increase during that same time of the day.

During peak times, on *good* connecting streets the second most prevalent activities are the necessary ones. However, on *average* and *bad* connecting streets, necessary activities are the most common. Optional activities, on the other hand, constitute the smallest proportion of all activities at the same times (Figures 7.71 & 7.72). During off-peak times, the frequency of social activity is the highest in *good* and *average* quality and the second in *bad* quality, while necessary activity is the other way around. Optional activity is still rated the smallest. In addition, people who socialise through moving activities on *good* and *average* connecting streets are similar to those who performing stationary activities. However, people who socialise through moving activities along bad connecting streets are almost double those performing stationary activity at any time of the day.

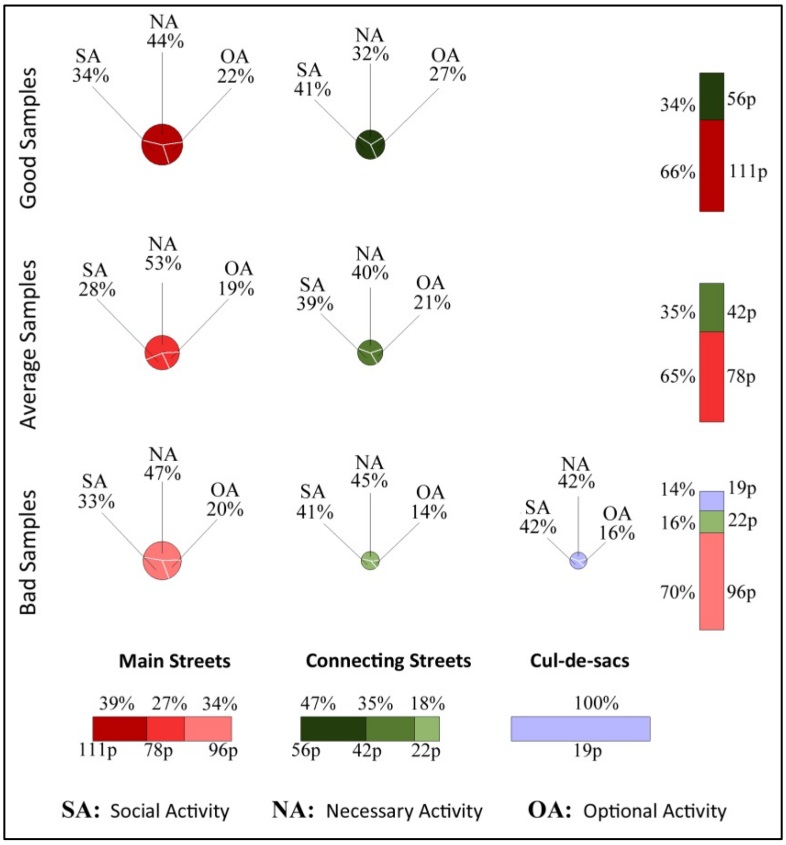


Figure 7.71: Social life according to the degree of necessity in the Garden City (Peak Times)

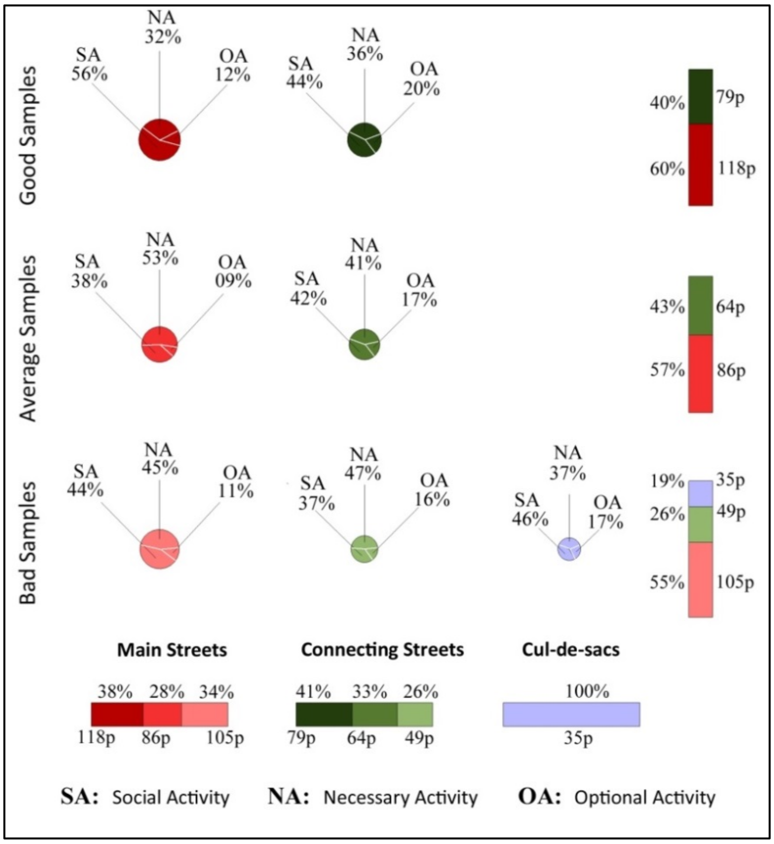


Figure 7.72: Social life according to the degree of necessity in the Garden City (Off-Peak Times)

Standees enjoy social and optional activities at the front of the shops and main entrances, where there are more activities of that type than necessary activities. Walking in necessity is the most common walking activity, while walking as a social activity is the second most common. Those activities still represent more than double those performing optional activities along connecting streets, with little response to street quality. There are more people who sit for socialising than those in necessary or optional activities, although optional activities are still more frequent than those performing necessary activities at any time of the day.

Street Type	Quality	Necessary Activities			Optional Activities			Social Activities			Total
		WK	SD	ST	WK	SD	ST	WK	SD	ST	
Main Streets	Good	38 78%	05 10%	06 12%	14 58%	07 29%	03 13%	22 58%	09 24%	07 18%	111
	Average	34 83%	04 10%	03 07%	10 67%	04 27%	01 06%	13 59%	05 23%	04 18%	78
	Bad	35 78%	05 11%	05 11%	13 65%	05 25%	02 10%	20 63%	07 22%	05 15%	97
Connecting Streets	Good	16 88%	01 06%	01 06%	04 27%	07 46%	04 27%	10 43%	08 35%	05 22%	56
	Average	13 76%	02 12%	02 12%	03 33%	05 56%	01 11%	07 44%	05 31%	04 25%	42
	Bad	08 80%	01 10%	01 10%	01 34%	01 33%	01 33%	05 56%	01 11%	03 33%	22
Cul-de-sacs	Good										
	Average										
	Bad	06 74%	01 13%	01 13%	01 34%	01 33%	01 33%	04 50%	02 25%	02 25%	19

Table 7.49: Amount and percentage of human necessities in the Garden City (Peak Times)

The only cul-de-sac in this urban fabric exhibits the smallest frequency of social activities, but regardless of street quality, this cul-de-sac becomes more social during off-peak times rather than peak times (Tables 7.49& 7.50). The analysis of this model shows that walking activities dominate during peak and off-peak times alike. Standing and sitting are equally frequent during peak times, with little difference during off-peak times. Along this type of streets, there are more people who perform necessary and social activities than those who perform optional activities, during peak times. Although there are as twice as many people who perform social and optional activities in off-peak times, necessary activity is still the second most predominant activity during the same time. In addition, there is no obvious difference in the number of people who socialise in moving activities or those performing social activities while stationary. Although there are relatively few people who perform any physical activity on this type of street, walking is the most frequent activity when compared to standing and sitting activities.

Street Type	Quality	Necessary Activities			Optional Activities			Social Activities			Total
		WK	SD	ST	WK	SD	ST	WK	SD	ST	
Main Streets	Good	30 79%	06 16%	02 05%	06 43%	03 21%	05 36%	35 53%	18 27%	13 20%	118
	Average	39 85%	05 11%	02 04%	04 58%	01 14%	02 28%	17 52%	09 27%	07 21%	86
	Bad	40 85%	05 11%	02 04%	05 42%	03 25%	04 33%	23 50%	13 28%	10 22%	105
Connecting Streets	Good	26 92%	01 04%	01 04%	06 38%	06 38%	04 24%	13 37%	13 37%	09 26%	79
	Average	23 88%	02 08%	01 04%	04 36%	04 36%	03 28%	11 41%	09 33%	07 26%	64
	Bad	20 88%	02 08%	01 04%	03 38%	03 38%	02 24%	09 50%	05 28%	04 22%	49
Cul-de-sacs	Good										
	Average										
	Bad	10 77%	02 15%	01 08%	02 34%	02 33%	02 33%	06 38%	06 38%	04 24%	35

Table 7.50: Amount and percentage of human necessities in the Garden City (Off-Peak Times)

The theory of the Garden City development emphasises the need for developing a realistic and efficient setting, in which a variety of necessary activities can easily occur. However, increasing automobile traffic has removed social life from the urban fabric and has made pedestrian activity difficult and unfeasible. Trade and service functions are mainly concentrated in hot spots, which demonstrate that it is impossible to arrive at the various facilities within the urban form without the use of a car. Pedestrianism, social life and the use of the built environment as a meeting place have all been neglected in this type of urban design (Figures 7.73).

Figure 7.73: Common social activities within the Garden City

The first observation, that which analyses moving and stationary activities, demonstrates that the Italian quarter is the most active urban form within Tripoli's city centre for both activities. Therefore, moving activities within the Italian urban fabric are much more common than in the other two cases, at peak and off-peak times, while the Garden City is the least vibrant area, with fewer frequencies of both moving and stationary activities.

City-wide, during peak times only 3% of all moving activities are performed along the Garden City's streets. However, this activity reaches 75% within the Italian Quarter (about 19 times that of the Garden City) and 23% in the Old Town (about 1/3 that of the Italian Quarter). The percentages reflecting the activities in the Italian Quarter are lower during off-peak times (66%), while these percentages increase in the Old Town, which reaches 26% as well as in the Garden City, which reaches 8% of the total moving activities in Tripoli's city centre. Further, more than half of the stationary activities in the city centre of Tripoli, whether during peak times or off-peak times, are carried out along the streets of the Italian urban form.

While the frequency of stationary activity in the Old Town and the Italian Quarter declines during off-peak times, it increases dramatically in the Garden City, as the streets become occupied by chatting adults and playing children. On the other hand, one third of the social activities occurring in the Old Town are stationary ones, since optional activities are the most common in this urban neighbourhood.

When comparing the three selected areas of Tripoli's city centre, the Old Town's streets are frequented by more people than those of the Garden City, but less than those of the Italian Quarter. This generally holds true during both peak times and off- peak times, except for the activities located in cul-de-sacs during off- peak times, when there are more people walking, standing and sitting in the cul-de-sacs of the Old Town than in the Italian Quarter. This is mainly due to the fact that cul-de-sacs are considered to be private open spaces for the surrounding residential units, and so this space becomes their living room and hosts different types of social activities.

Although pedestrian traffic dominates the traditional urban fabric of the Old Town, the Italian Quarter has better conditions to accommodate city life and encourages people to take pleasure in their activities along its streets. Social activities are influenced dramatically by the quality of city space, which itself is a significant aspect in creating a link between people and the surrounding built environment. This connection becomes more interesting when examining the relationship between necessary, optional and social activities within all the cases.

7.9 Correlating Street Front Quality and Social Life

The analysis has so far shown that pedestrian movement within the three case studies, especially along main and connecting streets, is generated by the centrality of the street network and by the characteristics of the cityscape in peak times. However, cul-de-sacs have a lower centrality rating, as well as a less attractive physical quality, but they exhibit more local liveability during off-peak times. These social interactions become more public along connecting and main streets, where streets are more accessible and better integrated in the street network. It is clear that as the accessibility and centrality criteria increase, city life flourishes. However, the Garden City shows little difference in the frequency of the social life along all types of streets, although they have clear differences in their physical quality. The urban fabric of the Garden City demonstrates more liveable streets during off-peak times than peak times, as it is dominated by residential units.

Although the frequency of stationary activities performed in the Old Town and the Italian Quarter during off-peak times drop, they increases dramatically in the Garden City, as the streets become full of chatting adults and playing childern. Regardless of their physical quality, traditional cul-de-sacs generate the most local social life during both peak and off-peak times. This is evidence that cul-de-sacs play a major role in increasing the social interactions between neighbours at the block scale, yet these dead-ends do not encourage the movement of passer-byes at the scale of the overall network of streets.

When comparing the street quality and social life analyses based on the street type, it is clear that the best samples of *good* quality of main and connecting streets are located in the Italian Quarter. The second is in the Old Town, while the Garden City has the lowest quality of these samples with no big differences in quality amount. However, the same models in the Italian Quarter still host the best social life during peak and off-peak times, then the Old Town followed by the Garden City, with huge differences in city life between the three of them. In addition, and with the absence of any *good* model of cul-de-sac in the Garden City, the attribute of *good* models in the other two cases show that the *good* traditional cul-de-sacs do not only have better quality than the Italian Quarter, but they also have a better social life than the *good* Italian cul-de-sacs do.

Considering that the Garden City does not have any *average* cul-de-sacs, the *average* samples of cul-de-sacs within the other two cases show some similarity in street front quality. However, the *average* main street in the Italian Quarter is still slightly more attractive, where the *average* main street in the Garden City is the second in street front quality. The *average* connecting model in the Garden City is similar to that of traditional model. The social life shows the same behaviour in samples of main streets, where centrality has an essential participation in generating the social activities.

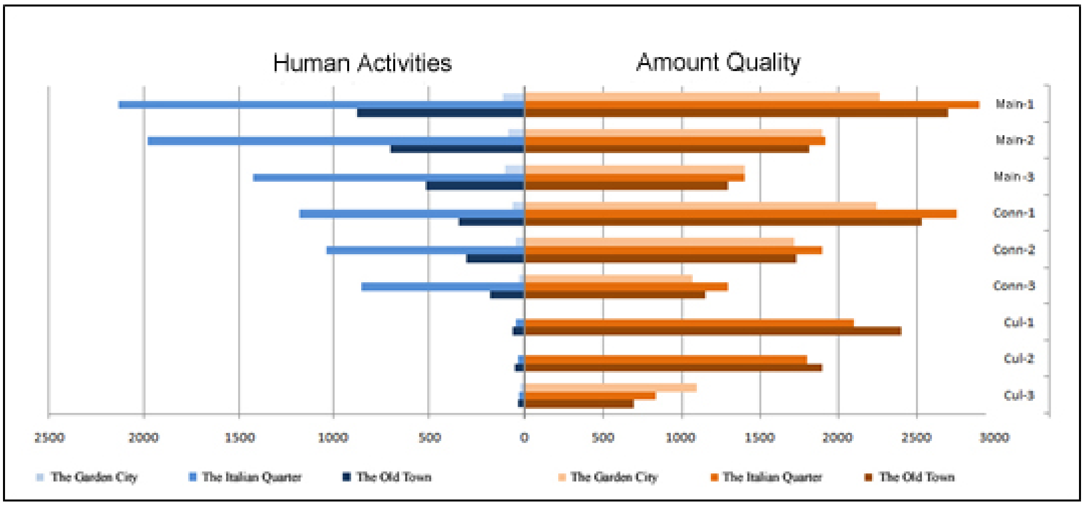


Figure 7.74: A correlation between street quality and social life (Peak Times)

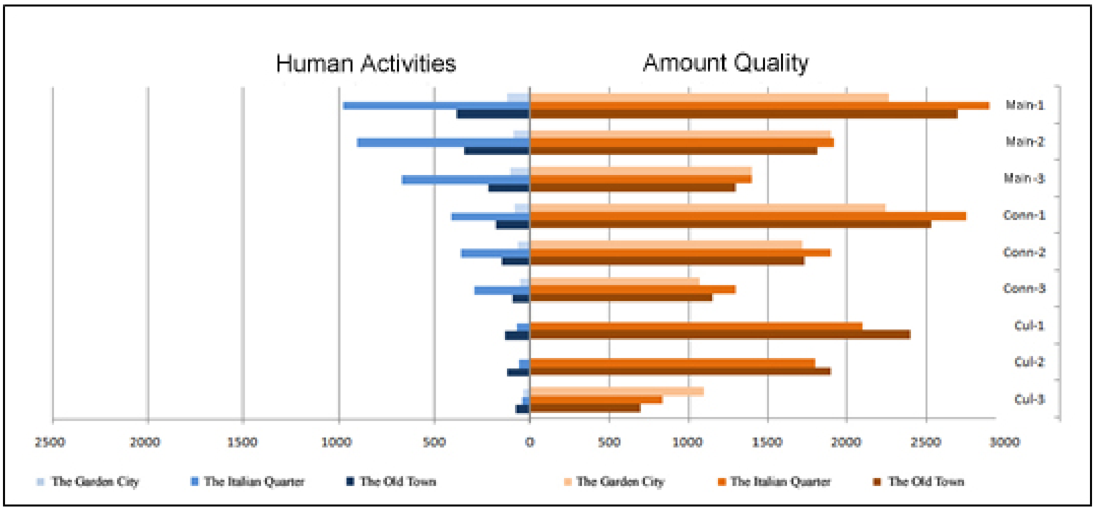


Figure 7.75: A correlation between street quality and social life (Off-Peak Times)

The *bad* examples of main streets show that the Italian Quarter and the Garden City have similar qualities, while the Old Town scores the lowest. The Italian urban form has the best quality of *bad* connecting sample followed by the Old Town, and then the Garden City. Surprisingly, the *bad* cul-de-sac model of the Garden City is the best, when compared to the Italian *bad* cul-de-sac model, while the chosen traditional *bad* cul-de-sac is the worst (Figures 7.74 & 7.75).

The MCA analysis shows that the Italian Quarter and the Garden City have almost the same network connectivity and provide good *through- movement,* due to the insignificant participation of cul-de-sacs within the overall street structure. However, the liveability of the Italian urban form is much higher than that of the Garden City, due to the large varieties of land use. In the Old Town, the MCA betweenness analysis demonstrates that there is less *through-movement* at the block scale, whereas cul-de-sacs are the major routes at the micro scale. In addition, it shows more *through-movement* at the district scale, where main and connecting streets contribute effectively towards increasing the connectivity, and express the growth of social life.

The sense of place identifies the characteristics, importance, meaning, purpose, and experienced values provided to places by individuals (Pred, 1983). Wilbert Gesler summarizes that people view places differently, where some interpret places through feelings of security, while others construe places through identity and physical quality. General judgements have been made through an understanding of social life and aesthetic quality of the built environment, where these perceptions are transferred to particular sites giving them a spirit or personality. It is a subjective knowledge that gives such places significance, meaning and value to those experiencing them (Gesler, 1991).

The most significant observation expresses different patterns of social life within the three cases. The Old Town's built environment is a balanced, collective place for local social activities that are performed along cul-de-sacs and global social activities that are performed along the main and connecting streets, where the degree of centrality and diversity of land use increase. On the other hand, the social life in the Italian Quarter and the Garden City exhibit different patterns, where the liveability along the three types of streets varies significantly within the Italian urban fabric, while it shows little difference in the Garden City.

7.10 Conclusion

Read (2001) argues that in neighbourhoods, the relationship between the nature of movement and global social life is much weaker than that between connectivity and local social life. However, the analysis discloses that an overall study of the urban fabric quality might be more accurate than just selecting separate samples for comparison with the social life. Therefore, studying the quality of separate samples of streets is not always precise, as the overall land use generates specific streets that share a similar physical quality with different social lives. This can be seen easily through Jan Gehl's five-point indicators. In addition, centrality plays a major role in the pattern of city life. This fact is true as the comparison between different types of streets show almost the same average quality amount, but different social life. Consequently, urban layout participates in shaping social life and encouraging people to engage in activities.

The five-point indicators applied in this analysis were initially used by Jan Gehl in studying different places around the world. These indicators tend to be suitable for assessing the quality of some places that are full of diversity and public life, whereas there is a bias against places and streets with private residential edges. Therefore, the five-point indicators are better suited to assessing streets full of public life, such as along main and connecting streets in the selected samples. However, some of these indicators do not properly evaluating the true quality of cul-de-sacs, where residential units dominate and the diversity of functions diminishes. It is important to note that cul-de-sacs, especially those of the Old Town, are not designed to act as public places.

The Italian Quarter has the most integrated street networks in the city, hosting a significant number of people, activities and interactions in comparison with the other case studies. Walking occurs mostly on the main streets where stores, cafes and main institutional buildings are situated. Sitting and standing activities in the Italian Quarter still occur more frequently than in the other two cases, where the sitting facilities, cafe chairs and façade modelling have a greater role in enhancing such activities. These attributes of social life reveal that the Italian fabric has the most active streets within the city centre of Tripoli. Regarding the local residents, people in the Old Town can gain a feeling of belonging, with a great sense of community and safety. On the other hand, people in the Italian quarter have a neutral sense of community, friendship and acquaintance, while those in the Garden City have less of a feeling of belonging to local community. This demonstrates that the street liveability in the traditional and British urban fabrics affects the relationship between neighbours, whereas the Italian Quarter serves as a global place rather than a local one.

The social life analysis reveals that the *virtual community* depends mainly on the network structure, land use and people's perception of the quality of the built environment. The MCA defines the possibility of social interaction among the different types of streets, where the main streets are the most liveable places regardless of their physical quality, followed by connecting streets and then cul-de-sacs. Hillier (1996) defines *Natural Movement* as the finding of the relation between urban form and social life. The layout of the streets plays a major role in determining this relationship, and so do the physicals quality of the place and land uses, although it is to a lesser extent. Because the routes are accessible and integrated, commercial activities will situate themselves on these routes and enhance the overall effect of the city life. When Hillier examined the relation between urban form and the diversity of land use, he concluded that there are two common factors shaping this relationship; intelligible built environment and social activities.

Although the research in Chapter Six focuses on quantitative analyses of urban structure, such as measuring the number of intersections, the percent of gridded streets and the average block sizes per area, there is only a slight consideration of the attributes of the street network study. A general concept of this approach is to show how an ideal size of street blocks or a fine-grained urban network of densely interconnected streets fails to promote the liveability in a well-structured urban fabric. The aim here is to uncover the effect of street quality, density and land use on travel behaviour (Handy 1996). Apart from average measures of street density, some studies have investigated the underlying quality of buildings' ground floors that surround the streets, in order to show a relationship between street features and social life (Gehl, 1987).

Potentially, the key implication of quantitative analyses in Chapter Six is to provide a clear understanding of how street networks and block arrangements impact the performance of specific urban fabric, in regards to social behaviour. However, the accurate findings and detailed results are more meaningful when quantitative methods and better measures of both the spatial street qualities and social life are applied. Accordingly, the need to capture and understand street quality and community life leads to the creation of basic quantifying methods to assess the internal street structure and its social capital. Having noted in the preceding study a number of positive quantities associated with the urban structure of the street network and urban blocks within a city, it would enrich the study if the quality of interactive correlation between streetscapes and city life is examined.

Chapter Eight:
Analysing the Street Edge: Constitutedness and Social Life

8.1 Introduction

In Chapter Six, the study discussed the arrangement of urban blocks and the effectiveness of street networks, as well as showing quantitatively the degree to which the urban fabric is accessible, permeable and interconnected, at a macro scale. The spatial configuration of city streets and their relationship to the surrounding building frontages is another issue that must be taken into consideration, in order to promote street liveability and encourage social activities at the micro scale. This spatial configuration is the main topic of this section. The key implication of the spatial analysis is to provide a clear understanding of how building configuration affects the performance of street life at a macro scale. The findings and results that are related to street liveability become more meaningful when the spatial configuration, which shows the connection between spatial street property and the buildings' fronts at smaller scale, is well understood. In other words, capturing and understanding the interaction and interrelationship between block edges and their adjacent streets leads to the creation of basic measuring methods that can help assess the street's internal structure and its surrounding blocks at the micro scale.

The dominance method of analysing the structure of an urban form is based mainly on understanding of the macro scale spatial conditions that are related to the street network and urban blocks. However, the spatial analysis at a micro scale, which reveals the private-public space relationship, is almost neglected. There are a number of recent studies that show how people's natural movement patterns are enhanced when buildings become better integrated with the adjacent streets (van Nes, 2002,; Hillier et al., 1993 and Hillier, 1998 &1999) and how social behaviour influences their interrelationship (Rogers, 1999 and Hillier & Sahbaz, 2005) as well as their intervisibility (Gehl, 2010).

Having noted in Chapter Six a number of positive quality that are associated with the urban structure of street network and urban blocks within the city, the study would be richer if the quality of interactive correlation between the street network and the edges of adjacent urban blocks is examined (Ozbil & Peponis 2012). As the basic approach of studying urban form focuses on macro-scale spatial conditions, Bill Hillier and Akkelies van Nes demonstrate the significance of what is referred to "constitutedness", to analyse the conditions of an urban environment at micro-scale, either by applying a quantitative approach or by using space syntax theory. Therefore, "*it became inevitable to pay attention to the interdependence between the macro as well as the micro scale spatial conditions*" (van Nes & López, 2007, p1:023).

8.2 Measuring Constitutedness: Indicators Defined

According to Hillier and Hanson (1984) and van Nes and López (2007), the configuration of a city's network and the distribution of public activities at the neighbourhood scale have a direct influence on the street quality and movement patterns of both walkers and automobiles. The constitutedness approach of studying urban form at a micro scale is considered to be a substantial indicator, which measures the characteristics of the buildings that are located on a street edge, and at the same time shows how these buildings shape the efficiency of street performance and generate civic life. In addition, this approach merges an examination of the way a walker reaches a building form the nearest street, and the way that street can be observed from adjacent buildings. In this sense, applying such a method reveals the characteristics of the spatial configuration of a street front, at the micro scale, and defines the relationship between public urban spaces and the configuration of their surrounding buildings (Hillier et al., 1998).

It is important to note that there are two quite divergent views on how the constitutedness of street fronts affects natural surveillance of the streets. On the one hand, Jane Jacobs (1961), in her book "*The Death and Life of the Great American Cities*" states that people who pass through open and permeable built environments, as well as those who live in it, have indeed a great contribution to the mechanism of natural observation. On the other hand, Oscar Newman (1972) in his book "*Defensible Space*", believes that closed and impermeable neighbourhoods are the only method to observe streets, where this mechanism of controlling streets can be accomplished by local residents, and where all others who pass through are recognised as strangers and intruders who might compromise the privacy and safety of vicinity. Therefore, the former sees strangers as an element that increases the safety of a neighbourhood as seen in the traditional urban fabrics, where streets are seen as an extension to the interior spaces, while the latter considers outsiders as a threat to the local environment and applies an approach to perpetuate the inward-looking idea within defensible urban form, where whatever happens within these *enclaves* remains obscure (Hillier, 2004).

Although there is a shortage of research that studies relationship between buildings and streets at the micro level, the few studies that have been conducted make it clear that a building's degree of exposure to its neighbours makes a clear contribution to natural surveillance (Shu, 2000). Akkelies van Nes (2008) states that present-day design practices, both at the building scale and street scale, do not take into account the spatial possibilities of social interaction within a neighbourhood, due to the lack of spatial tools that can measure the topological relationship between indoor and outdoor spaces.

The literature reviews on the urban form approach, which was covered in Chapter Six, highlight the importance of measuring street intersections, street segments and urban blocks, as well as the interconnection of those elements. However, this analysis solely underlines the spatial characteristics of streets at a neighbourhood scale, which focuses on pedestrian movement and the interaction between indoor and outdoor spaces. Akkelies van Nes (2008), Valerie Alford (1996) and Bill Hillier (1996) state that a widely applied concept of designing urban form neglects urban design attributes at the pedestrian-level: these are the attributes that capture the relation between sidewalks and nearby buildings.

The quality of a street network within an urban form is usually improved by its compactness, a mix of uses and an adherence to a gridiron pattern. However, compact urban tissue with a mixture of activities or a hierarchal network, combined with a grid-like pattern is not enough to improve the quality of the travelling experience or to increase efficiency of the network (Park, 2008). Akkelies van Nes (2005) states that constitutedness is another major subject, and a central theme of travel behaviour, that must be underlined and discussed at the block scale, in order to find out how permeability and intervisibility are influenced by the spatial quality of a street edge. In addition, she states that constitutedness is more about determining the spatial integration between a street and its adjacent buildings, and showing how buildings contribute to street life. However, in order to make this research analysis more meaningful, the interpretation of the results from the spatial street structure must be correlated with an understanding of social activities and human behaviour.

During the last few decades, policy makers such as the British programme Secured by Design and the Dutch Police Label Safe Housing have focused more on the relationship between social behavior and the built environment at a micro scale. They took advantage of various insights, which were provided by environmental criminology studies, and translated them into practical prevention applications in order to produce protective ideas of place-making. Their approach shows that the physical characteristics of each individual building can have either a positive or a negative effect on social behavior (van Nes & López, 2007).

Several studies of Akkelies van Nes (van Nes & López, 2007 and van Nes, 2009a) focus on the public-private relationship and its impact on urban safety at micro scale spatial conditions. She was motivated by Jane Jacobs's idea of short urban blocks, where urban forms produce a sufficiently dense concentration of people. She was also inspired by Jan Gehl's concept of life between buildings and how these spaces generate the social life of an urban fabric. In 2007 Akkelies van Nes and Manuel López were assigned a research project on space and crime in the Dutch towns of Alkmaar and Gouda. She examined 1168 street segments through 25 different spatial features, such as the degree of permeability, topological depth between public and private space and the degree of intervisibility of entrances and windows. She concluded that there are certain differences in topological depth between traditional and modern urban fabrics. These differences are represented by the fact that entrances in traditional urban areas have a direct connection with the street, while in modern urban areas, a walker must pass through semi-public or semi-private spaces before reaching the private spaces.

Based on her approach, van Nes concludes that there is significance in a comparison between the number of buildings and the number of their entrances which directly face a street. Furthermore, she states that a high density of entrances that are connected to a street do not necessarily produce high visibility or permeability, since their performance is also affected by topological depth. Through the two cases, van Nes found that the deeper a segment is situated inside an urban area, the greater the topological depth between private and public space becomes. In addition, she concluded that many recent urban projects, such as constructing urban motorways instead of urban boulevards, tend to be 'anti-urban', because they force dwelling entrances away from streets. However, she noted that more evidence is required in order to prove such findings, and suggests inserting the micro scale spatial relationship component into the Space Syntax software (van Nes, 2005; van Nes & Lobez, 2007 and van Nes & Rueb, 2009).

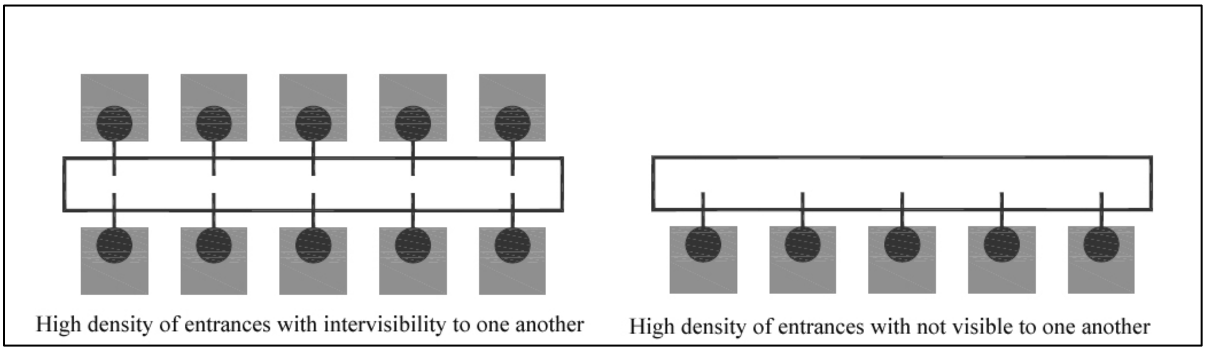


Figure 8.1: The meaning of intervisibility based on van Nes's definition (van Nes & Lopez, 2007, p23:4)

Although she indicates that her studies measure the intervisibility of both windows and doors, most of her studies only analyse intervisibility in relation to main doors (Figure 8.1). She emphasises that the inter-relationship of street segments is affected by the density of entrances. She also relates the degree of constitutedness to the way a building is accessible from a street, neglecting all transparent surfaces that are located on the façade facing that specific street (Figure 8.2).

Figure 8.2: The meaning of constitutedness based on van Nes's definition (van Nes & Lopez, 2007, p23:6)

In order to understand the relationship between private and public space and its impact on street life, three spatial variables, all related to the configuration of buildings along streets, were introduced by Bill Hillier and Akkelies van Nes. These spatial variables are constitutedness, topological depth and intervisibility. Constitutedness is a measure of how building entrances are connected to a street, and how a building is permeable and accessible from its adjacent public space. Topological depth, on the other hand, relates to the relationship between public and private spaces, and of the number of spaces through which a walker must pass, in order to reach a public space from a private space. Finally, intervisibility measures how entrances on both sides of a street are visible to each other, regardless of the density of entrances. Based on Bill Hillier and Akkelies van Nes, constitutedness is an analytical approach that describes these spatial variables at a micro scale, aiming to define the interrelationship between buildings and their adjacent street segments, along with topological depth and intervisibility between private and public spaces.

Constitutedness in the studies conducted by Hillier and van Nes, only relates to a building's permeability with its adjacent street, and shows a spatial configurative relationship between building entrances and their adjacent street network. In this study, constitutedness investigates the contribution of building to the liveability of its adjacent streets and shows how buildings that shape, the street fronts interact with the streetscape. Constitutedness in this research has a wider meaning; as it does not only measure the building's permeability, it also measures all spatial variables that analyse the relationship between public and private space; permeability, topological depth and street intervisibility.

8.2.1 Permeability

In this research, constitutedness is a measurement indicated by the aggregate values of all three spatial variables; permeability, topological depth and street intervisibility. However, permeability between buildings and their adjacent public space is only one of these spatial variables, in the definition of constitutedness. This approach is distinct from that of Hillier and Hanson (1984) and van Nes (2009), who state that a building constitutes a street only if it has a direct access to the same street. This means that a street would become un-constituted form a building if that building does not have a direct access to the related street. Through their definition, Akkelies van Nes and Bill Hillier only measure permeability as a definition of constitutedness: they neglect other features such as windows and balconies.

In this study, the degree of permeability of any building facing a street does not depend on how the building entrances are connected to a street, as the direct and indirect doors matter only in evaluating the degree of topological depth and not the permeability of the units' main doors. Therefore, permeability in this study is mainly related to whether a building is accessible from the adjacent street, whereas the measure of topological depth assesses the directness of the buildings' main doors to the adjacent street.

Akkelies van Nes and Hillier associate the degree of permeability to the directness of a buiding's main doors to the adjacent street (Figure 8.3). However, the entrances that are hidden behind high fences or hedges, or located on the side of the building, are still permeable, despite the fact that there are more public-private transitional spaces (Figure 8.4).

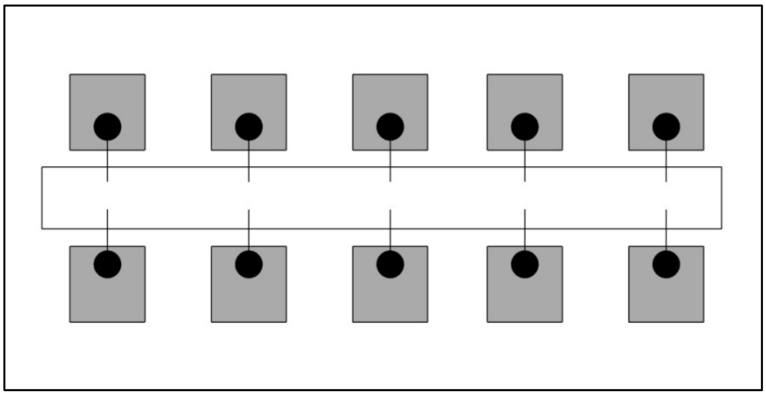


Figure 8.3: High degree of permeability as all buildings are accessible from the street (By the author based on van Nes)

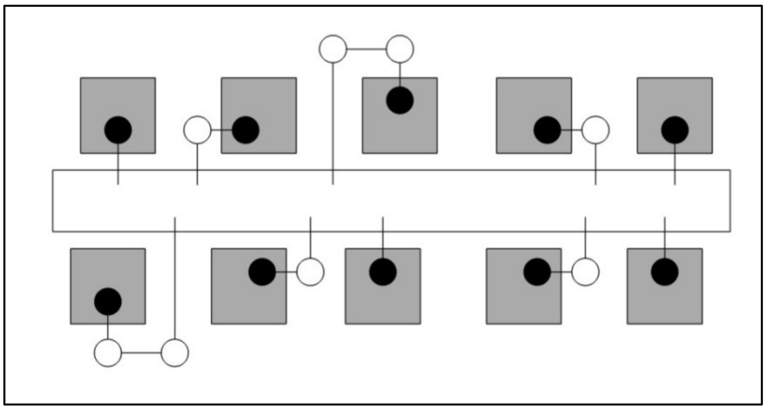


Figure 8.4: High degree of permeability as all buildings are directly accessed from the street (The research approach)

It is vital to compare the number of entrances that are accessible from a street with the number of buildings facing that street, in order to quantify the degree of permeability at that street. Therefore, the degree of permeability is calculated by dividing the number of buildings that are directly or indirectly connected to a street, with the total number of buildings on that street. This should be repeated for each side of the street separately (Shu, 2000).

8.2.2 The Topological Depth

"*There are several ways of analysing spatial configurative relationships between building entrances and the street network*" (van Nes & Lopez, 2007, p3). However, the absolute understanding of an entrance is not always a reliable evidence of showing a clear inter-relationship (Hillier & Hanson, 1984).

Akkelies van Nes and Manuel Lopez (2007) have studied the topological depth of an entrance in relation to a public space, and have categorised it into several types, based mainly on the number of semi-public or semi-private spaces that must be passed through before reaching private spaces. On the basis of this concept, Akkelies van Nes considers the topological depth to be equivalent to zero for entrances that are directly connected to public spaces without any degree of separation between them, something similar to that shown in traditional urban fabrics. In the case of a front garden or a semi-public staircase, the value of topological depth becomes one, as there is only one space that must be traversed before reaching the private space from the public space. When a building has a garden, or is located behind hedges or fences, or when the entrance is on the side, then the topological depth of the entrance will have a value of two. Entrances that are located in back alleys or that are covered behind a shed are given a value of three. In this way, the topological depth is defined by the number of transitional steps between a street from a private space.

In this way the, topological depth can be measured not just in relation to horizontal transitional spaces, but in relation to vertical ones as well. The permeability of most upper residential units is affected by staircases that have to be passed through in order to reach the units' main doors. Therefore, topological depth of the main doors of upper residential units has a value of two if the main door of the block is directly accessible from the street, whereas if a garden or a semi-public space is located between the street and the block then the value becomes three.

Moreover, van Nes and Lopez (2007) highlight significant caveats when evaluating the topological depth of upper residential units. For example when a flat has a closed main entrance, where visitors must use a calling system when visiting someone, then the staircase becomes an extension of the units and the topological depth becomes zero. On the other hand, if a visitor can walk up to ring the flat's doorbell directly, then the staircase will count as a semi-private space that is passed through before reaching the flat's main door, and the topological depth becomes one.

Topological depth varies from one location to another as it mainly depends on building typology. Some streets are characterised by buildings that contain small shops on the ground floor, which have entrances directly connected to the street, and residential units or offices at upper floors, which have a step or two before reaching their main doors. Other street segments accommodate detached, semi-detached or row houses, which produce different topological depths. To accurately measure topological depth between public and private spaces within one street segment, it is not enough to simply evaluate each side of the street separately, but rather each building is measured individually, in order to produce an accurate, average value of topological depth between public and private space. Figure (8.5) shows the different types of relationships between private and public spaces. The black dots represent private spaces and the white circles represent semi-private or semi-public spaces (Lopez & van Nes, 2007).

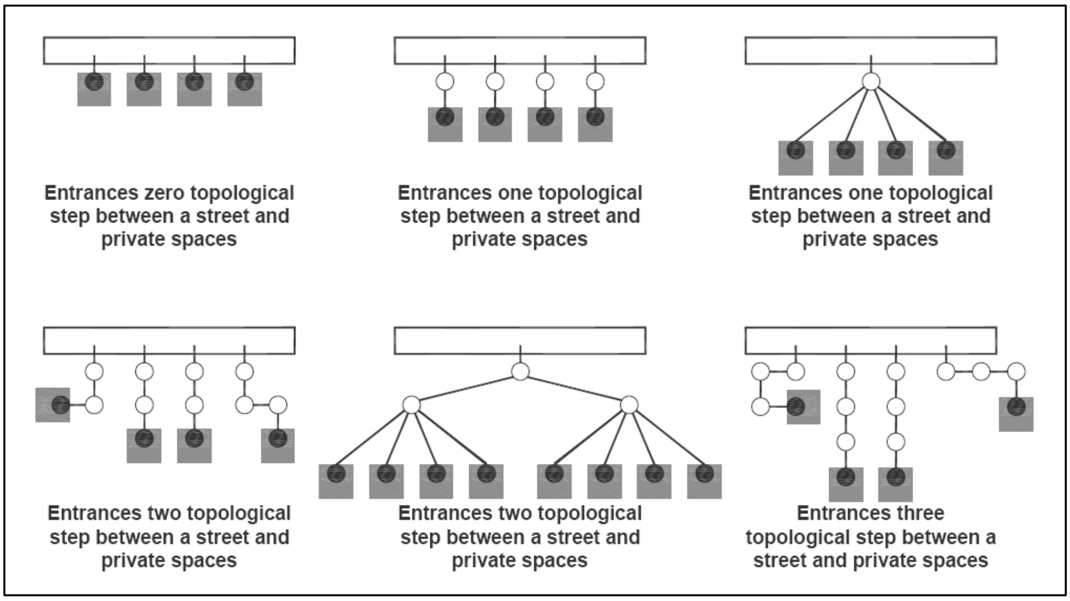


Figure 8.5: The degree of topological depth between private and public spaces (van Nes & Lopez, 2007, p23:4)

Akkelies van Nes (2009) states that the topological depth in most traditional urban fabrics is zero, as the entrances of houses often face a street directly. However, in modern urban fabrics, walkers must pass one, or several, semi-public or semi-private spaces in order to enter private spaces. These spaces are designed to increase the privacy of interior spaces, as well as to reduce the interaction between private and public spaces. A difference in topological depth does not only exist between traditional and modern residential units, but also between commercial units of both urban fabrics. Commonly, traditional shopping areas accommodate a diversity of shops allocated along the streets, with direct connections to them. Conversely, in modern shopping centres, a person must walk through a central entrance in order to reach the shops or units. Most modern shopping centres are provided with an entrance, or several entrances, that are not oriented towards any street, with façades that are merely large walls with blind windows.

Akkelies van Nes and Lopez (2007) indicate that a desirable atmosphere can be achieved along main streets when the topological depth is decreased, as a street becomes more useable to a variety of visitors. This indication shows that residents who have entrances directly connected to public streets want to be part of the urban life, where streets are frequented not only by local residents but also by visitors. Similarly, dwellers participate in street life by sitting in front of their homes or by keeping an eye on what is happening outside from their windows. Such circumstances show that a low topological depth encourages inhabitants to become part of city life, and turns the street into an extension of private spaces. At the same time, a desolate atmosphere would be present in segregated urban areas, where the topological depth is increased and the streets are predominantly used by those who live on them. This indication shows that residents inside these areas often favour privacy from nearby neighbours, especially when the streets are busy. In areas like this, there are measures taken to present social control, like installing high hedges or hiding entrances from the street and from general visibility (van Nes & Lopez, 2007).

8.2.3 Street Intervisibility

There are several ways to measure the degree of intervisibility along a street, although Akkelies van Nes and Manuel Lopez (2007) state that intervisibility is measured by the number of building entrances that are visible from each other, from both sides of a street. However, the use of intervisibility in this study is not necessarily measured from one door to the opposite door. The purpose of this approach is to analyse the intervisibility from transparent surfaces (doors or windows) of a building to the street, and the intervisibility between both sides of a street.

Akkelies van Nes applies a specific criterion to measure the intervisibility in several studies. She states that the intervisibility of a street is not only related to the density of entrances, but to how many doors are visible from each other. Therefore, she considers a street to be highly intervisible if more than 75% of the entrances are intervisible to one another from both sides. On the other hand, she considers a street to be a non-visible street if it has a high density of entrances on one side but no entrances, or entrances covered by high hedges and fences on the other side (van Nes 2005) (Figure 8.6).

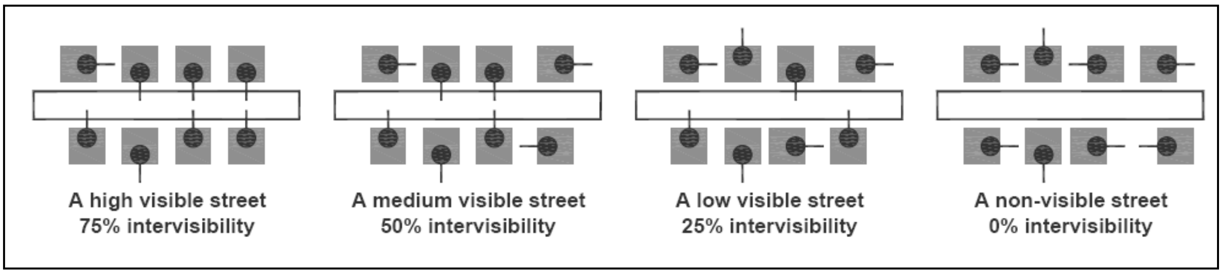


Figure 8.6: Diagrammatic principles of density and intervisibility of entrances (van Nes & Lopez, 2007, p23:8)

The more transparent surfaces that are connected to a street, then the higher the mechanism of controlling a street, and consequently, a stronger relationship between public and private space develops. There is a distinction between how buildings are permeable from a street and how a street is intervisible from the buildings fronting that street. The way that entrances and windows are positioned in relation to each other influences the probability of control.

In this study, the measurement of street intervisibility is mainly based on the combination of van Nes's method and Jan Gehl's approach in relation to the importance of good visual contact between public and private space, at both ground and upper floors alike. Akkelies van Nes measures the degree of intervisibility in relation to the quantity of main doors positioned on both sides of a street, and how a door could be visible from other doors located on the other side of the same street (Figure 8.7). In her studies, van Nes does not take into account the width of the street nor the distance between doors in achieving a good visibility. She measures the intervisibility in an abstract way, whereby street width, visual barriers and physical barriers are not integrated in her analysis.

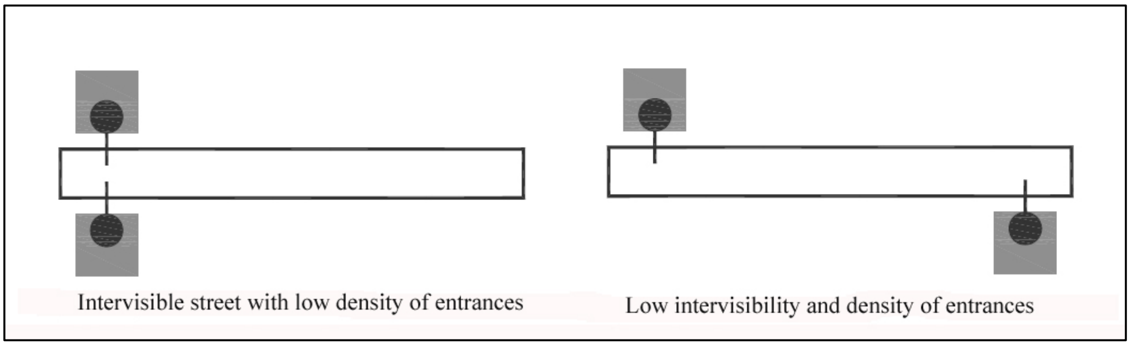


Figure 8. 7: The diversity in intervisibility as applied by van Nes (van Nes & Lopez, 2007, p23:8)

Jan Gehl's theorises that the relationship between indoor and outdoor spaces contributes significantly to the overall visibility of a street. His approach is based on natural aspects of designing cities for people, which consider the human senses as a biological basis for social activities, behaviour and communication in a city space. He states that "*urban pedestrians are the result of an evolution over millions of years. Man has evolved to move slowly and on foot, and the human body is linear in orientation*" (Gehl, 2010, p33). Jan Gehl (2010) divided human senses into two classifications, the first are the "close" senses; feelings and tastes that are related to the skin and muscles, while the second are the "distance" senses; seeing, hearing and smelling, which he considers to be passive activities in public spaces.

Jan Gehl (2010) states that in public spaces, vision is the most developed sense. He believes that the distance between people in public spaces, or between public and private space is a major aspect that should be taken into consideration when measuring the degree of intervisibility along both sides of a street (this factor is omitted from Hillier and van Nes's analysis). He classifies the way in which people recognise each other according to different distances and directions; either horizontally or vertically.

According to Jan Gehl (2010), a typical horizontal relationship is to measure linear distance, in terms of recognizing other people at a distance. At a distance of 300-500 meters, people can identify the shape of an object as human or non-human, whereas their movement and body language can be identified as an outline at 100 meters. Moreover, the identity of people, gender and age, as well as their characteristic body language, can be recognised at somewhere between 50-70 meters. At the distance of 20-25 meters, facial expressions and dominant emotions can be registered accurately. Short messages can be exchanged at a distance of 20-25 meters but a clear conversation is not possible until people are within 7.0

meters of each other. If the distance is less than 7.0 meters, a more detailed and articulated conversation can be accomplished (Figures 8.8 & 8.9).

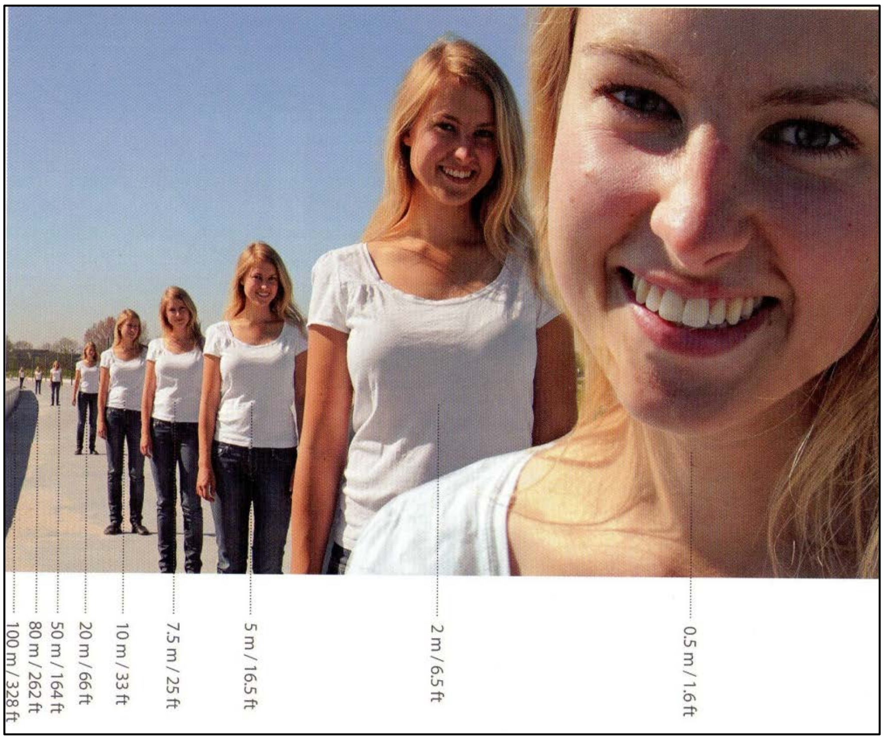


Figure 8.8: The perception of people at different distances (Gehl, 2010, p34)

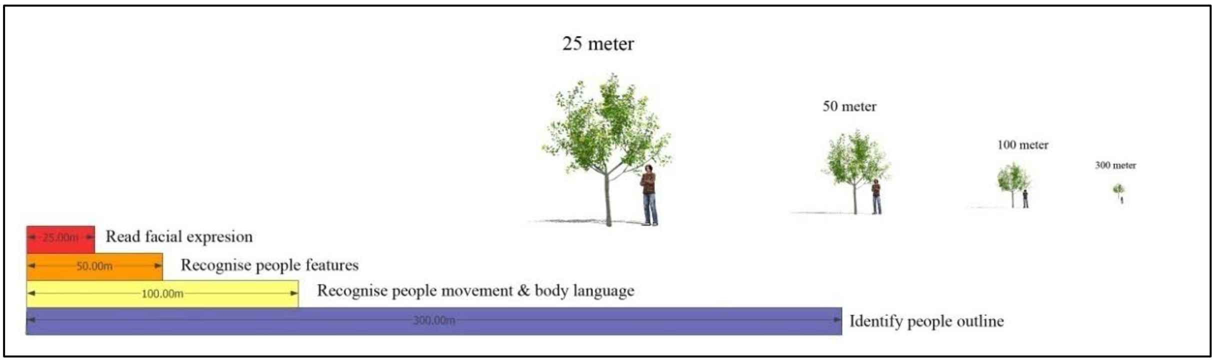


Figure 8.9: Horizontal distance and vision relationship (By the author)

According to Jan Gehl's observations of horizontal distances, senses and social contact, there is little visual interaction or social communication between people who are 100 to 25 meters apart. However, at a distance of 25 meters or less, the richness of social interaction is considerably strengthened, meter by meter. As distance decreases between 7.0 and zero meters, more human senses are used to articulate experiences, and more passionate feelings can be exchanged.

Looking up and down is also an important concept that intensifies the relationship between public and private spaces. Looking down is more natural to humans, as they can see up to 70-80 degrees below the horizon, while looking upwards is only feasible at between 50-55 degrees above the horizon. Looking down is more efficient as people can easily bend their heads down to enjoy a scene from balconies or windows of upper floors. Looking up cannot be achieved as easily, since rising the head upwards is much more difficult (Gehl, 1987) (Figure 8.10).

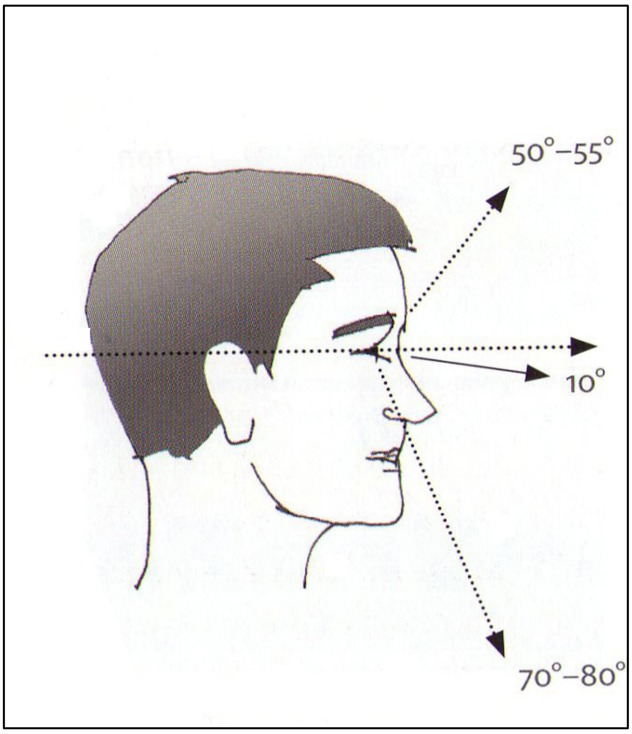


Figure 8.10: Downward and upward vision degree (Gehl, 2010, p39)

While people on lower floors enjoy street life with all human senses, people on upper floors feel slightly isolated from what is occurring at the street level. As stated by Jan Gehl (2010), people who are on the ground and first floors effectively interact with the events that take place on the street. This social interaction with city life is also maintained, to a certain degree, from the second floor. The third and fourth floors intact less with street life, even though people can watch and follow the life at the street level: talking, shouting and arm movements can be perceived. On the fifth and sixth floors, the situation changes dramatically, as details cannot be distinguished and the people on the street can neither be recognised nor contacted. From the seventh floor and above, people no longer belong to the city and they become a part of the air-traffic's territory (Figure 8.11).

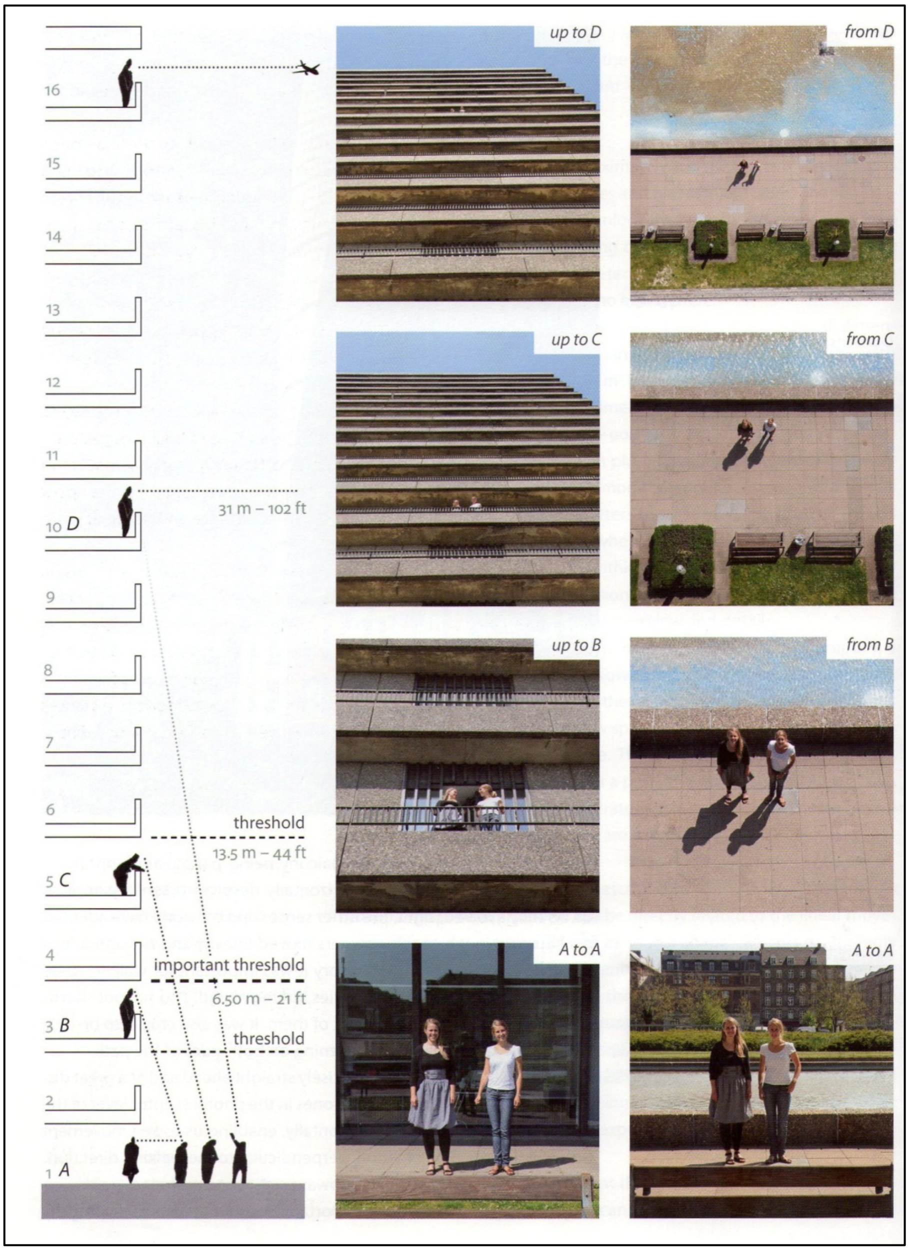


Figure 8.11: The interaction between building storeys and street (Gehl, 2010, p41)

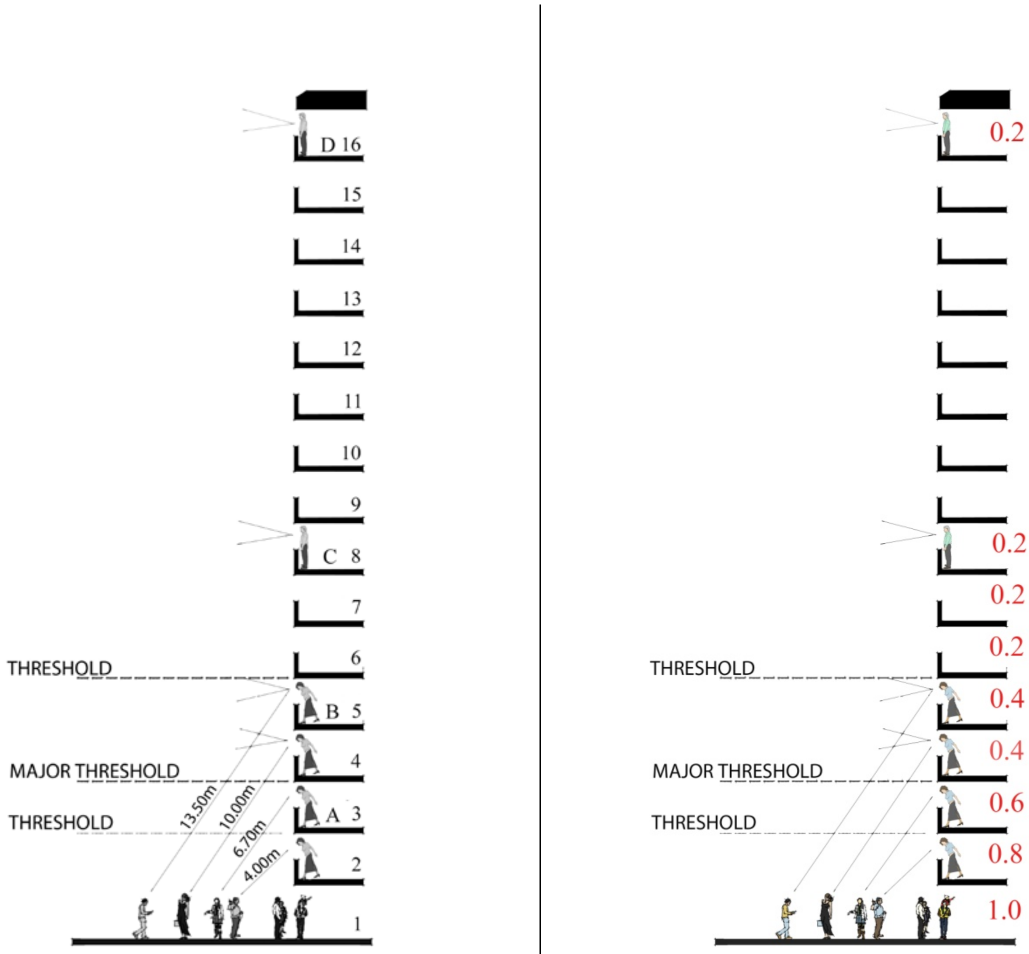
Accordingly, people can often have a fine overview from a higher position, but less physical participation and interaction with street life (Whyte, 1980). Jan Gehl (1987) also states that experiencing activities with a range of senses, from 20 to 100 meters at the street level, is more desirable than following street activities even from 3 metres above. Therefore, low buildings along a street allow for better interaction with people's movement and their senses, whereas these human behaviours are stifled in high rise buildings. In general, the human horizontal sensory range is a natural key in experiencing urban spaces and interacting with low buildings, whereas the upper floors of high rise buildings have less interaction with city life.

8.2.4 Constitutedness

As mentioned previously, constitutedness, in this research, is indicated by the combined characteristics of three spatial variables; permeability, topological depth and street intervisibility. In order to accurately compute the permeability and analyse how accessible a building is from a street, it is important to consider the topological depth between private and public spaces. Therefore, permeability and topological depth are measured jointly in this study.

The approach of this study is to analyse, in detail, selected samples of street segments in the city centre of Tripoli, based on their spatial configurations. For each street segment, the number of units is registered; whether they are houses, offices, shops, cafes or even banks. This study does not only include units on the ground floor, but it takes into account all the units on all the floors, as illustrated in the provided drawings related to the selected samples. Also, all windows and door overlooking the selected street segments are registered, and any solid blind fencing or sight barriers located along each street segment are also recorded.

This analysis simultaneously takes into account the number of permeable doors on each side of the road, along with their topological relationship between private and public space. As a result, the topological depth counts both the horizontal and vertical steps between a street and the private spaces, in a way that only includes the units overlooking the selected street segment. The horizontal topological depth is based on van Nes's approach in finding the relationship between private and public spaces at the street level, while the vertical topological depth is derived from the criteria of Jan Gehl in studying the relationship between a street and the private spaces that are located in the upper floors of a building. Therefore, the integration between horizontal and vertical topological depth in this study introduces a new method of analysing permeability and topological depth in a more integrated and detailed manner, as a means of determining a street's constitutedness. The approach of this study is not only to discover the relationship between private and public spaces at the ground floor, but to also reveal the permeability of the upper floors and how many spatial steps must be passed between the private and public spaces.



The relationship between upper floors and the street
(By the Auther based on Gehl, 1987)

The storey topological depth factor
(By the author)

Figure 8.12: The idea of producing a storey's typological depth factor

Before implementing the measurement of permeability, a specific criterion related to horizontal (street width) and vertical (storey's level) topological depth factors is produced. The vertical topological depth is shown in (Figure 8.12). Each floor of a tall building is assigned a certain factor, depending on the unit level. The factor value decreases as the unit's height increases. Therefore, the topological depth factor of the units located below the second threshold, although it decreases gradually, is higher than those located above the fifth floor, where the topological depth factor becomes constant. Also, the horizontal topological depth factor is considered before conducting the permeability analysis. The factor value of the horizontal topological depth decreases as the number of spaces passed by the walker to reach the private space increases (Figure 8.13).

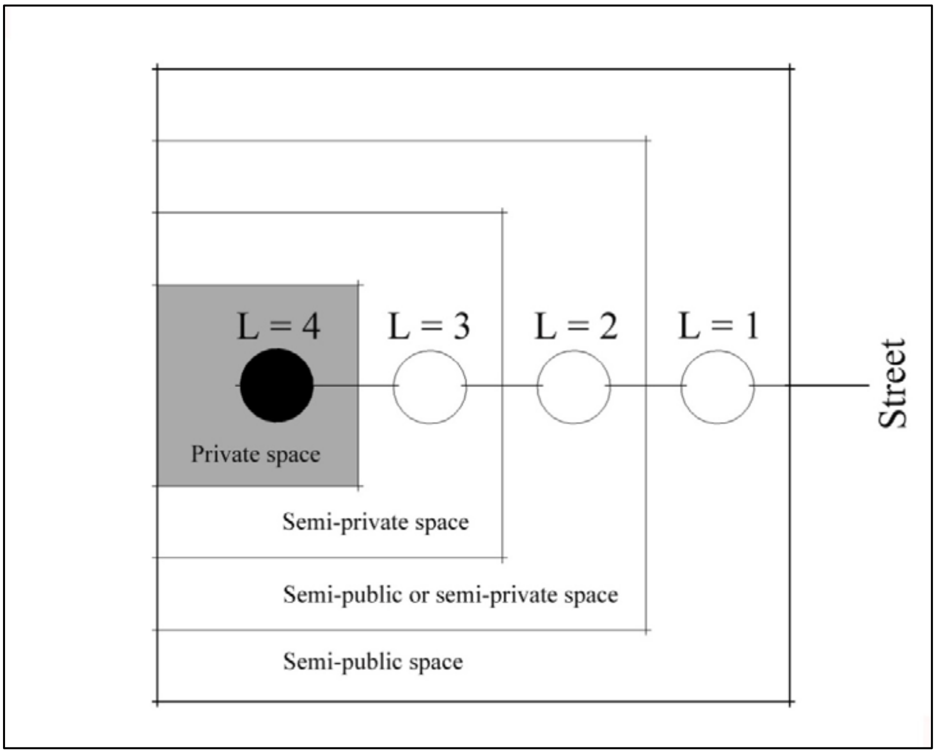


Figure 8.13: The criteria of measuring topological depth at ground floor

The formula for producing permeability (**P**) according to the degree of topological depth is:

Permeability (P)

P $=\sum_{1\rightarrow e}[\sum_{1\rightarrow n}(u \times s)] \times d$

u = number of units per storey are served by the entrance

n = number of stories

s = storey topological depth factor

e = number of entrances on the street

d = horizontal topological depth factor

P $=\sum_{1\rightarrow e}[\sum_{1\rightarrow n}(u \times s)] \times d$ (where d = 1/no. of links)

Topological depth value at ground floor (d) = 1/L where L = 1, 2, 3, 4,…

This formula is based on the number of units per storey that are served by the entrances (***u***), multiplied by the vertical topological depth factor (***s***) along the street segment, and the horizontal topological depth factor (***d***).

In addition to permeability and topological depth, street intervisibility is the third spatial variable that needs to be addressed in order to determine constitutedness. Street intervisibility, in this study, is not about how a door is visible from the doors on the opposite side of the street, as applied in van Nes's analysis. Rather, it is related to how the intervisibility is achieved between private and street space, where the unit level and street width play a major role in assessing the intervisible relationship between private and public space.

In regards to the unit's height, the intervisible relationship between the upper floors and the street is illustrated by Jan Gehl (1987 & 2010), in detail, where he emphasises that the unit's level shapes the degree of intervisibility between private and street space, and where these units have a direct interaction with the street segment. The higher the unit is from street level, the less intervisibility there is between the street and the unit. Besides the height of the units, the street width is another major factor that characterises the intervisibility between the inside and outside spaces, and between the sides of a street. Although the street width was not taken into consideration in van Nes's analysis, this study underlines the street width as a substantial factor in maintaining a good intervisible relationship, not only between private and public spaces but also between both sides of the street (Figures 8.14 & 8.15) and (Table 8.1).

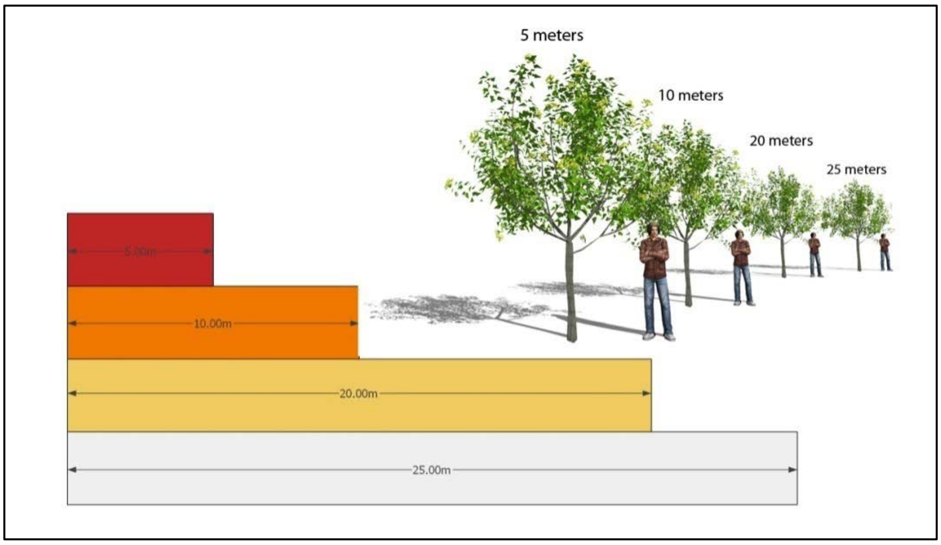
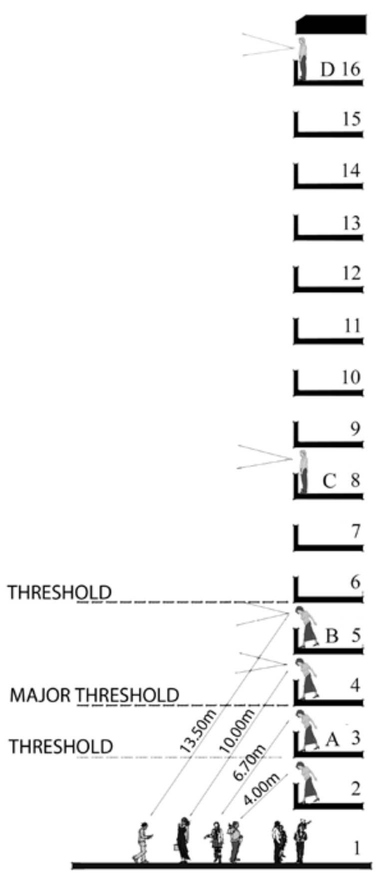


Figure 8.14: The degree of intervisibility at the ground level

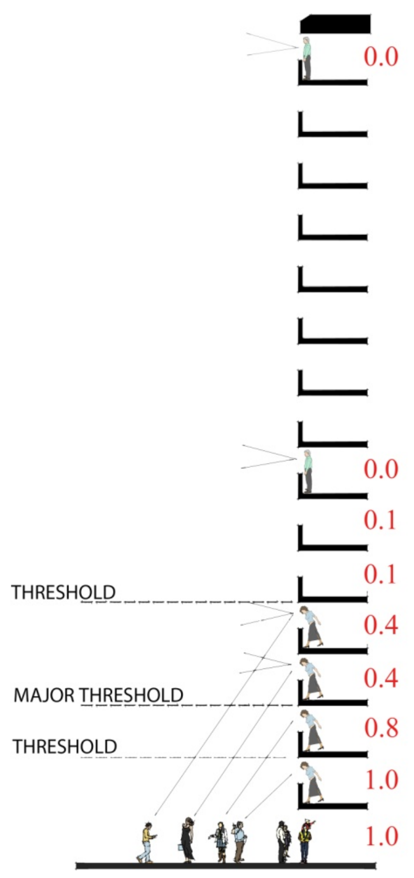
Categories of Street Width	Street Width Range	Street Width Factor
Category I	$0 \leq 5$	1.0
Category II	5 – 10	0.9
Category III	10 – 20	0.7
Category IV	20 – 25	0.5
Category V	≥ 25	0.0

Table 8.1: The criteria of producing street intervisibility factor at ground floor



The relationship between upper floors and the street

(By the Auther based on Gehl, 1987)



The storey intervisibility factor

(By the author)

Figure 8. 15: The idea of producing street intervisibility factor

The formula for producing street intervisibility (**SI**), according to the storey intervisibility factor and street width factor is:

Street Intervisibility = (Number of Units * Storey Intervisibility Factor) Street Width Factor

The degree of intervisibility from neighbouring houses is measured by counting the number of units that have a clear intervisibility to the street space, in relation to their height and street width. If a single unit is taller than one storey, the intervisibility of each floor is measured separately in order to determine the street intervisibility factor of the entire unit. In addition, the study measures the high rise buildings floor by floor, as each floor has a specific street intervisibility factor that affects the overall intervisible relationship between the building and its adjacent street segment. It is important to note that any solid blind walls or sight barriers, such as trees, that obscure the vision between inside spaces and the street, are taken into consideration. This study also highlights any physical obstacles that may interfere with the street intervisibility between both sides of a street. Figure (8.16) shows the conditions that provide the best street intervisibility between both sides of a street, while Figure (8.17) shows the conditions that negatively affect street intervisibility.

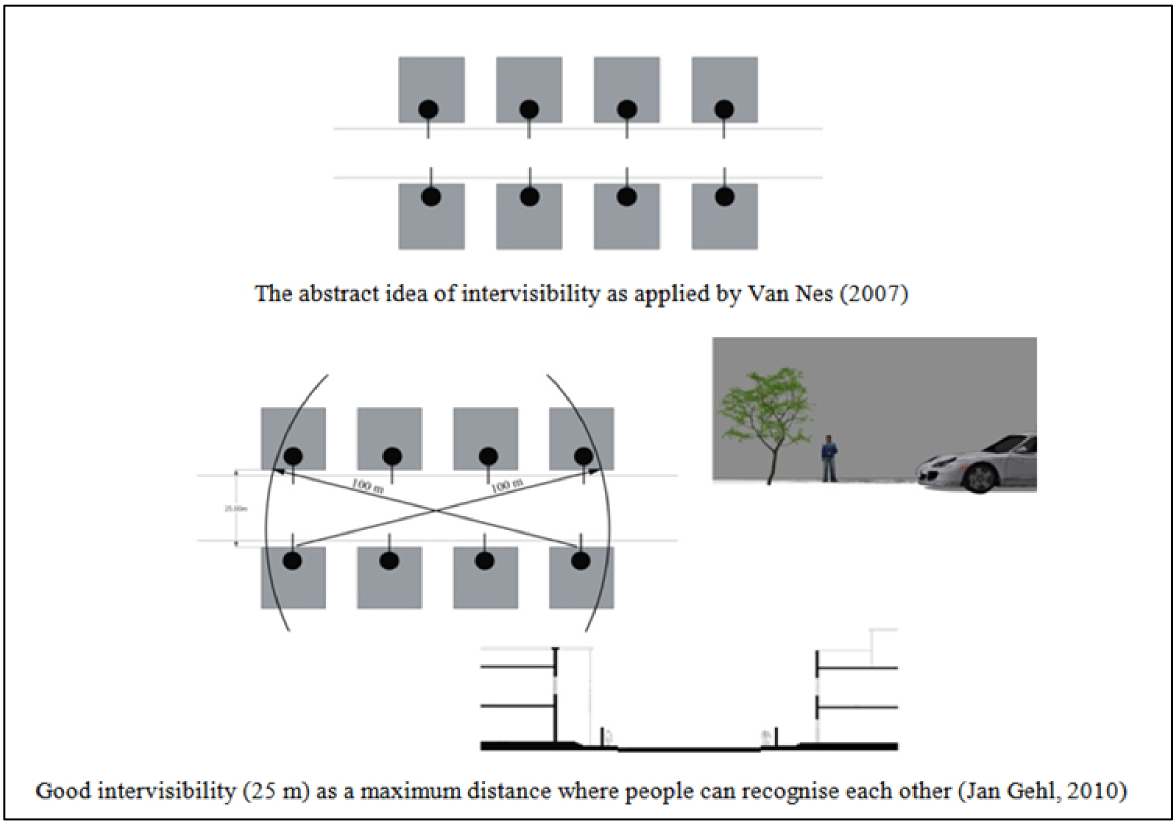
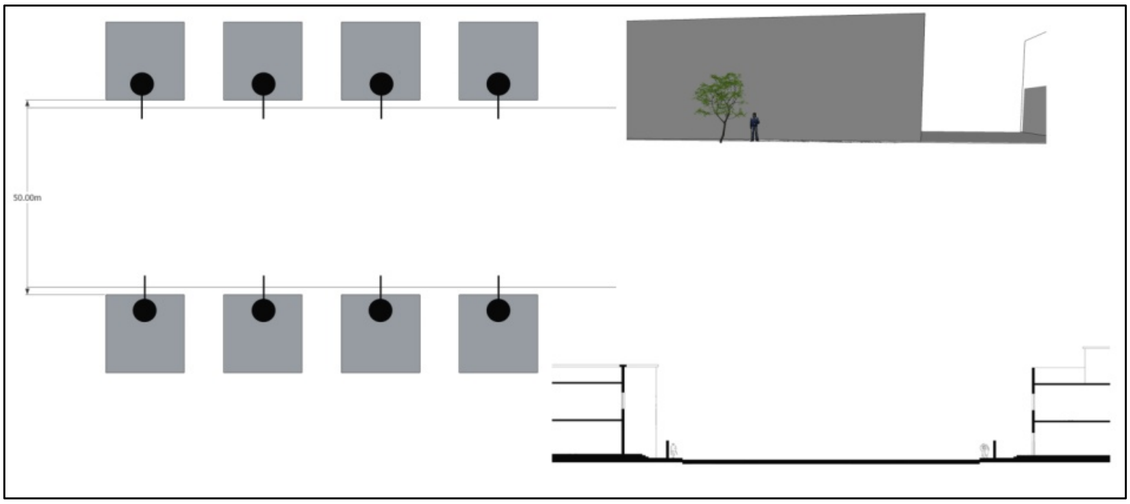
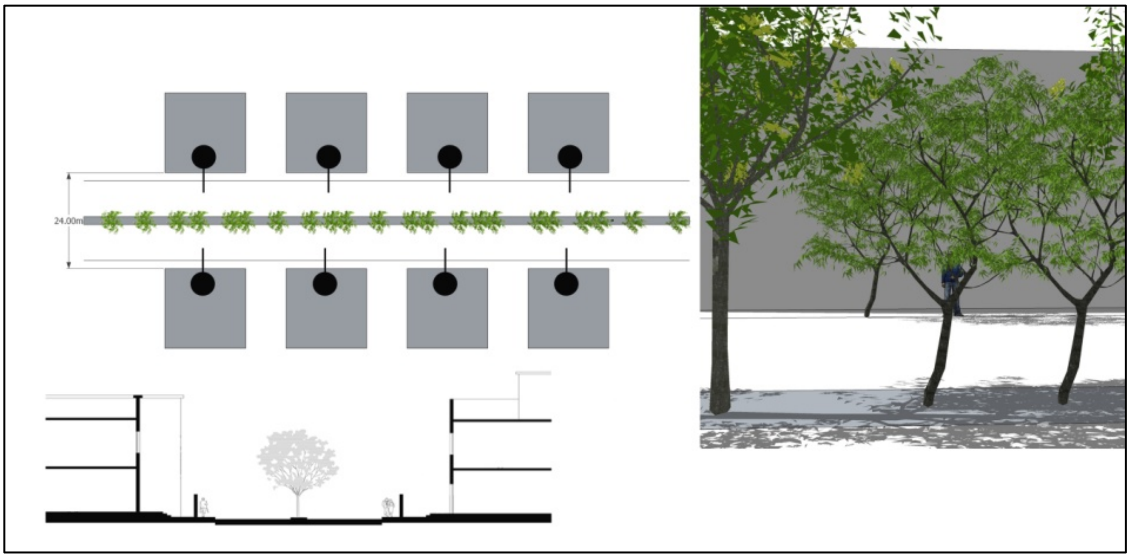


Figure 8.16: Best street condition in achieving good street intervisibility



Weak intervisibility (50m) where people cannot recognise each other



Poor intervisibility due to sight barriers between the two sides of the street

Figure 8.17: Worst street conditions in achieving street intervisibility (By the Author based on Gehl, 2010)

Finally, Constitutedness is a result of the permeability based on the topological depth and street intervisibility.

Constitutedness = [Permeability (P) + Street Intervisibility (SI)] / 2

C = [P + SI] / 2

Therefore, constitutedness is a quantitative method that depicts micro scale spatial variables in urban studies and clarifies the interrelationship between a building or private space and its adjacent street segments. It measures how a unit relates to the street network at the micro scale, the way a building's main door is permeable from the street, the degree of directness and indirectness between private and public space and the intervisibility between both sides of a street. Lopez and van Nes (2007) state that the study of constitutedness is about how objects (buildings) are positioned in relationship to each other, and how they respond to their area's street network, social behaviour and city life. However, the main aim of the constitutedness study in this research is to make a comparison between spatial characteristics of the street at a micro scale and social behaviour.

8.3 Findings: the Quantitative Analysis of Constitutedness and Social Life

Constitutedness is a method of measuring the relationship between public and private spaces. It is a result of Permeability and Street Intervisibility. However, topological depth plays a major role in assessing these spatial variables. The purpose of this analysis is to discover the three spatial configurations of several buildings within a specific distance, in order to find out how each building constitutes a street and how these buildings contribute to city life at the micro scale. This analysis is mainly based on characteristics of the spatial configurations of buildings and their façades, in relation to the adjacent street space. As stated by van Nes (2009), the statistical data from the micro scale of spatial analysis is crucial in identifying the level of liveliness in the streets as well as the movement flow.

Akkelies van Nes (2009) also discusses the importance of the relationship between private and public spaces; "*human beings are social beings. Even though they have their private spaces inside buildings, they also seek spaces to interact socially or economically with others*" (van Nes, 2009, p120:1). In addition, the large structure of a street network, urban blocks and the diversity of land use play a major role in people's natural behaviour and their movement patterns (Hillier 1996 and van Nes 2002)

Therefore, the spatial analysis method is applied in this study to quantify the relationship between indoor and outdoor spaces and how this relationship promotes the street liveability. The analysis shows how the topological depth affects the permeability and the street Intervisibility simultaneously and generates the relationship between public and private space. The study also computes how private spaces are connected with public spaces, and how the street is controlled and monitored visually from the private spaces, in a way that increases the sense of safety and creates an active social public space. Constitutedness study that is carried out in analysis focuses on the various spatial parameters in a detailed manner by examining the correlation between statistical spatial data that is based on the street centrality and social life.

Bill Hillier and Julienne Hanson (1984, p90) argue that "*the space system seems everywhere to be like a beady ring system, in that everywhere space widens to form irregular beads and narrows to form strings at the same time joining back to itself so that there are always choices of routes from any space to any other space*". In that sense, 'beadiness' represents a space in two dimensions, where private space is indicated by black beads and semi-private space is indicated by white beads, while 'stringness' shows a space in one dimension (Hillier & Hanson, 1984; van Nes & Lopez, 2007). In order to make a clear comparison between constitutedness and social life in the three urban fabrics that are located in Tripoli's city centre, the Old Town, the Italian Quarter and the Garden City, three samples from each urban fabric are selected based on the MCA analysis (Figure 8.18). As stated by Hillier (1999) and van Nes (2002), centrality is considered to be a collective process of spatial configuration and functional characteristics, and not just a descriptive method of any urban condition. Therefore, the comparison between the spatial configurations of streets and city life will be conducted at the micro scale, along three samples of each urban fabric, all which contain a main street, a connecting street and a cul-de-sac.

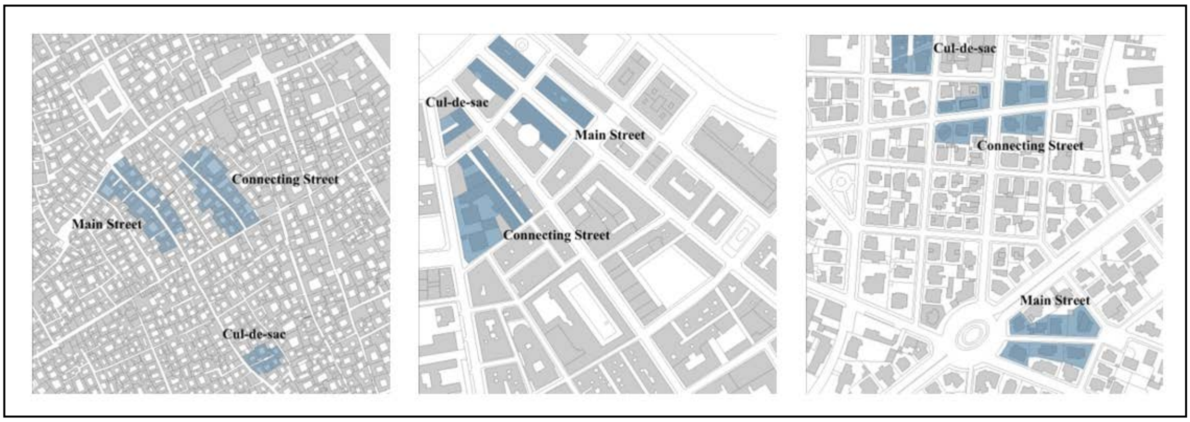


Figure 8.18: The selected street samples within the three urban fabrics

Constitutedness analysis in this study is conducted over only three streets per case. These three streets are representative of a main street, a connecting street and a cul-de-sac. This selection is mainly based on street type, not on street quality, in order to make a correlation between constitutedness and street life.

8.3.1 The Old Town

Like many other traditional urban fabrics, the buildings in the Old Town have a direct connection with the street network. The majority of the buildings' main doors open directly to the street space. As stated previously, privacy is the main objective that regulates the relationship between residential units and the street network. In these residential units, the main door on the ground floor provides good permeability and intervisibility in relation to the adjacent streets. However, the degree of intervisibility increases at the upper levels, due to the fact that the windows become larger. Since most buildings are directly attached to the street in this urban fabric, there is zero topological depth between the street and the buildings (Figure 8.19).

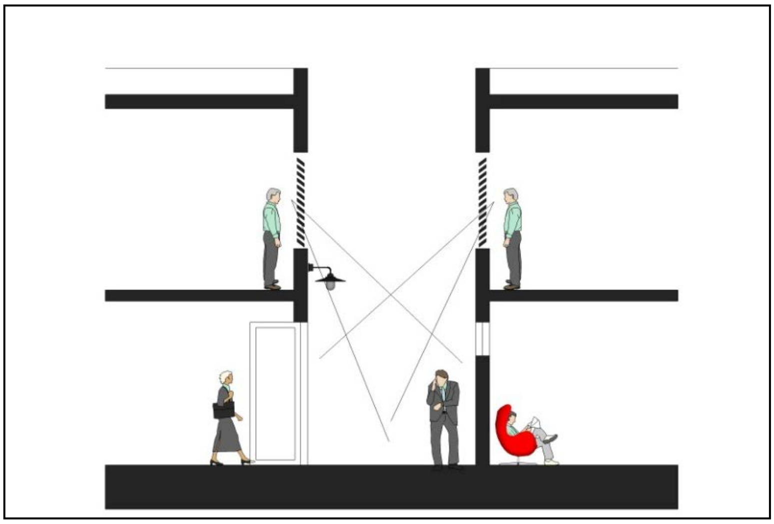


Figure 8.19: A typical cross-section showing the interaction between public and private spaces in the Old Town

In the first example (Figure 8.20), along a 100 meter segment of the main street, 16 of the total 18 dwelling entrances are directly connected to the street. Based on this study's approach, the topological depth factor of the 16 units is (1.0) and the topological depth factor of the other two units is (1/2). The former is accessible from the adjacent street and the latter has a semi-public space between the street and the main door. In this case, the permeability is the multiple of the number of units and the horizontal topological depth, divided by the total number of units.

The permeability (**P**) index for this main street sample in the Old Town is a result of the topological depth index, and can therefore be calculated as: **[16 * 1 + 2 * ½] / 18 = [16 + 1] / 18 = 17 / 18 = 0.94**.

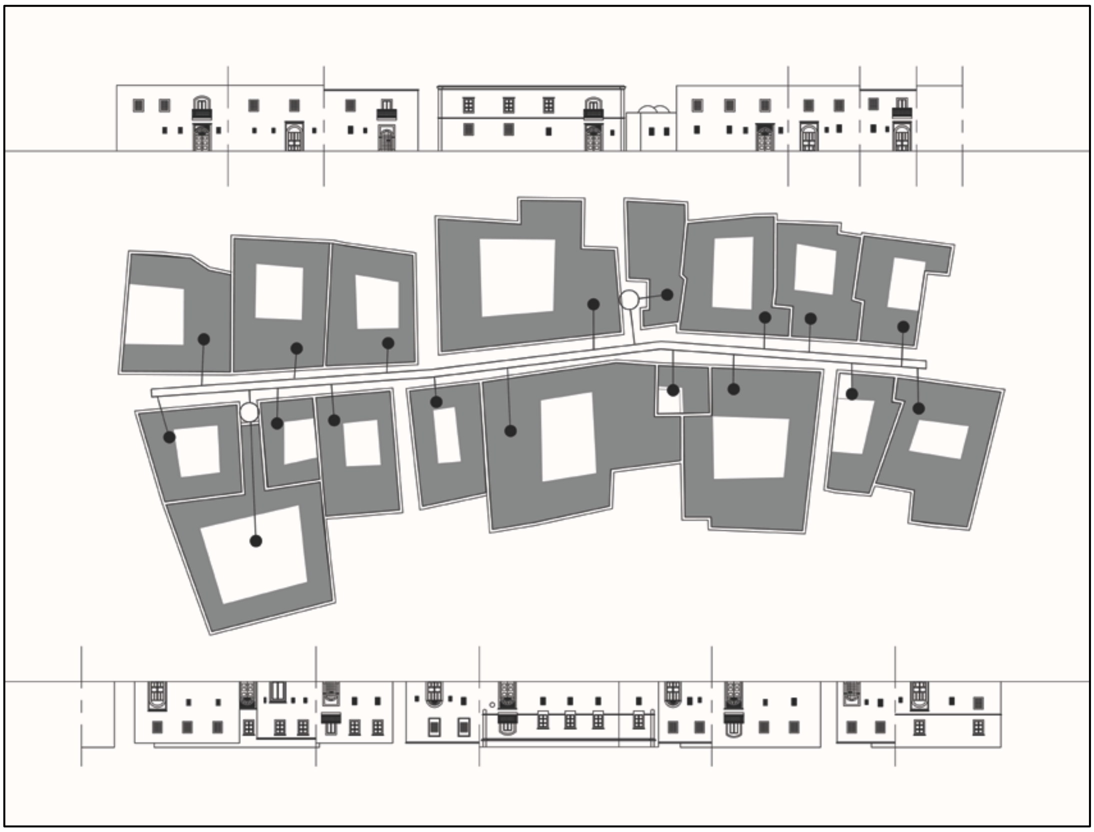


Figure 8.20: Constitutedness on the main street of the Old Town

When analysing the street intervisibility in this case study, based on the provided drawings, we find that 16 of the total units have a clear intervisible relationship with the street space, while two of them have no intervisibility upon the selected street segment. Although the first 16 units have doors directly attached to the street and their ground floor windows are higher than the human vision level, the upper floor windows provide good intervisibility to the adjacent street. The other two buildings are recessed back, which prevents them from having any visual interaction with the street space. In addition, the street width is less than 5 meters, which means that the street width factor is 1.0, based on table (8.1). Therefore, the street intervisibility is the multiple of the average building intervisibility and the street width factor (Table, 8.2).

Therefore, the street intervisibility (**SI**) of the main street = **16 / 18 * 1.0 = 0.89**.

In the second example (Figure 8.21), along a 100 meter segment of the connecting street, 18 of the total 19 dwellings have entrances directly connected to the street. Only one building is not permeable from the selected street segment. Based on this study's approach, the topological depth factor of the 18 units is (1.0), and only one unit has the topological depth factor of (1/2) as there is a semi-public space that must be passed through when reaching the private space from the connecting street. In this case, Permeability is the multiple of the number of units and the horizontal topological depth of each individual unit that is located along the connecting street, divided by the total number of units.

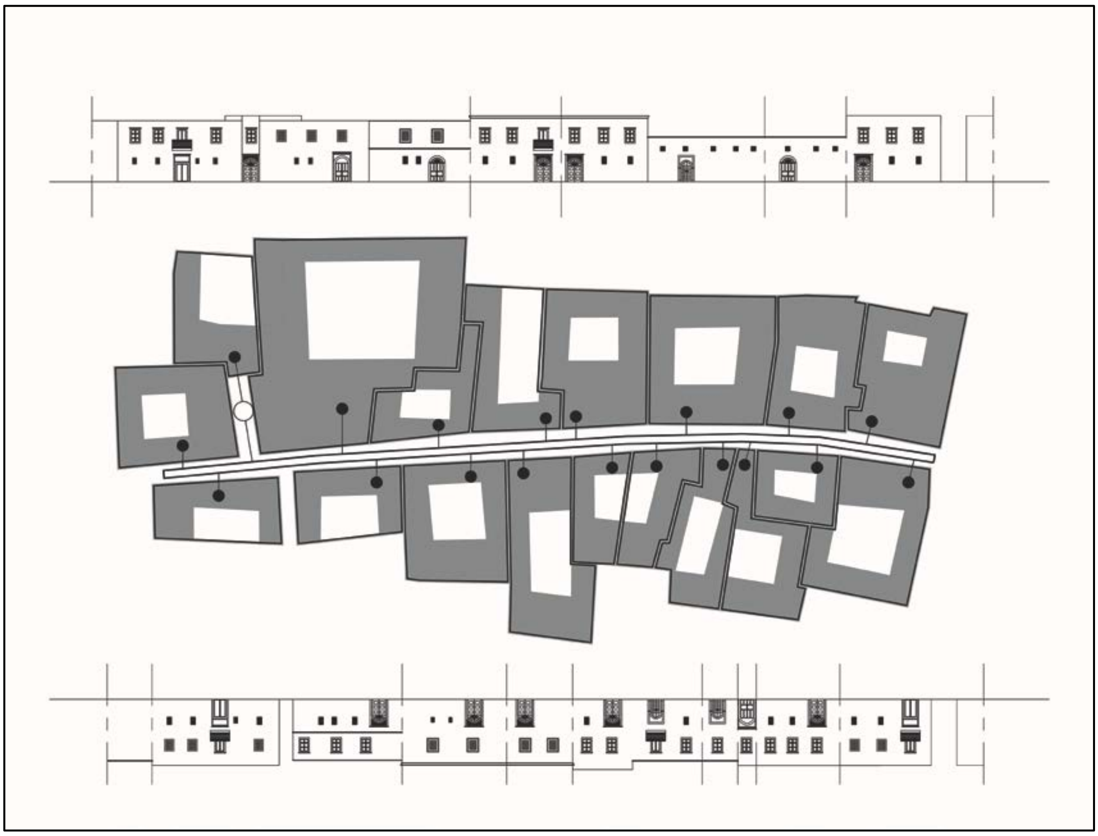


Figure 8.21: Constitutedness on the connecting street of the Old Town

The permeability (**P**) index for this connecting street sample in the Old Town is a result of the topological depth index, and can therefore be calculated as: **[18 * 1 + 1 * ½] / 19 = [18 + 0.5] / 19 = 18.5 / 19 = 0.97**.

When analysing the street intervisibility in this case study, based on the provided drawings, we find that 18 of the total units have a clear, intervisible relationship to the street space, while only one unit has no intervisibility with the adjacent street. The building that has no intervisibility is completely recessed back and has no visual interaction visually with the street space. In addition, the street width is less than 5 meters, which means that the street width factor is 1.0 based on table (8.1). Therefore, the street intervisibility is the multiple of the building intervisibility and the street width factor.

Therefore, the street intervisibility (**SI**) of the connecting street = **18 / 19 * 1.0 = 0.94**.

In the third example (Figure 8.22), along a 100 meter segment of the cul-de-sac, nine of the total nine dwelling entrances are directly connected to the street. Based on this study's approach, the topological depth factor of all the units is (1.0). In this case, Permeability is the multiple of the number of units and the horizontal topological depth of each individual unit, divided by the total number of units.

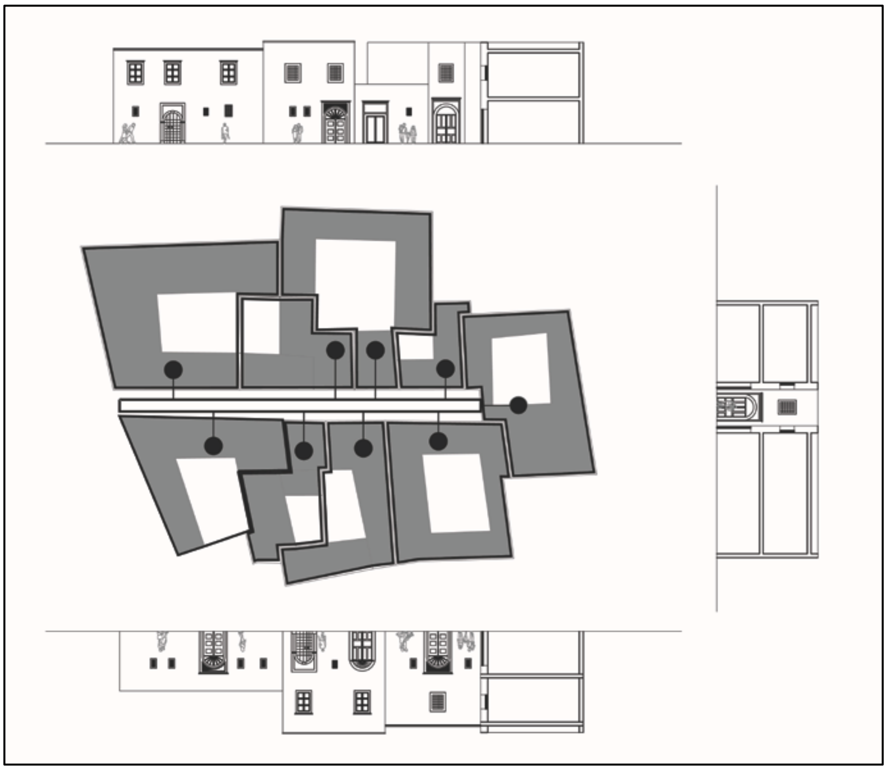


Figure 8.22: Constitutedness on the cul-de-sac of the Old Town

The permeability (**P**) index for this cul-de-sac sample in the Old Town is a result of the topological depth index, and can therefore be calculated as: **[9 * 1] / 9 = 9 / 9 = 1.0**.

When analysing the street intervisibility of this case study, based on the provided drawings, all the units have a clear, intervisible relationship with the selected street segment. In addition, the street width is less than 5 meters therefore, the street width factor is 1.0 based on table (8.1). Therefore, the street intervisibility is the multiple of building intervisibility with the street width factor.

Therefore, the street intervisibility (**SI**) of the cul-de-sac = **9/9 * 1.0 = 1.0** (Table, 8.2).

Street Type	Number of Units per 20m	Total Number of Units	The Level	Building Intervisibility		Street Depth Factor	Street Intervisibility
				Unit Intervisibility	Storey Factor		
Main Street	3.6	18	Ground Floor	0.89	1.0	1.0	0.89
			First Floor	0.89	1.0		
			Average	**0.89**			
Connecting Street	3.8	19	Ground Floor	0.94	1.0	1.0	0.94
			First Floor	0.94	1.0		
			Average	**0.94**			
Cul-de-sac	6.0	09	Ground Floor	1.0	1.0	1.0	1.0
			First Floor	1.0	1.0		
			Average	**1.0**			

Table 8.2: Street intervisibility measurement in the Old Town

Constitutedness **(C)** of the three street types in the Old Town **= [P + SI] / 2** (Table, 8.3).

		Main Street	**Connecting Street**	**Cul-de-sac**
Permeability (P)		**0.94**	**0.97**	**1.0**
Street Intervisibility (SI)		**0.89**	**0.94**	**1.0**
Constitutedness (C)		**0.915**	**0.955**	**1.0**
Social Life	**Peak Times**	**703**	**301**	**28**
	Off-peak Time	**344**	**149**	**73**

Table 8.3: The relationship between the social life and spatial variables in the Old Town

Despite any obvious differences in the street intervisibility measures between the three types, the case study of the cul-de-sac reveals a relatively higher degree of the street intervisibility than the other two street types. It is important to note here that the street intervisibility along the connecting street is higher than that along the main street. This result is mainly influenced by the number of units per specific distance in each street type. There are more units in the cul-de-sac per 20 meters, than for the other two cases the permeability of all the street cases corresponds to the performance of the street intervisibility, where the street intervisibility and the permeability exhibits similar trends (Tables 8.2 & 8.3).

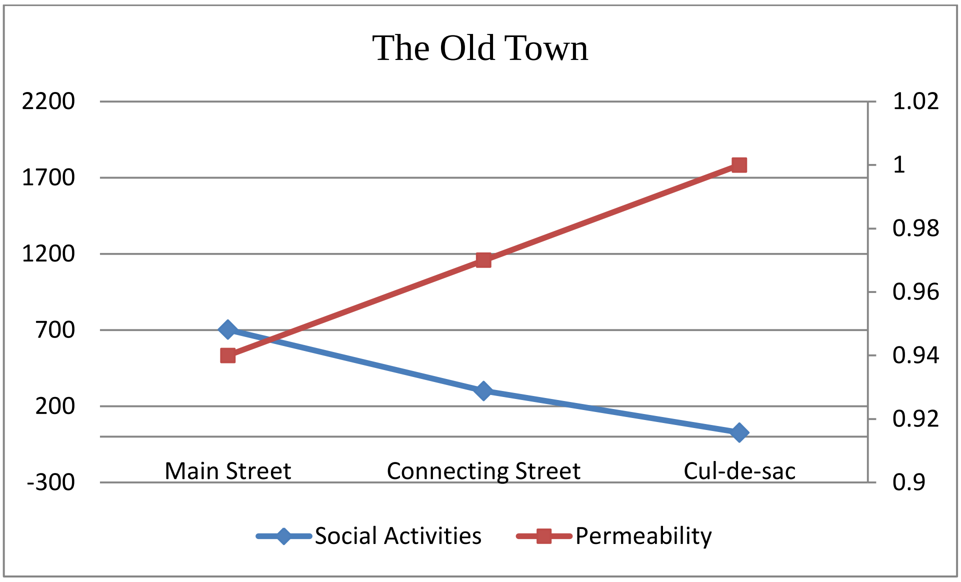


Figure 8.23: A correlation between the social life and permeability (Peak Times) (O.T)

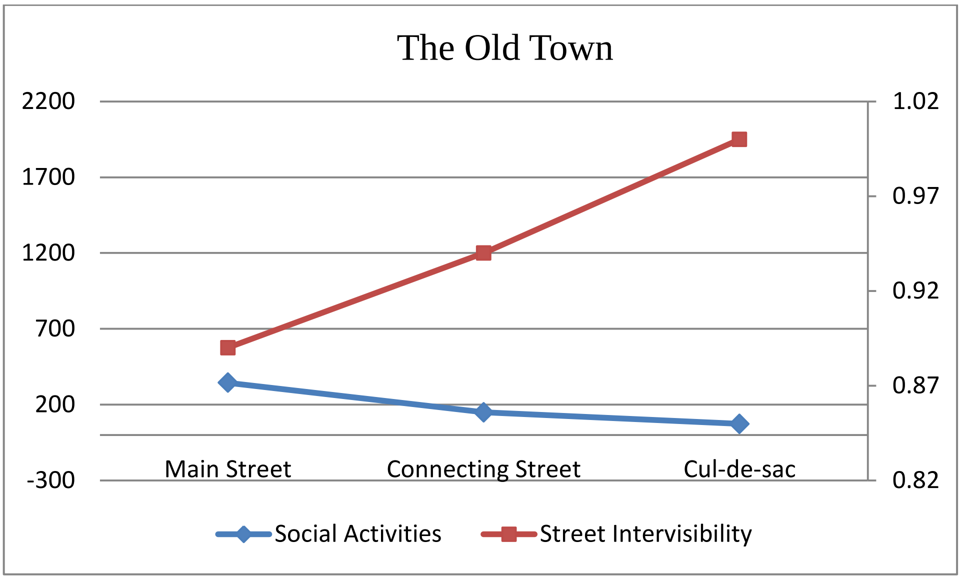


Figure 8.24: A correlation between social life and street intervisibility (Peak Times) (O.T)

Accordingly, constitutedness analysis (Figures 8.23, 8.24 & 8.25) reflects the street intervisibility and the permeability results, whereby it decreases when a walker approaches the main street from the cul-de-sac. In other words, the constitutedness value is higher for cul-de-sacs, but decreases along connecting streets and even more along main streets.

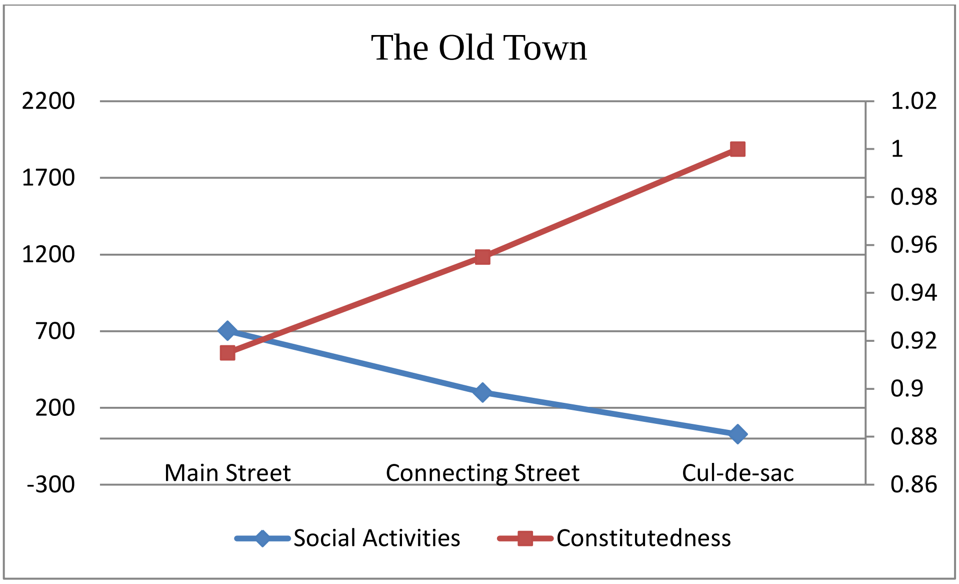


Figure 8.25: A correlation between social life and Constitutedness (Peak Times) (O.T)

In relation to the social life along these streets, it is evident that as constitutedness increases, the frequency of social interaction decreases. This indicates that there is not a positive correlation between constitutedness and social life on the streets of the Old Town. This is because street centrality. However, the constitutedness along the streets of the Old Town is a spontaneous reflection of the initial social behaviour that was applied at the time of designing its urban fabric. People who originally lived in the town required more interaction along cul-de-sacs, and this interaction decreases as the walker approaches the main streets.

8.3.2 The Italian Quarter

As mentioned in Chapter Five, the Italian urban fabric, in general, is considered to be a collection of mixed use buildings. Apart from few public institutions, the majority of the buildings there are occupied by commercial, leisure and service activities on the ground floor, while the upper floors accommodate residential units. The permeability of most of the upper residential units is affected by staircases that must be used in order to reach the main doors of the individual units. Therefore, the topological depth value of the main doors of the upper residential units is a smaller when compared to the units on the ground floor (Figure 8.26). The reciprocal enrichment between inside and outside spaces of the Italian Quarter is achieved by generating residential density and specialised retail activity, which made the inner structure of the urban neighbourhood become more sustainable and vibrant.

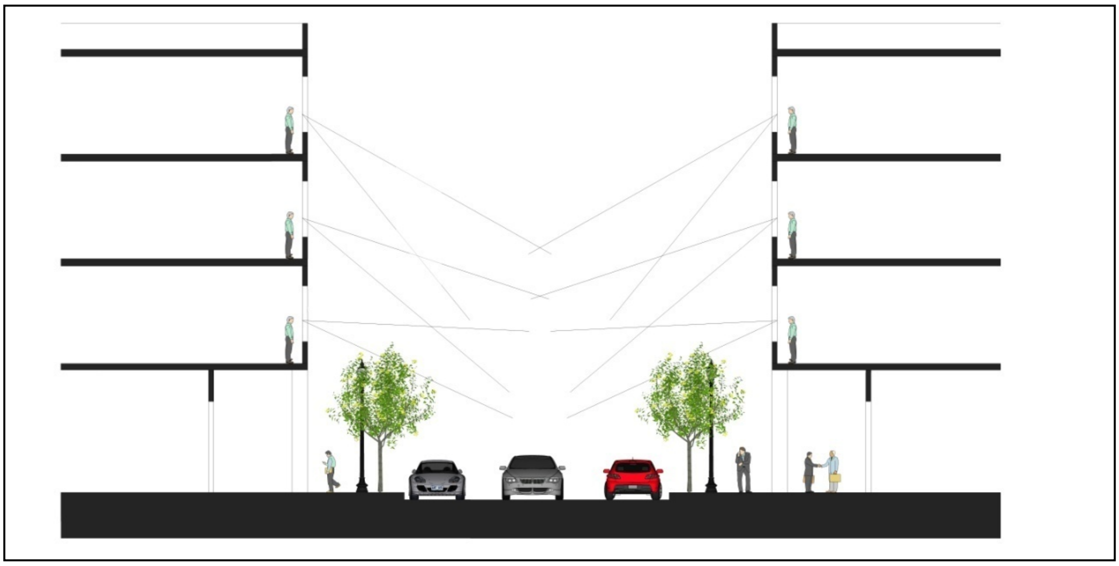


Figure 8.26: A typical cross-section showing the interaction between public and private spaces in the Italian Quarter

In that sense, the numbers of directly constituted entrances that lead to the residential units only represent the number of residential blocks and not the number of dwellings. The upper residential units have an additional semi-private space to be passed through before reaching the adjacent street. Hillier et al (1993) identify spatial configuration, movement flow and attractiveness as three determinants of the manner in which shops are located within the urban network. In the Italian Quarter, the ground floors are dominated by shops along the streets, which in themselves become attractors for people. This indicates that the buildings' spatial configurations generate movement and attractiveness.

In the first example (Figure 8.27 & 8.28), along a 100 meter segment of the main street, there are 68 unit entrances, where 33 of them have a direct connection and 35 of them have indirect connection to street. Based on this study's approach, the topological depth factor for 33 of the total units is (1.0) and 35 of them are scored as (1/2), as they have semi-private spaces between the street and their main doors. In this case, Permeability is the multiple of the number of units and the horizontal and vertical topological depth, divided by the total number of units.

Figure 8.27: Constitutedness of the ground floor plan on the main street of the Italian Quarter

The permeability (**P**) index for this main street sample in the Italian Quarter is a result of the topological depth index, and can therefore be calculated as: **[(33 * 1)*1] + [(8 * 0.8)*0.5] + [(5 * 0.8)*1/3] + [(8 * 0.6)*0.5] + [(5 * 0.6)*1/3] + [(4 * 0.4)*0.5] + [(5 * 0.4)*1/3] / 68= 33 + 6.4 + 3 / 68 = 42.4 / 68 = 0.623**.

When considering the street intervisibility of this case study, according to the provided drawings, we find that all units have a clear, intervisible relationship with the street space at all floors. The intervisibility factor of the units located on the ground and first floor is valued as 1.0, the second is 0.8 and the third is 0.4, based on this study's approach.

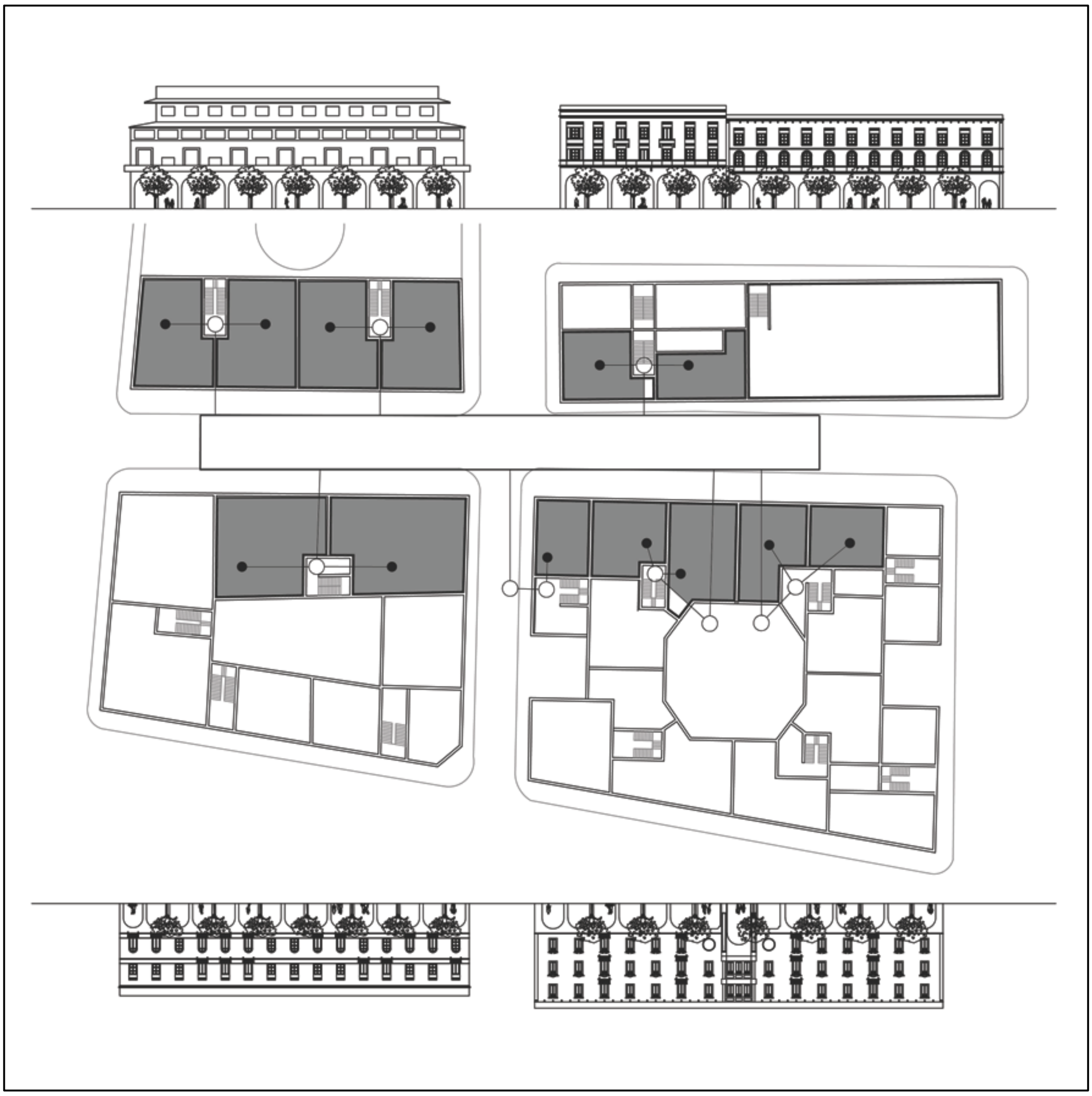


Figure 8.28: Constitutedness of a typical floor plan on the main street of the Italian Quarter

In addition, the street width is between 10 and 20 meters, which means that the street width factor is 0.7 based on table (8.2). The street intervisibility is the multiple of the average building intervisibility and the street width factor (Table8.4).

Therefore, the street intervisibility (**SI**) of the main street = {**46 * 1.0 + 13 * 0.8 + 9 * 0.4 / 68} * 0.7 = {46 + 10.4 + 3.6 / 68} * 0.7 = {60 / 68} * 0.7 = 0.88 * 0.7 = 0.616**.

Street Type	Number of Units per 20m	Total Number of Units	The Level	Building Intervisibility		Street Depth Factor	Street Intervisibility
				Units Intervisibility	Storey Factor		
Main Street	13.6	68	Ground Floor (33	1.0	1.0	0.7	**0.616**
			First Floor (13 units)	1.0	1.0		
			Second Floor (13 units)	1.0	0.8		
			Third Floor (9 units)	1.0	0.4		
			Average	**0.88**			

Table 8.4: Street intervisibility measurement on the main street of the Italian Quarter

In the second example (Figures 8.29 & 8.30), along a 100 meter segment of the connecting street, there are 57 unit entrances, 32 of them have a direct connection and 25 of them have an indirect connection to the street. Based on this study's approach, the topological depth factor for 32 of the total number of units is (1.0) and (1/2) for 19 of them, since they have semi-private spaces between the street and their main doors. In addition, the topological depth factor for 6 of the units is (1/3), as they have two spaces to pass through before reaching private spaces. In this case, Permeability is the multiple of the number of units and the horizontal and vertical topological depth, divided by the total number of units.

The permeability (**P**) index for this connecting street sample in the Italian Quarter is a result of the topological depth index, and can therefore be calculated as**: [(32 * 1)*1] + [(1 * 1)*0.5] + [(1 * 1)*1/3] + [(10 * 0.8)*0.5] + [(1 * 0.8)*1/3] + [(6 * 0.6)*0.5] + [(1 * 0.6)*1/3] + [(2 * 0.4)*0.5] + [(2 * 0.4)*1/3] + [(1 * 0.2)*1/3] / 57= 32 + 0.5 + 4 + 1.8 + 0.4 + 1.133 / 57 = 39.833 / 57 = 0.698**.

When looking at the street intervisibility of this case study, based on the provided drawings, we find that all units have a clear, intervisible relationship with the street space at all floors. The intervisibility factor of the units that are located at the ground and first floor is 1.0, the second is 0.8, the third and fourth are 0.4 and the fifth floor is 0.1, according to the analysis method.

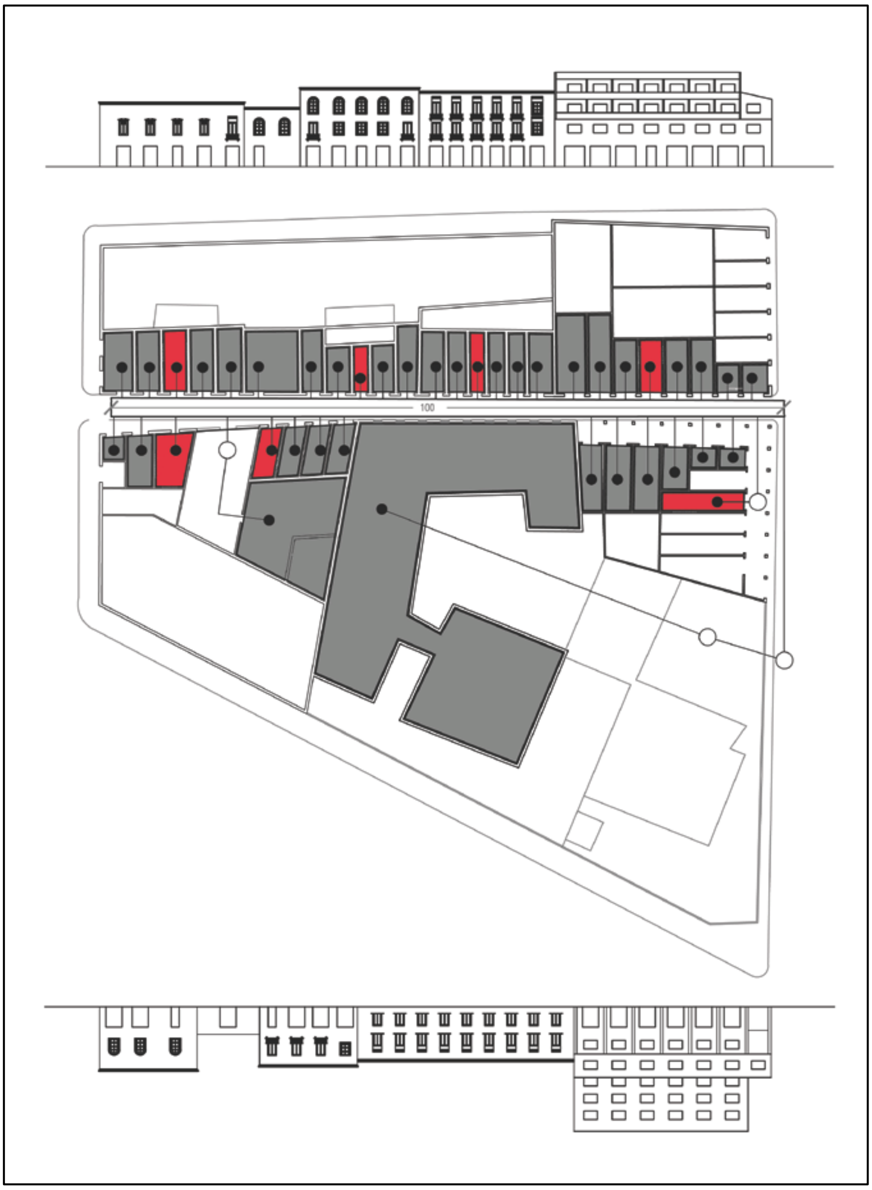


Figure 8.29: Constitutedness of the ground floor plan on the connecting street of the Italian Quarter

In addition, the street width is less than 5.0 meters so the street width factor is 1.0. The street intervisibility is the multiple of the average building intervisibility and the street width factor (Table 8.5).

Therefore, the street intervisibility (**SI**) of the connecting street = **{45 * 1.0 + 7 * 0.8 + 4 * 0.4 + 1 * 0.1 / 57} * 1.0 = {45 + 5.6 + 1.6 + 0.1 / 57} * 1.0 = {52.3 / 57} * 1.0 = 0.917**.

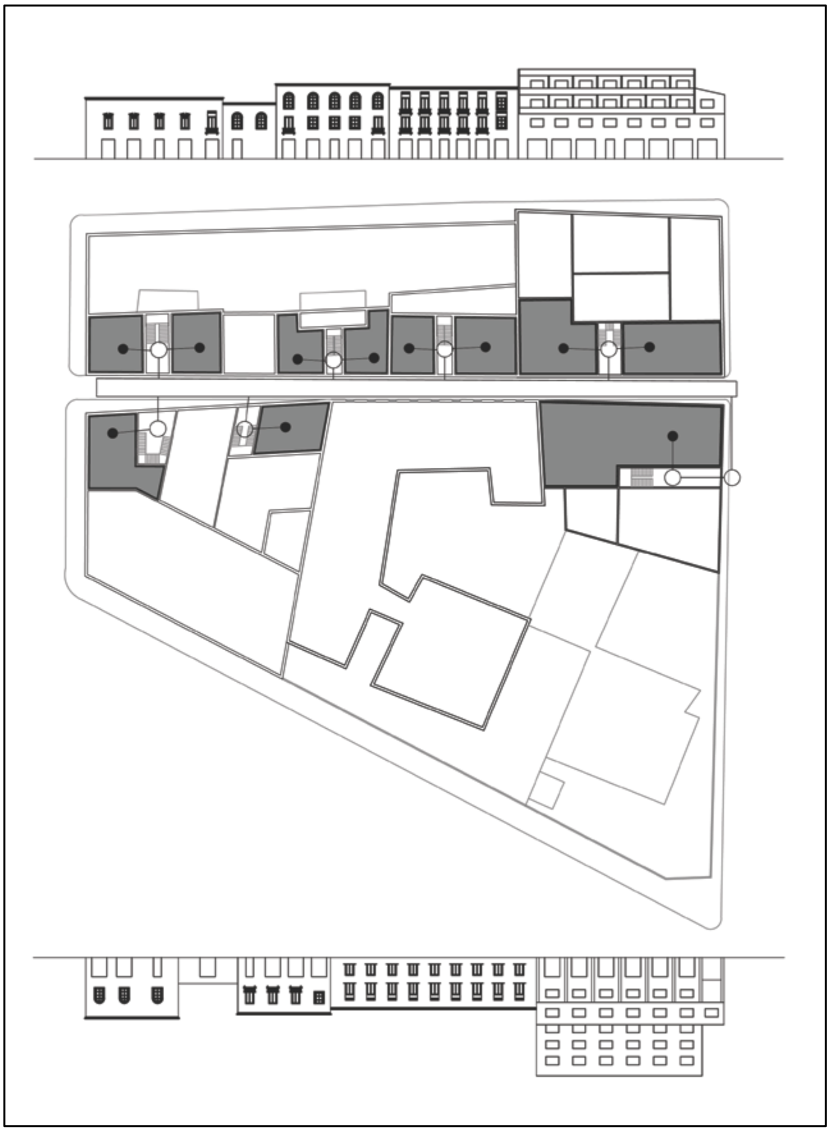


Figure 8.30: Constitutedness of a typical floor plan on the connecting street of the Italian Quart

Street Type	Number of Units per 20m	Total Number of Units	The Level	Building Intervisibility		Street Depth Factor	Street Intervisibility
				Units Intervisibility	Storey Factor		
Connecting Street	11.4	57	Ground Floor (34 units)	1.0	1.0	1.0	**0.917**
			First Floor (11 units)	1.0	1.0		
			Second Floor (07 units)	1.0	0.8		
			Third Floor (04 units)	1.0	0.4		
			Third Floor (01 units)	1.0	0.1		
			Average	**0.917**			

Table 8.5: Street intervisibility measurement on the connecting street of the Italian Quarter

In the third example (Figures 8.31 and 8.32), along a 23 meter segment of the cul-de-sac, there are only 16 unit entrances, where 3 of them have a direct connection to the street and 13 of them have an indirect connection to the street. Based on this study's approach, the topological depth factor for 3 of the units is (1.0), and (1/2) for the other units, since some of them are accessible from other streets or have semi-private spaces between the street and their main doors. In this case, the permeability is the multiple of the number of units and the horizontal and vertical topological depth, divided by the total number of units.

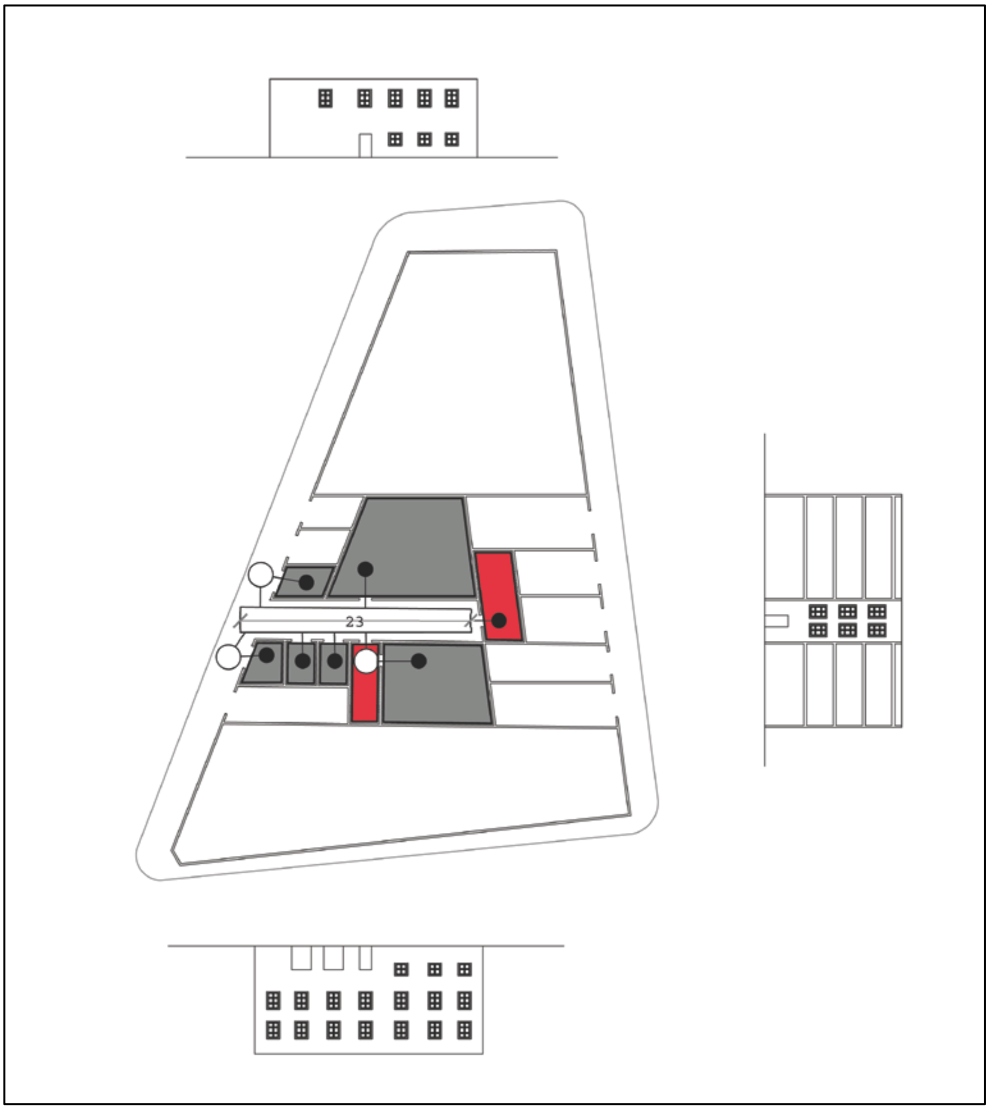


Figure 8.31: Constitutedness of the ground floor plan on the cul-de-sac of the Italian Quarter

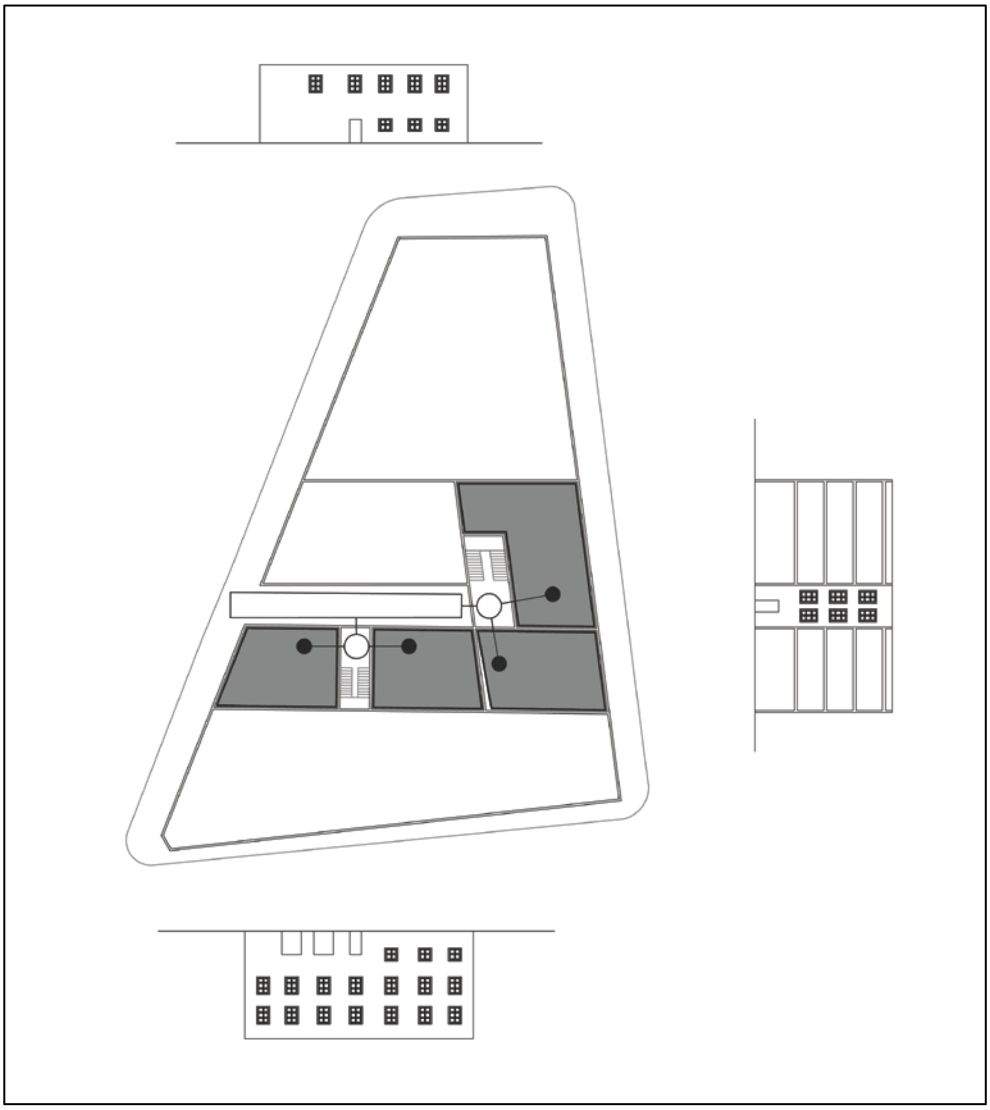


Figure 8.32: Constitutedness of a typical floor plan on the cul-de-sac of the Italian Quarter

The permeability (**P**) index for this cul-de-sac sample in the Italian Quarter is a result of the topological depth index, and can therefore be calculated as: **[(3 * 1)*1] + [(3 * 1)*0.5] + [(4 * 1)*0.5] + [(4 * 0.8)*0.5] + [(2 * 0.4)*0.5] / 16 = 3 + 1.5 + 2 + 1.6 + 0.4 / 16 = 8.50 / 16 = 0.531**.

When analysing the street intervisibility of this case study, based on the provided drawings, all units have a clear intervisible relationship with the street space at all floors. The intervisibility factor of the units that are located at the ground and first floor is 1.0, for the second floor is 0.8, for the third and fourth floors 0.4 and the fifth floor 0.1, consistent with the analysis process (Table 8.6).

<table>
<tr><th rowspan="2">Street Type</th><th rowspan="2">Number of Units per 20m</th><th rowspan="2">Total Number of Units</th><th rowspan="2">The Level</th><th colspan="2">Building Intervisibility</th><th rowspan="2">Street Depth Factor</th><th rowspan="2">Street Intervisibility</th></tr>
<tr><th>Units Intervisibility</th><th>Storey Factor</th></tr>
<tr><td rowspan="6">First Floor (11 units) Second Floor (07 units) Third Floor (04 units)</td><td rowspan="6">13.9</td><td rowspan="6">16</td><td>Ground Floor (04 units)</td><td>1.0</td><td>1.0</td><td rowspan="6">1.0</td><td rowspan="6">0.75</td></tr>
<tr><td>Ground Floor (02 units)</td><td>0.0</td><td>1.0</td></tr>
<tr><td>First Floor (04 units)</td><td>1.0</td><td>1.0</td></tr>
<tr><td>Second Floor (04 units)</td><td>1.0</td><td>0.8</td></tr>
<tr><td>Third Floor (02 units)</td><td>1.0</td><td>0.4</td></tr>
<tr><td>Average</td><td colspan="2">0.75</td></tr>
</table>

Table 8.6: Street intervisibility measurement on the cul-de-sac of the Italian Quarter

In addition, the street width is less than 5.0 meters so the street width factor is 1.0. The street intervisibility is the multiple of the average building intervisibility and the street width factor.

Therefore, the street intervisibility (**SI**) for the cul-de-sac in the Italian Quarter = **{4 * 1.0 + 2 * 0.0 + 4 * 1.0 + 4 * 0.8 + 2 * 0.4 / 16} * 1.0 = {4 + 4 + 3.2 + 0.8 / 16} * 1.0 = {12.0 / 16} * 1.0 = 0.75**.

Constitutedness **(C)** of the three street types in the Italian Quarter **= [P + SI] / 2** (Table, 8.7).

<table>
<tr><th colspan="2"></th><th>Main Street</th><th>Connecting Street</th><th>Cul-de-sac</th></tr>
<tr><td colspan="2">Permeability (P)</td><td>0.623</td><td>0.698</td><td>0.531</td></tr>
<tr><td colspan="2">Street Intervisibility (SI)</td><td>0.616</td><td>0.917</td><td>0.75</td></tr>
<tr><td colspan="2">Constitutedness (C)</td><td>0.6195</td><td>0.8075</td><td>0.6405</td></tr>
<tr><td rowspan="2">Social Life</td><td>Peak Times</td><td>2131</td><td>1177</td><td>38</td></tr>
<tr><td>Off-peak Times</td><td>981</td><td>412</td><td>66</td></tr>
</table>

Table 8.7: The relationship between the social life and spatial variables in the Italian Quarter

Constitutedness analysis shows that in the Italian Quarter, the case study of the connecting street maintains a higher amount of intervisibility than the other two street types, considering that the street intervisibility along the cul-de-sac is higher than along the main street. The permeability study demonstrates that the case study of the connecting street is more permeable than the main street, while the cul-de-sac is less permeable (Figures 8.33 & 8.34) (Table 8.7).

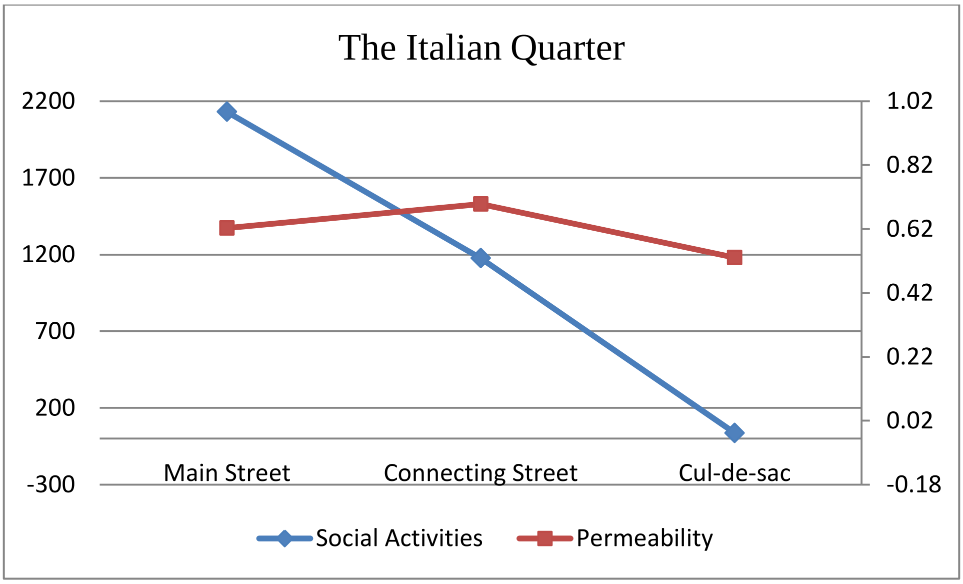


Figure 8.33: A correlation between social life and permeability (I.Q)

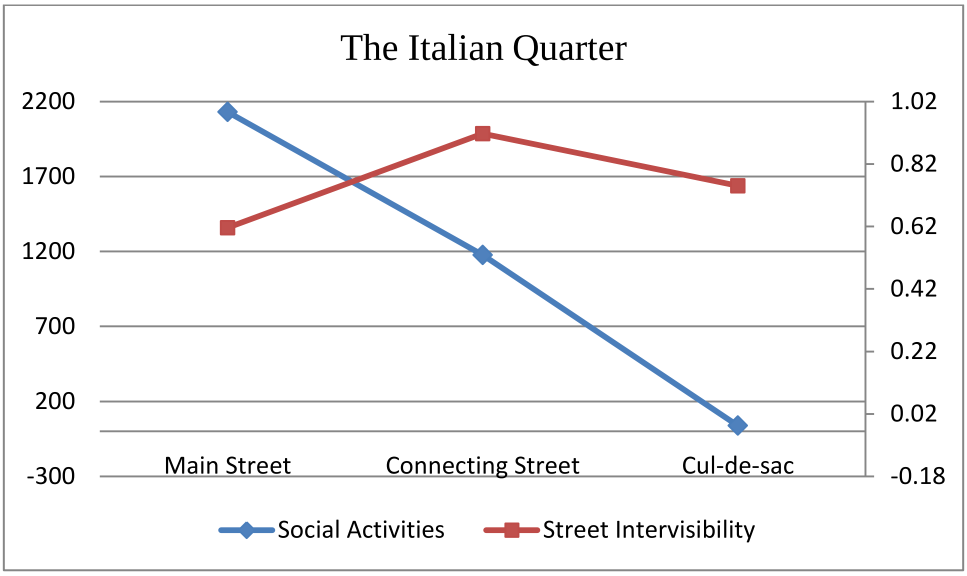


Figure 8.34: A correlation between social life and street intervisibility (Peak Times) (I.Q)

These results are influenced primarily by the number of units per specific distance of street, in each street type. The connecting street hosts the fewest units per 20 meter; 11.4 units, while the other two cases host more units per 20 meter; 13.9 units on the cul-de-sac and 13.6 per 20 meter on the main street.

Accordingly, constitutedness analysis reflects the street intervisibility results, increasing along the connecting street and decreasing along the cul-de-sac and decreasing even further on the main street (Figure 8.35).

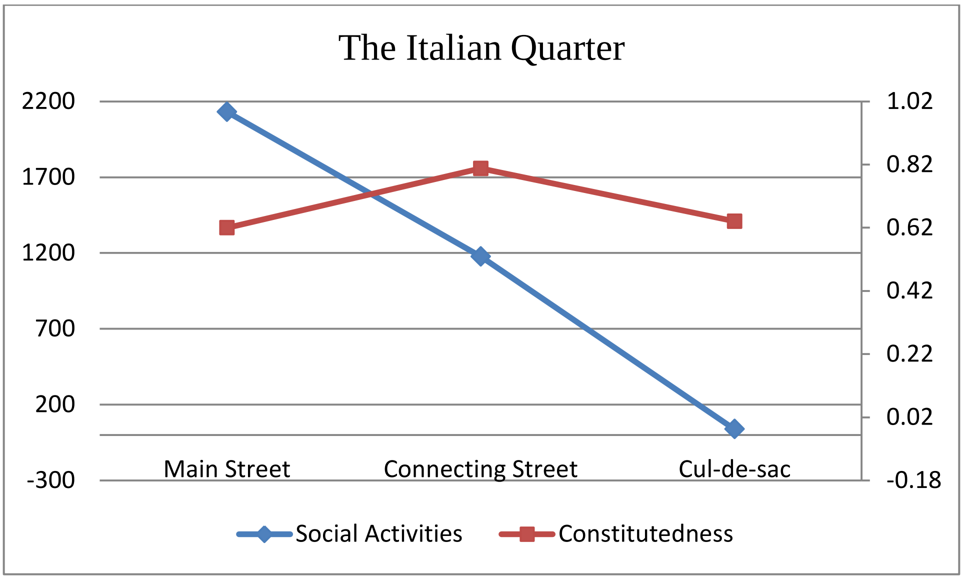


Figure 8.35: A correlation between social life and Constitutedness (Peak Times) (I.Q)

According to Figure (8.35), we find that, unlike the street centrality, the constitutedness index correlates negatively with the social life along these streets: as constitutedness levels increase, the social life on these streets decreases, despite the pattern of flatness of both of these factors along the various street types. The connecting street has the highest constitutedness value, with average liveability, while the main street, which has the lowest constitutedness, exhibits the most socially active streets. The cul-de-sac shows the second highest value in constitutedness, but it hosts less accumulation social life than the other two streets.

8.3.3 The Garden City

The idea of the Garden City was presented as a new urban neighbourhood, located adjacent to the Italian Quarter, representing modern architectural and urban models. The Garden City's planning focused mainly on providing private gardens around the residential units, a concept district from pre-existing urban forms. The neighbourhood's residential units promote the benefits of open space by maximising exposure to air and sunlight. However, in the Garden City, most of the green areas are largely privatised and are mostly maintained by the residents.

Therefore, most buildings in the Garden City are only indirectly connected to the street network. Each individual dwelling has an additional semi-private space, a private garden, which is located between the private space and the street space. As stated previously, the private gardens that surround the dwellings prevent the formation of a relationship between residential units and streets network. Although the green areas are mainly located on the ground floors of the residential units, the degree of intervisibility to adjacent streets, in some units, decreases in upper levels as well, due to high trees that block the interaction between the units' windows and the public space. The degree of street intervisibility is also affected by solid blind fencings, which are part of these units at the ground level. Because most buildings are indirectly attached to the street in this urban fabric, their topological depth, between the street and the building is scored as (1/2) (Figure 8.36).

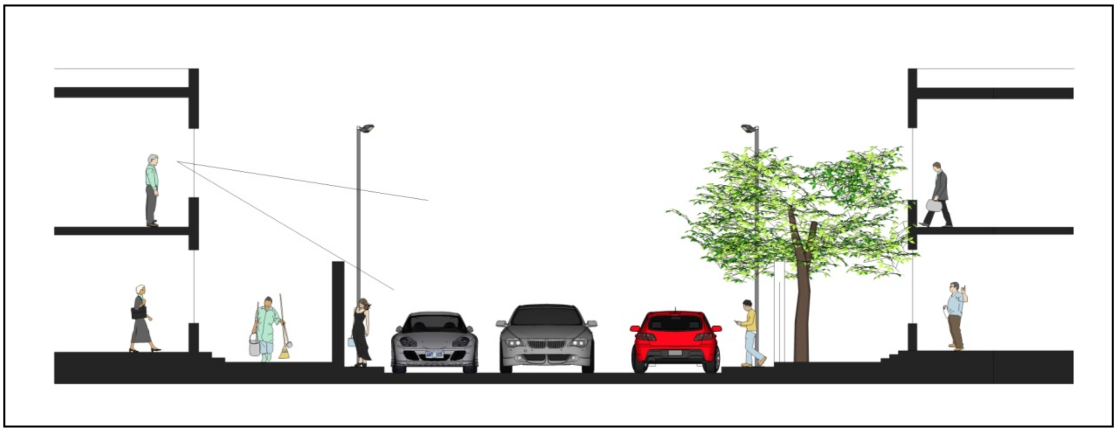


Figure 8.36: A typical cross-section demonstrating the interaction between public and private spaces in the Garden City

In the first example (Figures 8.37), along a 100 meter segment of the the main street, there are only 6 dwelling entrances, and they are indirectly connected to the street. Based on this study's approach, the topological depth factor of all the units is valued (1/2), since all the units have semi-private spaces between the street and their main doors. In this case, the permeability is the multiple of the number of units and the horizontal topological depth, divided by the total number of units.

The permeability (**P**) index for this main street sample in the Garden City is a result of the topological depth index, and can therefore be calculated as: **[6 * ½] / 6 = 3/6 = 0.5**

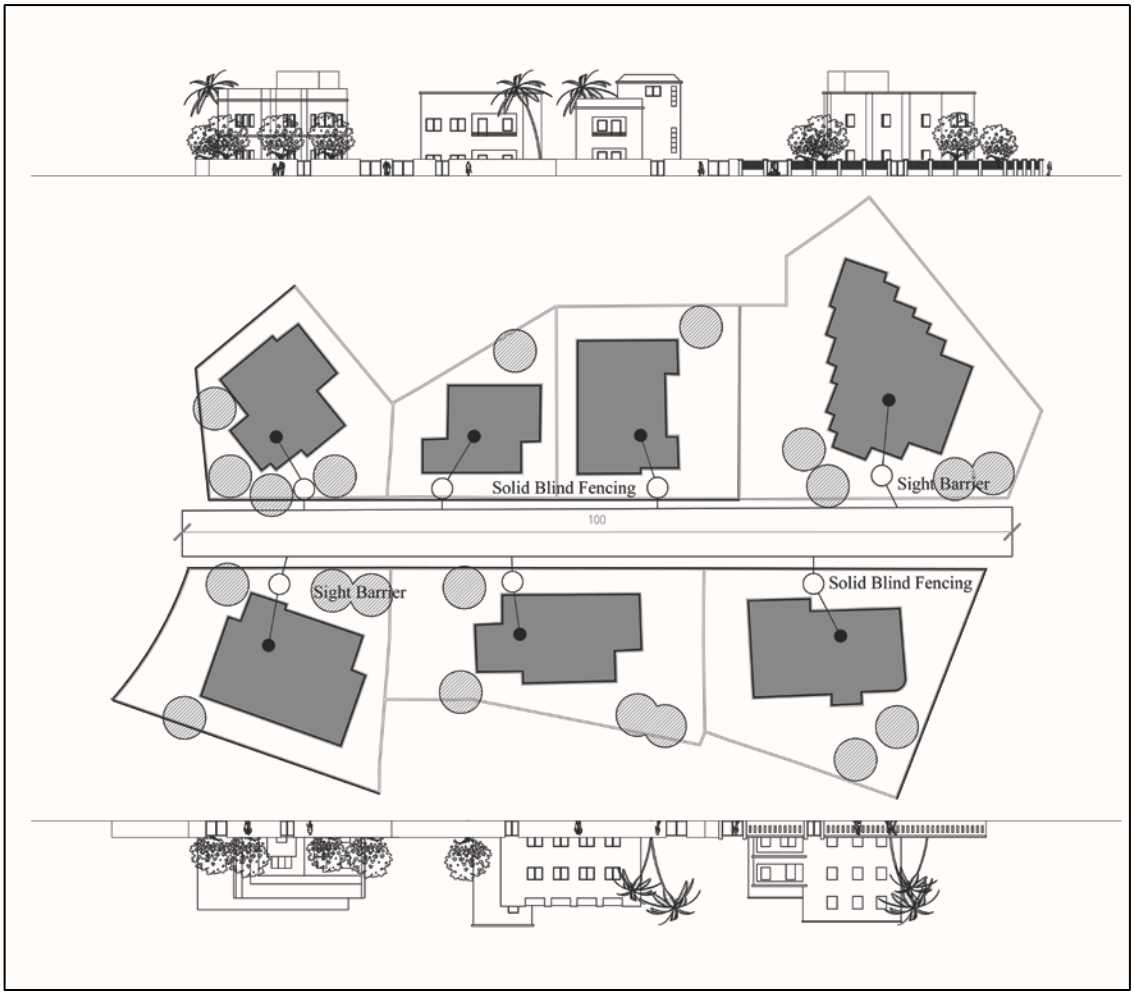


Figure 8.37: Constitutedness on the main street of the Garden City

When analysing the street intervisibility of this case study, based on the provided drawings, we find that only one of the units has transparent fencing, and consequently, has a clear, intervisible relationship with the street space at the ground floor, while the other five units have no intervisibility with the street due to the solid blind fencing. Four of these units have a clear intervisible relationship with the street space at the first floor, while the other three units have no intervisibility with the street at the first floor, due to the placement of trees that function as sight barriers. In addition, the street width is between 5 and 10 meters, which means that the street width factor is 0.9. The street intervisibility is the multiple of the average building intervisibility with the street width factor (Table 8.8).

Therefore, the street intervisibility (**SI**) of the main street in the Garden City **= 0.355 * 0.9 = 0.319**.

In the second example (Figures 7.38), along a 100 meter segment of the the connecting street, there are 10 dwelling entrances which are all indirectly connected to the street. Based on this study's approach, the topological depth factor of all the units is (1/2), as all the units have semi-private spaces between the street and their main doors. In this case, the permeability is the multiple of the number of units and the horizontal topological depth, divided by the total number of units.

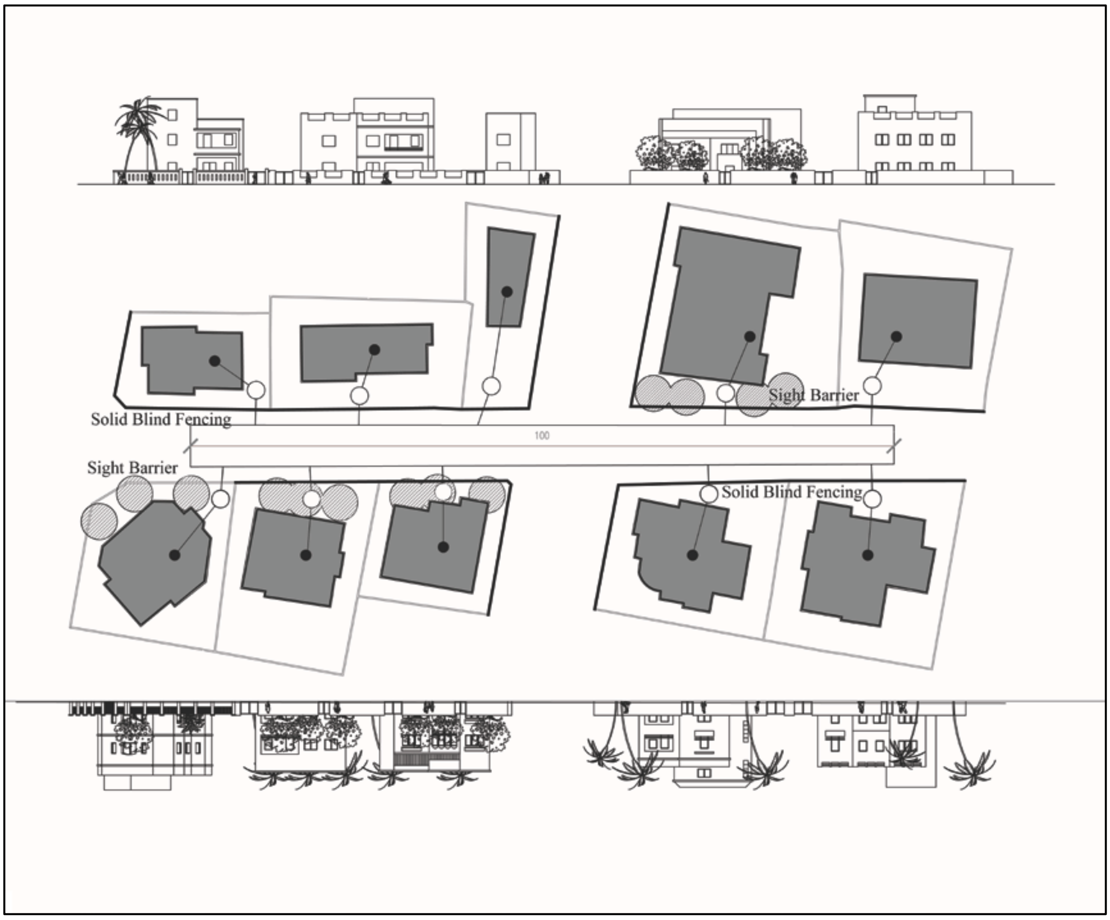


Figure 8.38: Constitutedness of the ground floor plan on the connecting street of the Garden City

The permeability (**P**) index for this connecting street sample in the Garden City is a result of the topological depth index, and can therefore be calculated as: **[10 * ½] / 10 = 5/10 = 0.5**

When analysing the street intervisibility of this case study, based on the provided drawings, we find that there is only one unit, out of all the units, that has a clear, intervisible relationship with the street space at the ground floor, while the other nine units have no intervisibility with the street due to the solid blind fencing. Six of these units have a clear, intervisible relationship with the street space at the first floor, while the other four units have no intervisibility with the street at the first floor due to the location of trees that work as sight barriers. In addition, the street width is between 5 and 10 meters, which mean that the street width factor is 0.9. The street intervisibility is the multiple of the average building intervisibility and the street width factor.

Therefore, the street intervisibility (**SI**) of the connecting street in the Garden City **= 0.350 * 0.9 = 0.315**

In the third example (Figures 8.39), along a 50 meter segment of the the cul-de-sac, there are 8 dwelling entrances, all indirectly connected to the street. Based on this study's approach, the topological depth factor of all the units is (1/2), as all the units have semi-private spaces between the street and their main doors. In this case, the permeability is the multiple of the number of units and the horizontal topological depth, divided by the total number of units.

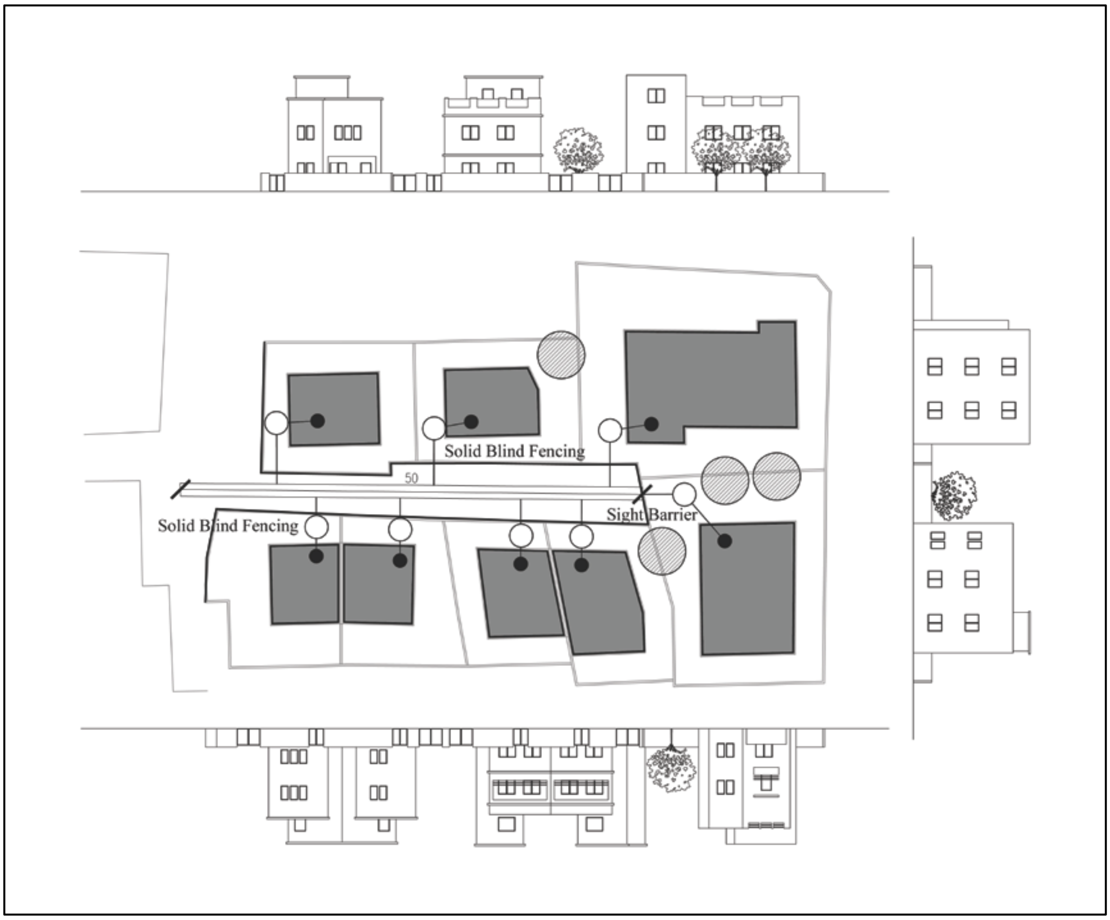


Figure 8.39: Constitutedness of the ground floor plan on the cul-de-sac of the Garden City

The permeability (**P**) index for this cul-de-sac sample in the Garden City is a result of the topological depth index, and can therefore be calculated as: **[8 * ½] / 8 = 4/8 = 0.5**

When analysing the street intervisibility of this case study, and according to the provided drawings, we find that none of the units have an intervisible relationship with the street space at the ground floor, due to the solid blind fencings. Seven of these units have a clear, intervisible relationship with the street space at the first floor, while the remaining unit does not have any intervisibility with the street at the first floor, due to the location and the position of trees within the plot that block the sight. In addition, the street width is less than 5 meters, which means that the street width factor is 1.0. The street intervisibility is the multiple of the average building intervisibility and the street width factor (Table 8.8).

Street Type	Number of Units per 20m	Total Number of Units	The Level	Building Intervisibility		Street Depth Factor	Street Intervisibility
				Unit Intervisibility	Storey Factor		
Main Street	1.4	07	Ground Floor	0.14	1.0	0.9	0.319
			First Floor	0.57	1.0		
			Average	**0.355**			
Connecting Street	2.0	10	Ground Floor	0.1	1.0	0.9	0.315
			First Floor	0.6	1.0		
			Average	**0.350**			
Cul-de-sac	3.2	08	Ground Floor	0.0	1.0	1.0	0.437
			First Floor	0.875	1.0		
			Average	**0.437**			

Table 8.8: The measurement of street intervisibility in the Garden City

Therefore, the street intervisibility (**SI**) for the cul-de-sac in the Garden City **= 0.437 * 1.0 = 0.437**.

Constitutedness **(C)** of the three street types in the Garden City **= [P + SI] / 2** (Table, 8.9).

Although there are no significant differences between the three types of streets in regards to the street intervisibility measures, the cul-de-sac maintains the highest levels of the street intervisibility of all the street types, as it scores 3.2 units per 20 meters. Although the street intervisibility along the main street is slightly higher than that along the connecting street, the former scores only 1.4 in index units, while the latter scores 2.0. This study demonstrates that the number of units contributes only marginally to the street intervisibility, and consequently to the constitutedness in this urban neighbourhood. The permeability in all the street cases is identical, as all the buildings in this urban fabric are provided with gardens around the main buildings, and each building has a semi private space between the private spaces and the street.

		Main Street	Connecting Street	Cul-de-sac
Permeability (P)		**0.5**	**0.5**	**0.5**
Street Intervisibility (SI)		**0.319**	**0.315**	**0.437**
Constitutedness (C)		**0.4095**	**0.4075**	**0.4685**
Social Life	**Peak Times**	**78**	**42**	**19**
	Off-peak Times	**86**	**64**	**35**

Table 8.9: The relationship between the social life and spatial variables in the Garden City

Accordingly, the constitutedness analysis (Table 8.9) reflects the street intervisibility and, to a certain degree, the numbers of units, where it is higher on the cul-de-sac, decreases along the main street, and decreases even further on the connecting street.

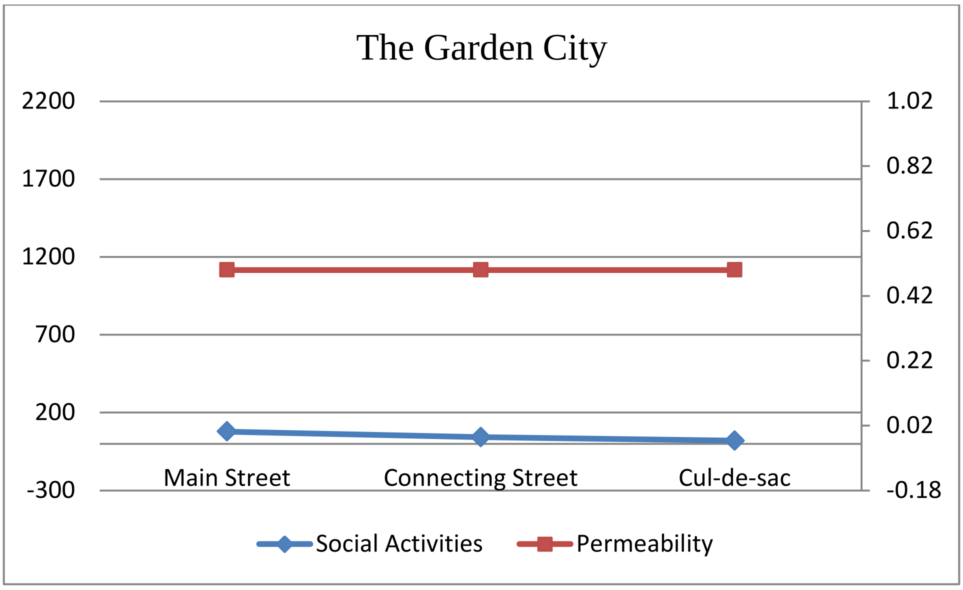


Figure 8.40: A correlation between social life and permeability (Peak Times) (G.C)

In correlation with the social life along these streets, we find that as constitutedness increases the social life decreases, despite the flatness in pattern of both factors along different street types. This indication shows that there is no relationship between constitutedness and social life along the Garden City streets, as street centrality affects the contribution of a street type within the whole street network of the urban fabric in terms of city life. While the permeability shows a constant relationship between the three cases, constitutedness reflects the behaviour of the number of units and the street intervisibility. Constitutedness goes up and down as the two factors go up and down (Figures 8.40, 8.41 & 8.42).

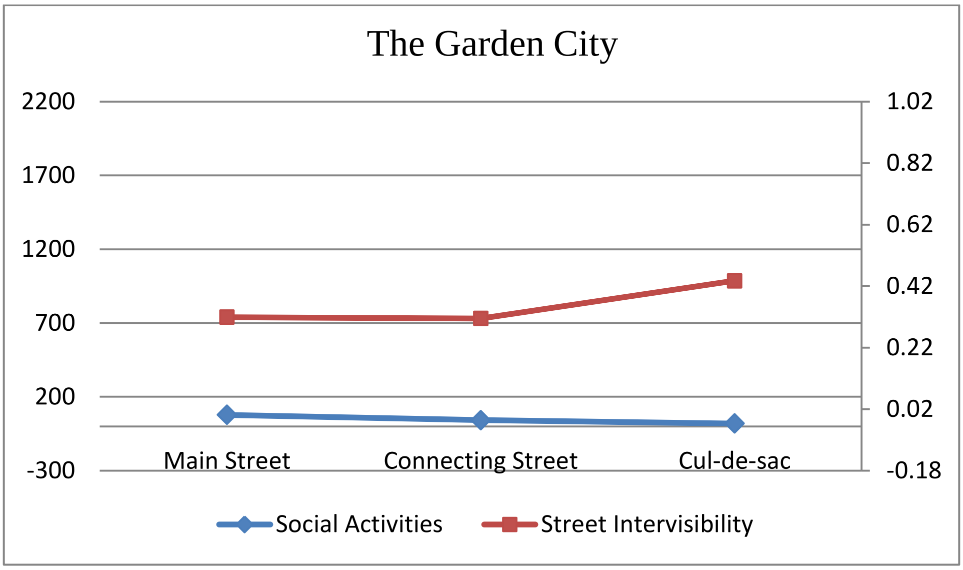


Figure 8.41: A correlation between social life and street intervisibility (Peak Times) (G.C)

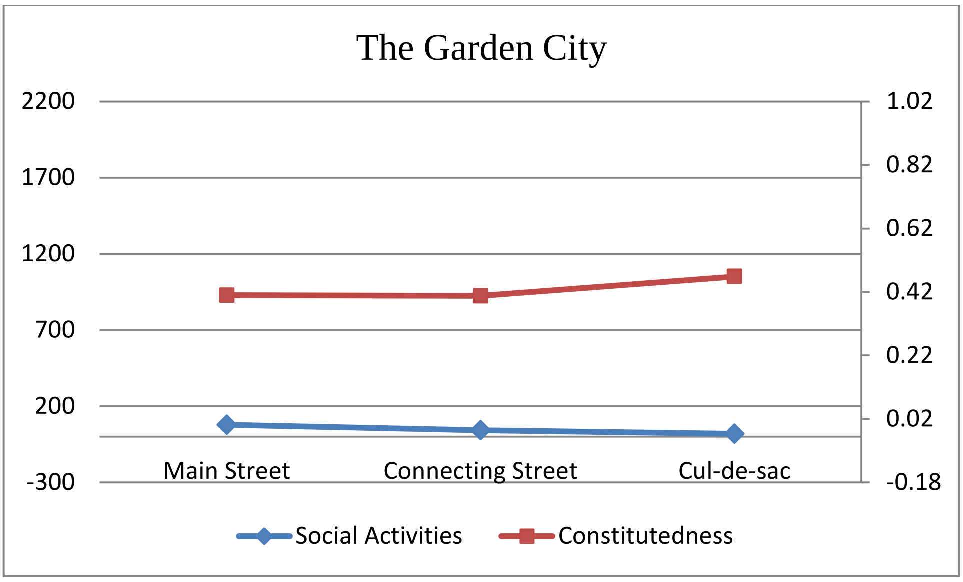


Figure 8.42: A correlation between social life and Constitutedness (Peak Times) (G.C)

8.4 Conclusion

In summary, a combination of a variety of micro spatial structures and social life makes it possible to gain quantifiable spatial data and provide enough information to evaluate whether there is any relationship between these spatial variables and social activities within the city centre of Tripoli. Akkelies van Nes (2008, p10) states that "*the micro spatial structure of urban street plinth affects the direct interface of public and private life of a built environment's inhabitants and visitors in an informal way*". However, the constitutedness analysis of the three types of streets within the different historical urban fabrics, in the city centre of Tripoli exhibits different results, in terms of the relationship between the spatial structure of an urban street and the social life along different streets (Figures 8.43 & 8.44).

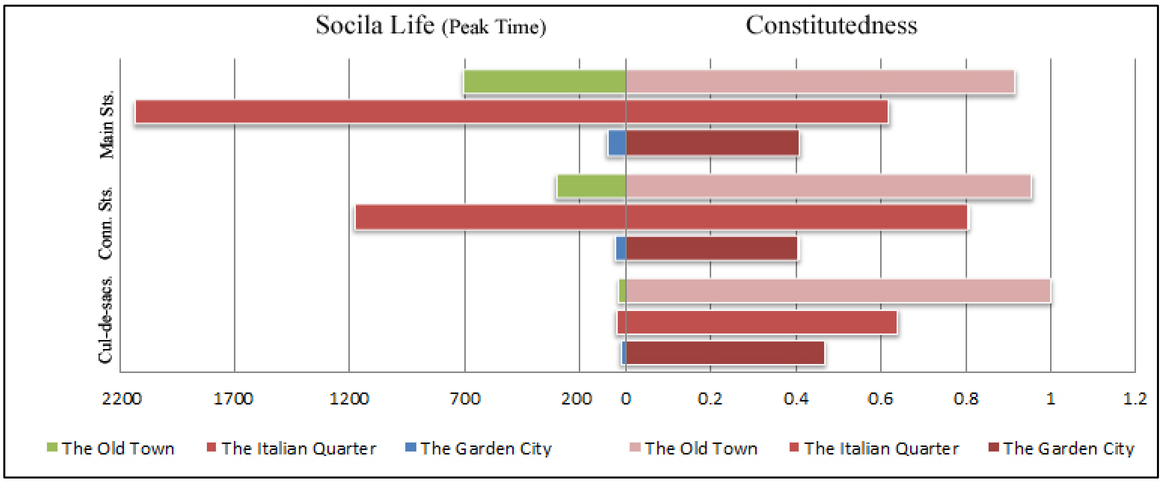


Figure 8.43: A correlation between social life and Constitutedness (Peak- Times)

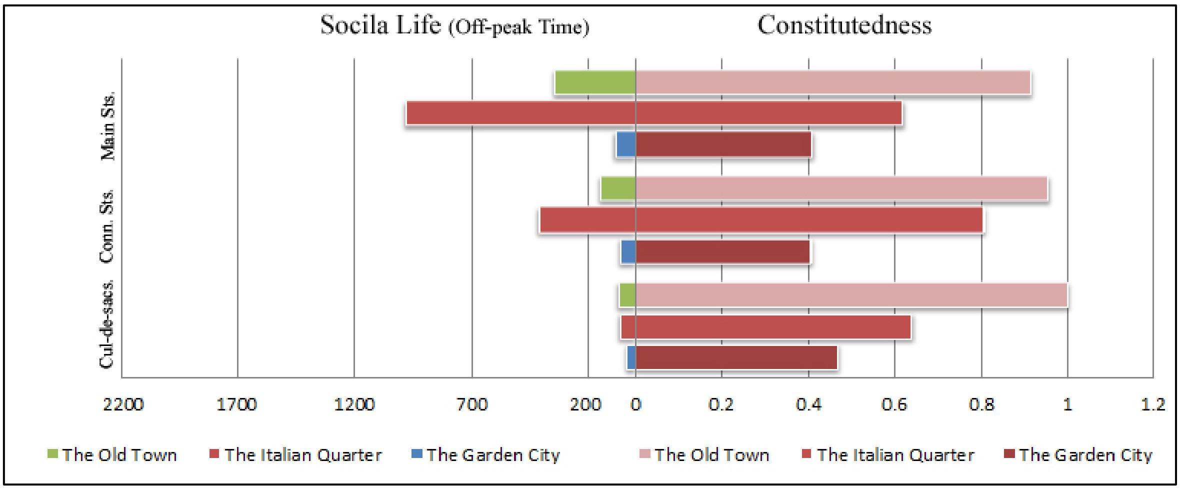


Figure 8.44: A correlation between social life and Constitutedness (Off-peak- Times)

Constitutedness results, along the three different streets of the three types of urban fabric, show almost the same pattern in behaviour with differences in values, despite the fact that each urban fabric has its own spatial structure of street fronts. Constitutedness does not reflect the amount of social activities but in fact it reflects the relationship between the private and the public spaces. The analysis shows substantial findings, where the traditional urban form has the best constitutedness value along its streets regardless of their centrality. The Italian Quarter comes second followed by the Garden City. This analysis shows that in the traditional urban form, and to a certain degree in the Garden City, the constitutedness values increase as a walker approaches the quieter public spaces, represented by cul-de-sacs and decreases as the public space becomes busier and forms main streets (figures 8.45, 8.46, 8.47 & 8.48).

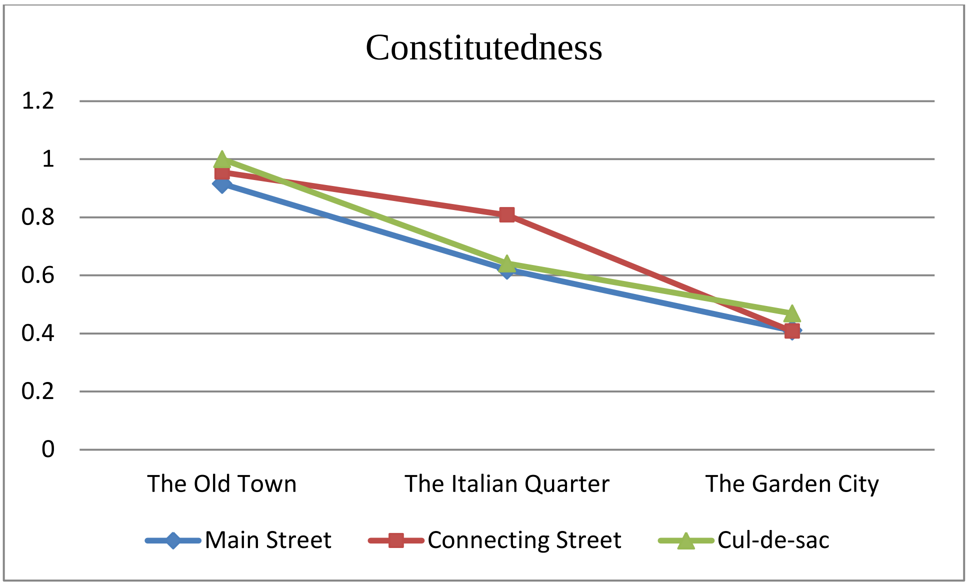


Figure 8.45: Constitutedness of the three cases according to thye street type

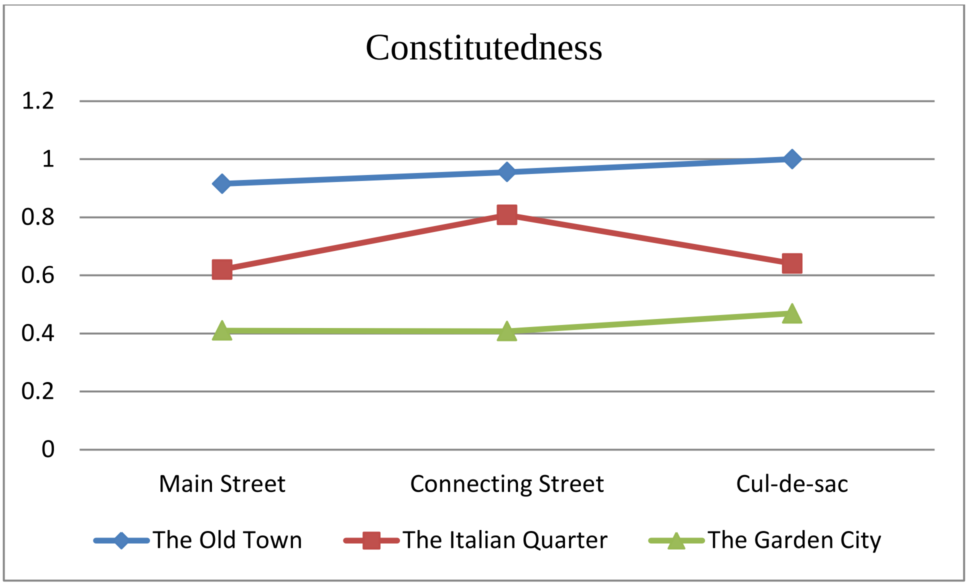


Figure 8.46: Constitutedness of the three cases according to the urban fabric

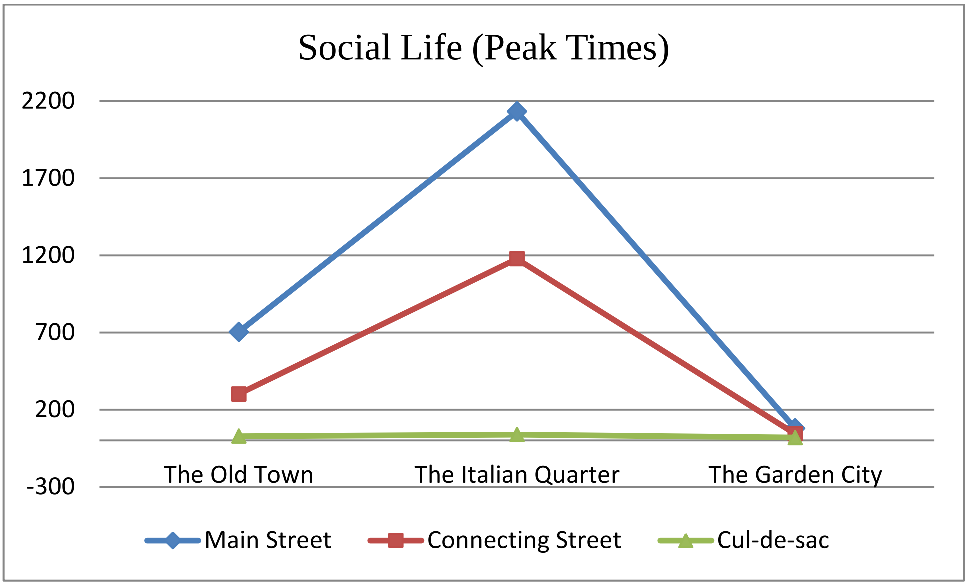


Figure 8. 47: Social life within the three urban fabrics (Peak Times)

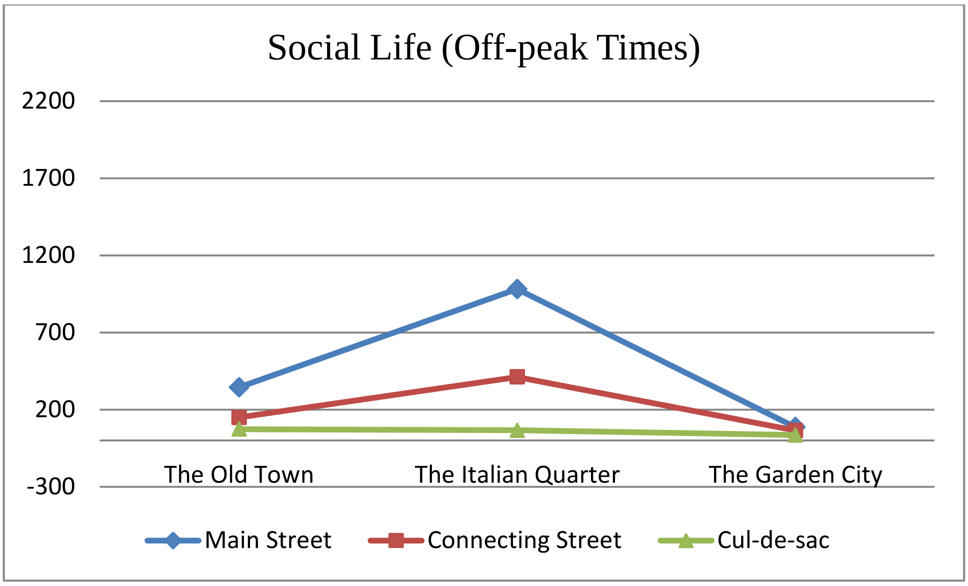


Figure 8.48: Social life within the three urban fabrics (Off-Peak Times)

The results show that the topological depth has a major role in influencing the degree of constitutedness. Constitutedness is the highest in the Old Town, where most units have a direct relationship with the adjacent street and a topological depth of (1.0). This degree of constitutedness decreases in the Italian Quarter, where about half of the units interact directly with the adjacent street segment, and their topological depth, therefore, is (1.0). The other half of the total number of units has an indirect relationship with the street segment, and consequently their topological depth is less than (1.0). Constitutedness in the Garden City is the lowest, since all the units have a topological depth less than one. It is important to note that constitutedness is significantly influenced by topological depth, even if the street segment hosts more units (Figure 7.48).

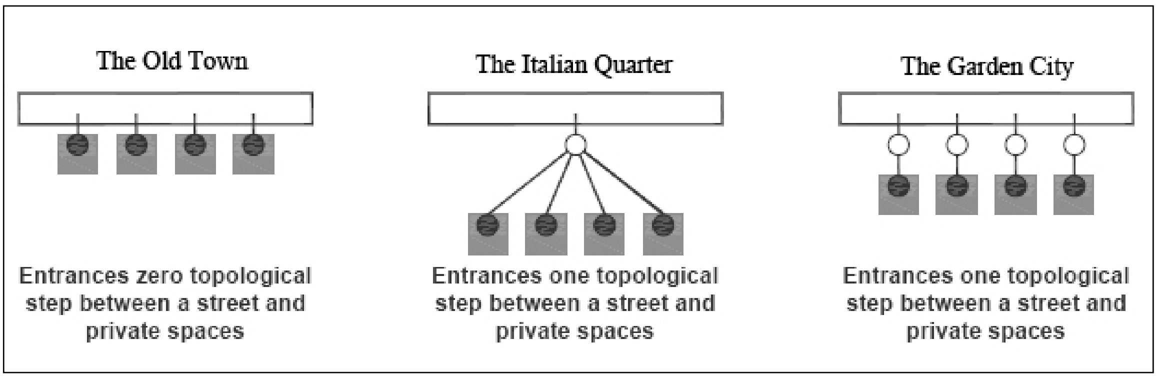


Figure 8.49: The topological depth of entrances in the three case studies (By the author based on van Nes)

As an example, it is stated by Hwang (2006) that although the 'vertical city' housing projects in Hong Kong have a large number of units, these neighbourhoods are not well connected to the street and there is little street life at the street plinth. In this sense, we find that in the urban form of the Italian Quarter, the constitutedness along the connecting street is higher than that along the main street, even though the latter is more liveable than the former. Both streets present similar spatial front structures, but their land use is different. Along the main street, most of the ground floor units are commercial shops and institutional buildings, which in themselves are places that attract people. Although the majority of the units in the case study's connecting street example are not particularly attractive, they accommodate essential services of the traditional handcraft of the city, such as goldsmiths' workshops and sewing and silk garment industrial units.

The results of the constitutedness analyses in Tripoli's city centre show that micro spatial variables do not clearly reflects a street's degree of liveliness. On the other hand, the topological depth of a street segment in relation to its nearest private space provides a detailed picture of how the spatial front configuration influences the character of each piece of urban fabric in the city centre of Tripoli.

SECTION THREE:
RESEARCH FINDINGS AND CONCLUSION

Chapter Nine:
Comparing the Findings of the Case Studies

9.1 Introduction

Certain rules of organisation lead the transformation of the urban fabric. Urban growth does not occur randomly, but rather they follow a particular system (Levy, 1999). Cities can be identified and classified based on their morphological structure. In that sense, the spatial configuration of urban components such as blocks and streets, provides a clear illustration of how cities are structured. Rabie (1991) states that each city, as a self-organised system, has a uniqueness in its urban form and identity, which is a result of the passage of time, despite the spatial and functional transformations that may have occurred. The motivation behind this research is to reveal the fundamental structure of the physical elements in the city centre of Tripoli, as well as to evaluate the different urban forms within the city. The three case studies that are investigated in this research disclose different urban patterns, as related to their morphological processes of formation.

This chapter clarifies the findings of this research analysis through two key discussion; first, a reflection on the role of the morphological approach in understanding the main components of urban fabrics, including the street network and urban blocks; and second, a reflection of the correlation between urban form and urban life.

9.2 The Street Network

The street network plays a major role in shaping urban fabric, impacting land-use and social behaviour. Urban networks can be characterised by different concentrations of activities, whereas urban places are characterised by the efficiency of their transportation network (Cheng et al., 2005). The network layout in an urban area represents a transportation system that plays an important role in policy-making (Geurs & Wee, 2004). A certain configuration of the street network determines the performance of a system in terms of navigability and accessibility, where distance can be measured in various ways; metric distance, topological distance, travel time or transportation costs (Weiping & Chi, 2010). Therefore, it can be concluded that smooth, rapid and fluent movement from one place to another defines an ideal network structure.

In the *Old Town,* streets provide a sense of richness and diversity in its layout. Streets' edges reduce boredom and produce a renewable vision as successive images are obtained during the passer by movement. The traditional method of planning the street network has created very solid, unbroken walls, on both sides of the streets, and emphasises the continuity of the movement flow. The streets in the Old Town derive their aesthetics and cosiness from the human scale, primarily taking into account the size of the users. These streets do not disclose themselves all at once, since time was applied as a fourth dimensional element of the place, where the perception of space is related to the time of movement.

As stated by Marshall (2005) the urban street traditionally united three physical roles; a route for circulation, a public space and a built frontage. In addition, the space devoted to movement in the Old Town also forms the fundamental connective tissue from the micro scale to the macro scale of the entire city. In that sense, routes might vary in length and their continuity will differentiate the street typology. By placing the front doors of dwellings at street level along the edges of this public space, a strong and direct connection between the dwelling and the street is achieved. This enhances the social life within the public space. Accordingly, the result is an internalised access system, with private corridors and cul-de-sacs branched on to semi-public alleyways, which in turn provide connections with the main public thoroughfares. These networks of streets are created in a hierarchical structure, starting with private corridors or cul-de-sacs, leading to semi-private residential alleyways and finally onto main public streets.

Before the modern, widespread promulgation of the automobiles, the movement systems within the Old Town were directly related to human scale and proportion (Figure 9.1). The transportation system in the town can be divided into two types of streets; the first are the open-ended streets, which work as main local streets. These link neighbourhoods together and accommodate essential facilities, such as shops, bakeries and mosques. Because the streets in the Old Town were constructed in the period prior to the invention of automobile, the width of these streets was designed to be used by pedestrians and packed camels or horses. The second type of street in the Old Town is the cul-de-sac, which is considered to be a semi-private property, belonging to the houses that open onto it, and is mostly used as a social place or play area for children due to its quietness and privacy.

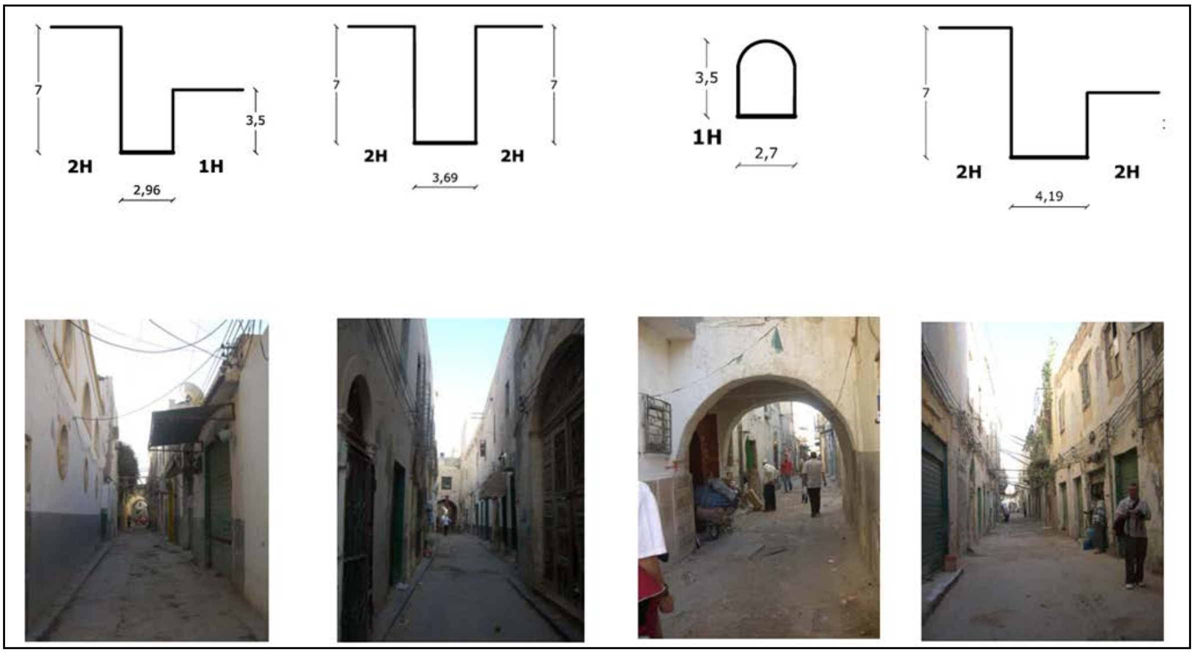


Figure 9.1: The main characteristics of the streets in the Old Town (IAU, 2008)

Further, the network structure of the Old Town is characterised by winding streets and alleyways. The layout of each meandering street is divided fragmentally into irregular sections, in order to improve walkability and to create a special identity and individuality of each section. This makes a journey within the streets of the Old Town interesting and reduces the street length to an appropriate scale for users. The irregularity of the street generates opportunities to emphasis the architecture of certain buildings as well as the street itself.

The traditional built environment is built on a pedestrian scale, which results in an extremely dense townscape with a high degree of complexity. The street network is often integrated into specific architectural units, such as religious buildings, hotels and shops, emphasising the importance of these buildings. Although the streets often take the shape of narrow internal corridors, they still contribute to the wholeness of the urban structure. Therefore, the labyrinthine street network is absorbed by the corresponding architectural units, where main thoroughfares are integrated into substantial buildings and land uses, the connecting secondary lanes into the residential quarters and the local services and the cul-de-sacs into the clusters of private houses to which they provide access (Figure 9.2).

One side (Austrian Embassy) Two sides (Special Houses) At Corner (Special Houses)

Figure 9.2: The position of important buildings within irregular streets

"In fact, a narrow winding street with a closed vista has the same function as the courtyard in a house: to regulate temperature" (Fathi, 1972, p8). The streets of the Old Town help provide a unique and a pleasant atmosphere throughout the whole year. The network structure offers a cool environment by keeping most of the streets in shade during the day time, and prevents walkers from the strong glare of the sun, especially during the summer season. Also, some streets are equipped with sabats or pergolas, in order to increase the air freshness within the streets, besides creating an appropriate place for community interaction or for children to play (Figure 9.3). In addition, the narrowness and winding nature of the Old Town streets prevent the walker from strong winter winds and allow the sea breeze to penetrate most of the open spaces in the town.

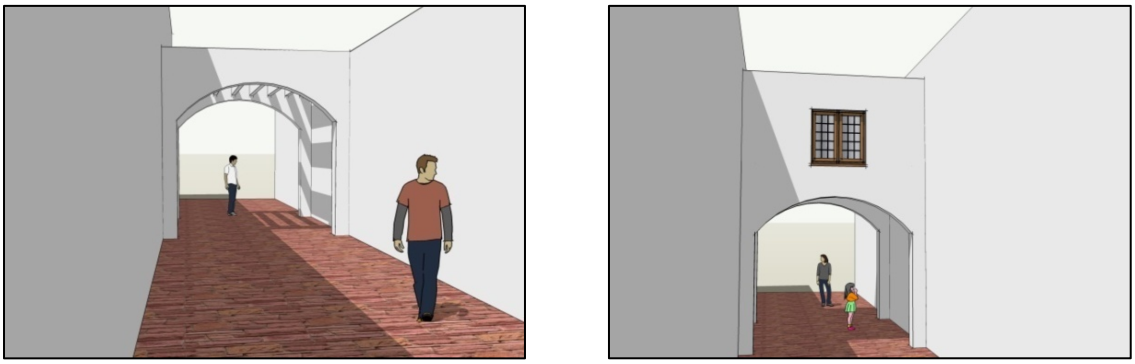


Figure 9.3: Good walking environment in the Old Town through the use of pergolas and sabats

In the *Italian Quarter*, the street network is based on a metropolitan masterplan, which was proffered by Italian architects in Tripoli during the colonial period, as a mean to initiate a change in the city and encourage a transformation into a larger urban context. In comparison with the original network of the Old Town, the Italian Quarter shows a clear difference in terms of proportion, hierarchy, connectivity and permeability (Figure 9.4).

Figure 9.4: The main characteristics of the streets in the Italian Quarter (IAU, 2008)

Since most of the properties on the ground floor are occupied by commercial functions, the retail shops are equipped with large windows that increase the transparency between interior and exterior spaces, and create a strong relationship between buildings and public streets. This is further enhanced in many shops, cafes and restaurants, by the use of arcades and canopies. In addition, this reciprocal connection to public streets is generated by eliminating any residual space between private and public spaces.

This district accommodates the most accessible thoroughfares within the city centre of Tripoli, thus achieving a successful usable network. Basically, the quarter was designed as a compromise in order to accommodate the needs of pedestrians and vehicles alike. Accessible pedestrian movement was suitably achieved as well due to the following design principles:

A) Streets have sidewalks on both sides, which are sufficiently wide to accommodate heavy pedestrian flow and activity. In addition, some streets are provided with extra covered pavements (arcades) close to shop windows, which protect pedestrians from the sun and rain, as well as create a kind of separation between the people who shop and those who pass by. Sidewalk curbs and finishing materials of pavements are further attributes that result in a successful pedestrian environment (Figure 9.5).

Figure 9.5: The use of arcades along main streets in the Italian Quarter

B) Most of the streets within this district are provided with buffer zones, which create a clear separation between the movement of cars and footpaths. Trees and side parking lanes play a practical role in protecting the walker from the fast-moving traffic. The trees not only work as a buffer zone, but also reduce wind speed and provide shade, especially during the afternoon (Jacobs et al., 2002 and Lynch & Hack, 1984). The relationship between building height and street width is excellent: it provides natural sun light throughout the year and also protects the users from strong, cold winds during the winter season (Figure 9.6).

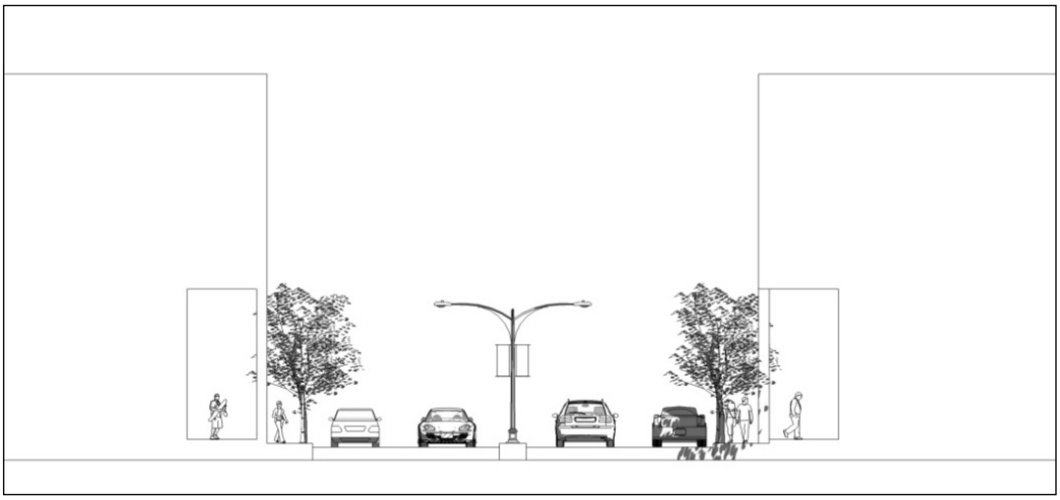


Figure 9.6: The relationship between pedestrian and vehicle movement in the Italian Quarter

C) Streets in this neighbourhood are rather narrow. This characteristic slows down the moving traffic and increases the sense of safety between pedestrians. As Southworth and Ben-Joseph (2003) state a narrow street is the more pedestrian-friendly. There are no instances of streets in this network with more than two lanes, which significantly reduces crossing distances (Figure 9.7).

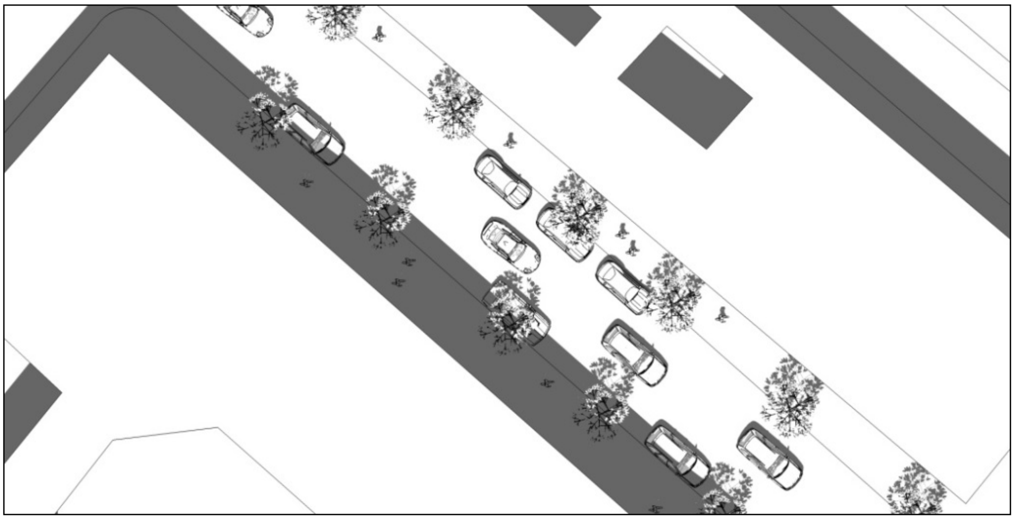


Figure 9.7: The importance of pedestrian path in the Italian Quarter

D) The streets in the Italian Quarter give a great sense of enclosure and an intimate human scale, a result of street width and building height. Buildings are arranged along the streets and perfectly define the edges of streets. Further, most buildings in this quarter are equipped with transparent façades on the ground floor, thus making the streets more attractive and interesting for pedestrian movement (Figure 9.8).

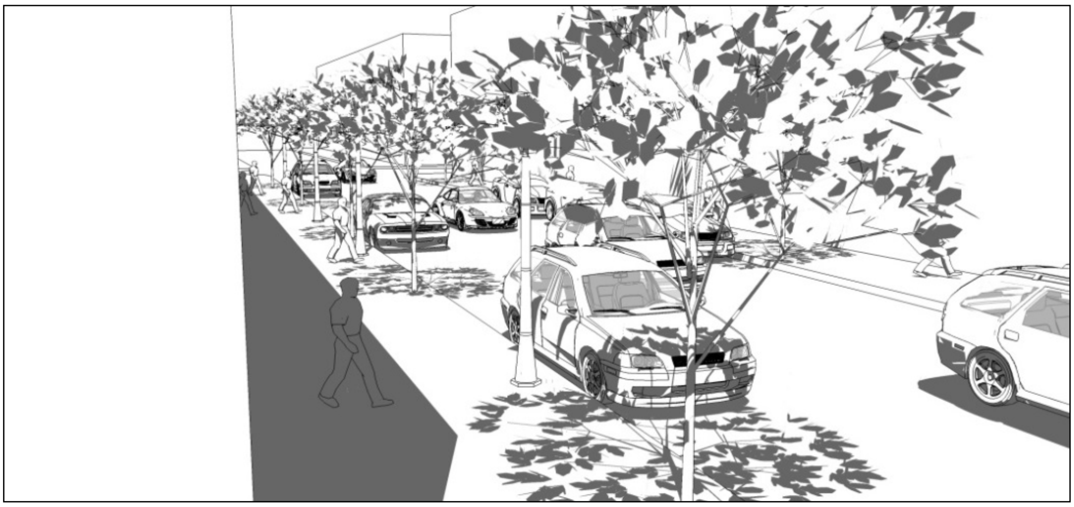


Figure 9.8: The strong presence of the natural elements along most streets in the Italian Quarter

E) Finally, Streets are considerably well-lit, even at the pedestrian level, because they are supplied with street lights and lamps. This artificial light increases the usability and the accessibility of the thoroughfares during the night, and makes these movement places safer for people to travel.

In the Garden City, the network structure is based on the same grid-like regularity of the Italian Quarter, yet the street structure is less hierarchical and there is less enclosure. As streets in this neighbourhood are usually just traffic spaces for automobiles rather than collective urban places, the liveability of open spaces as places for community interaction is lost. The public spaces, their dimensions and scale are incomparable with the traditional and Italian urban tissues. The street pattern of the Garden City loses the spirit of continuity and enclosure that is enjoyed in the Old Town and the Italian Quarter. In this urban fabric, most projects are built as individual components of urbanism. This is not only an inappropriate style of urban development, but it destroys the valuable features of old urbanism. In addition, it loses the ability to unify local public realms within the urban context and drops the coherence of their composition, which consequently causes the absence of livelihood of these places. In such a context, the public streets are transformed into large fields of public spaces with separated buildings, where the relationship between the network of streets and plots disappeared.

The urban fabric of the Garden City hosts a deserted and dull street network, where blank and unwelcoming fences frame the majority of private plots, creating a lack of vitality, attractiveness and quality in the life between buildings. The street network in this neighbourhood is dominated by automobiles as every trip is undertaken by car, in order to reach local services, resulting in an absence of pedestrian movement. In addition, there is no careful invitation for life or activities found in this urban fabric, and there is a clear neglect of both the climactic concerns and the human behaviour of local people.

Inevitably, the arrival of the motor vehicle brought fundamental changes to the scale of street, where speed became the primary form of movement. Because the street network is exclusively designed for vehicular movement, the Garden City suffers from a separation of service facilities and an omission of the cultural role that traditional streets play in a pedestrian-oriented development. Although the networks of interconnected streets are ideal in creating accessible movement, the navigation of these streets mainly based on car movement, with a clear disregard for walking or even cycling activities within this neighbourhood.

The planning system of the Garden City ignores the traditional urban system and emulates the modern approach, where the coherence of the urban form is divided into isolated blocks and trigger a number of subsequent steps of disintegration. Although this district is a home to high-class and wealthy people, the open spaces within the neighbourhood have a record of ineffective social performance over a long period of time. In contrast, Walters & Brown (2004) suggest that this pattern of the built environment fulfils social requirements, whereby people can find a recognisable spatial unit to belong to, identify their part of the city as being distinctive and have a sense of collective ownership and pride.

The system of public streets in this neighbourhood regulates the composition of the urban blocks, as it is placed in regular grid structure and provides the best measures of accessibility. However, the streets in reality, lack any indication of liveability, and most of the district's streets actually don't encourage pedestrian movement. This is mainly due to the fact that these streets, as mentioned previously, were designed to serve vehicles. Other factors that discourage pedestrian movement are as follows:

A) Pavement width is the first characteristic that negatively affects the accessibility of pedestrian flow and discourages people from regularly using these streets for walking. The average width of the pavement in this district is between 0.6 and 0.9 m, which is not appropriate for use by two passing walkers or a woman with a baby pram. In addition, trees and light posts are positioned in the centre of the footpath, further obstructing the flow of pedestrian movement (Figure 9.9).

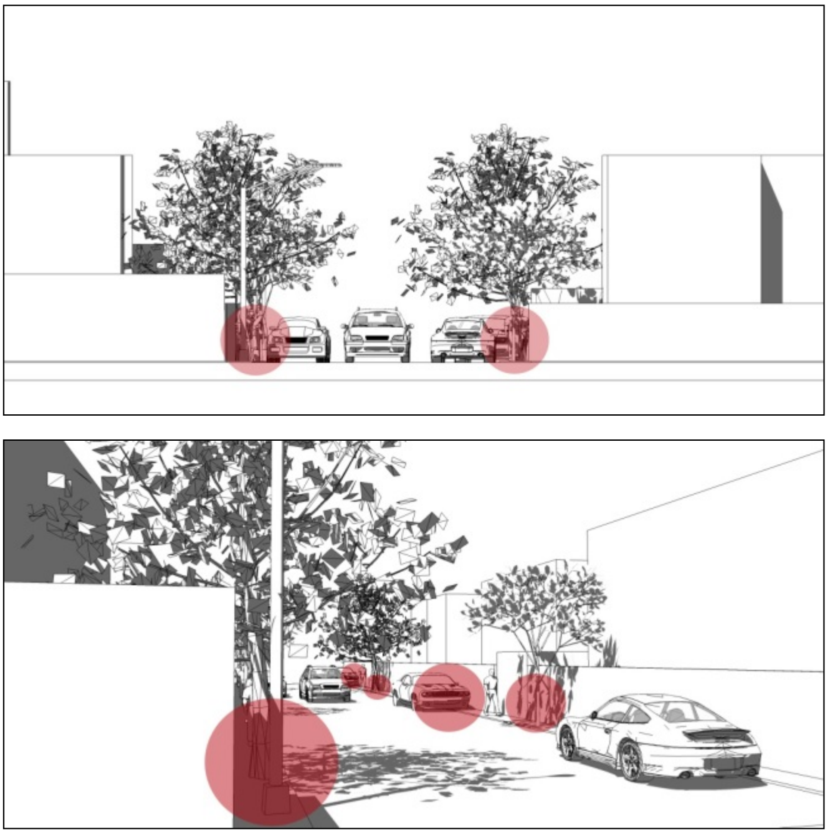


Figure 9.9: Some weak aspects of streets in the Garden City

B) Most residents don’t respect the pavement territory, and intentionally park their cars on the pavement: as a result, pedestrian flow is blocked by an invasion of vehicles onto its space. The inappropriate curb height entices cars to park above the pavement (Figure 9.10), where the curb height is almost the same as the level of the street in most of the neighbourhood. Also, residents tend to park their cars on the pavement because there is not enough space within the street width for two passing cars one car is parked on any side of the street.

Figure 9.10: Inappropriate parking of cars along streets in the Garden City

C) Although the distribution of artificial light within the streets is sufficient, these streets are not effectively lit due to a lack of maintenance of these lights. Accordingly, these streets become full of non-functional light posts, further detracting from the walkability of the area.

D) Due to continual infrastructure maintenance throughout the neighbourhood, the visible surface of the pavement has been greatly deteriorated; firstly the footpath surface has different levels, even within the same street, rather than one smooth level; secondly, because the maintenance is carried out through different periods of time, the pavement acquires an undesired diversity in size, type and shape of the materials that were used for the surface. People find it difficult to walk on this type of footpath and consequently, pedestrians abandoned these streets.

This neighbourhood is typical of orthodox planning. Within this urban fabric, streets are not good environment for humans: houses are turned away from the street and face inward towards semi-private spaces. Rudlin and Falk (1999) state that such urban fabric is considered as an attempt in robotics to replicate the complexity of the human body. However, "*Artificial towns, like robots, may be more efficient, and many businesses and residents may find this attractive, but they lack the diversity, vitality and character of their older cousins*" (Rudlin & Falk, 1999, p57). This urban neighbourhood can be described entirely as machine-like in terms of use, function, movement and systems, where social interaction and a presence of people are absent. Permanent places, such as the Old Town, have grown organically over time within a planning framework, rather than having been sprung from the inspired hand of a single masterplanner who undermines the quality of urban life through ideas, theories and untested principles. Therefore, the Garden City development sought to tame the city of Tripoli, by creating a safe, comfortable and sanitised environment, as well as by attracting car-owning residents and wealthy people. Yet, the conformity and monotony of the neighbourhood become mechanistic rather than organic, and fail to generate an urban form that is similar to the traditional town.

In summary, this analysis shows that the Italian Quarter exhibits higher centrality than the other two neighbourhoods. Although the Italian fabric and the Garden City have a clear, radial street system with less intersection density than the Old Town, the Italian Quarter preserves a better hierarchical order in street centrality and local and global *through movement* or betweenness, which reflects street life and land use activities on the ground floors. This provides the streets with a higher possibility to be selected when moving between two nodes within the system, which in a way reflects peoples' preferences of linearity, given they move and choose the shortest, simplest path and the slightest angle between their origin and their destination. Therefore, the most important factors influencing walkability, as stated by Hillier (2005), Hillier et al. (2007) and Turner (2005) are the *least angle of change* as a geometrical distance and the *fewest turn* as a topological distance. It is important to note that the degree of connectivity, permeability and accessibility are lower at the local than at the global scale in the Old Town, due to the fact that a cul-de-sac is a private space for only a few units, where movement of global scale activities is avoided.

The Old Town has less clarity at the block scale than the other two types of urban fabrics. The three urban forms are easily comprehensible at the neighbourhood scale, as they are clearly connected with the whole. Nevertheless, the Old Town performs better in terms of external connectivity than the other two cases, although the Italian Quarter and the Garden City are more easily understandable at the large scale by residents and visitors alike. Street dimensions and proportions are other facts that affect the intelligibility of the traditional urban form. This means that, although the Old Town is better connected within the global system and more accessible, its street dimension and proportion reduce the degree of perception. .

9.3 Urban Block

Block structure is considered to be an essential part of any physical urban structure, due to its purpose of forming volumetric structure with buildings and other masses. However, streets are also fundamental, as they separate the block structure within itself, and at the same time connect it to form different urban fabric. The urban morphological approach shows that the urban block is an important component in characterising the wider urban form.

In *the Old Town*, most urban blocks are classified as a collection of different shapes of buildings, where each plot predominantly contains a private courtyard. The dimensions of the plots depend on building type: private houses usually occupy smaller plots than public buildings. In addition, private dwellings rely on the wishes and financial capabilities of the buyers and their social position: usually, the wealthy families or individuals who run the government's institutions buy large plots, while ordinary people are satisfied with much smaller plots. On average, however, the size of plots is small and more variously shaped, as these plots are not planned in advance but emerge incrementally through a historical process of continuous adaptation (El-Barghuti, 1972 and Kshedan, 1984).

In addition, as stated by Kshedan (1984), rich landowners are likely to buy additional separated plots or buy parts of adjoining plots in order to build series of small dwellings, or expand their original property. The private builder-developers' main purpose of buying and building small plots is to contribute toward the construction of the public street, with the intention of selling or renting out the dwellings. Therefore, these plots are less important for the private builder-developers than their original homes, and are mostly connected to the public street by an alleyway or labyrinth. Because these streets are less important, the plots are accordingly smaller and the buildings have less magnificent characteristics. The traditional town considerably holds ideal principles of urban configuration, where the movement channels and open spaces are integrated perfectly with urban blocks. "*we need to return to the theories and models of the urban space that worked in the past and to develop a design vocabulary based on these successful precedents for today's cities*" (Trancik, 1986).

Within the traditional urban fabric, the amount of public spaces is restricted, and there is an obvious distinction between the public realm and private space within the plots. The open private spaces (courtyards) play a major role as continuous spaces of the interior private spaces. Public streets are kept away from the privacy of the indoor buildings' spaces, yet these building are provided with direct access from the public open spaces.

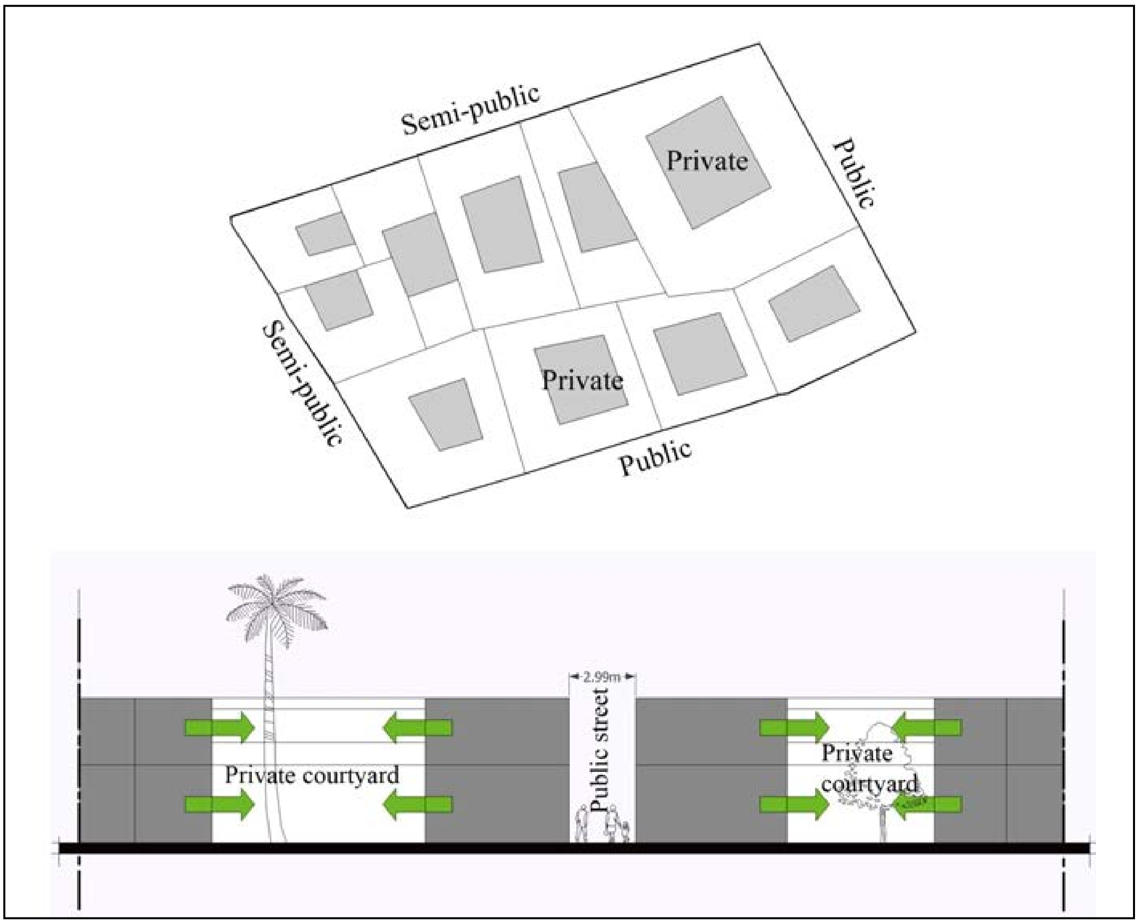


Figure 9.11: The hierarchy in privacy within the Old Town

This pattern of buildings has a major role on the evolution of local architecture and its various regional expressions. Building fronts integrate into a more coherent composition, forming a solid trunk, which interacts with the surroundings context and produce traditional Islamic architecture. Regardless of the building land use, this type of building imposes a unique pattern, where its front has a direct relationship with the street network, and at the same time, provides a special private environment within its interior spaces (Figure 9.11).

The urban form of *the Italian Quarter* in Tripoli is based on a different structure of urban blocks that was first introduced to constitute an urban fabric and make a clear impression on a city map. According to Meyer (2005), the urban block system is not just an arrangement of buildings built to fill in a series of parcels of land along various streets, but it is a composition that links the classification of plots with the position of public streets. In addition and within the Italian Quarter, the blocks of buildings were designed as a single, coherent, monumental structure, rather than a series of individual forms. The new pattern of urban neighbourhoods that was created in the Italian context and emerged from the European philosophy, founded a new relation between public streets and the structure of blocks in Tripoli. Streets, squares and alleyways are integrated in the plan of the Italian urban composition as if they are carved from a solid mass of buildings, where built land covers most of their blocks.

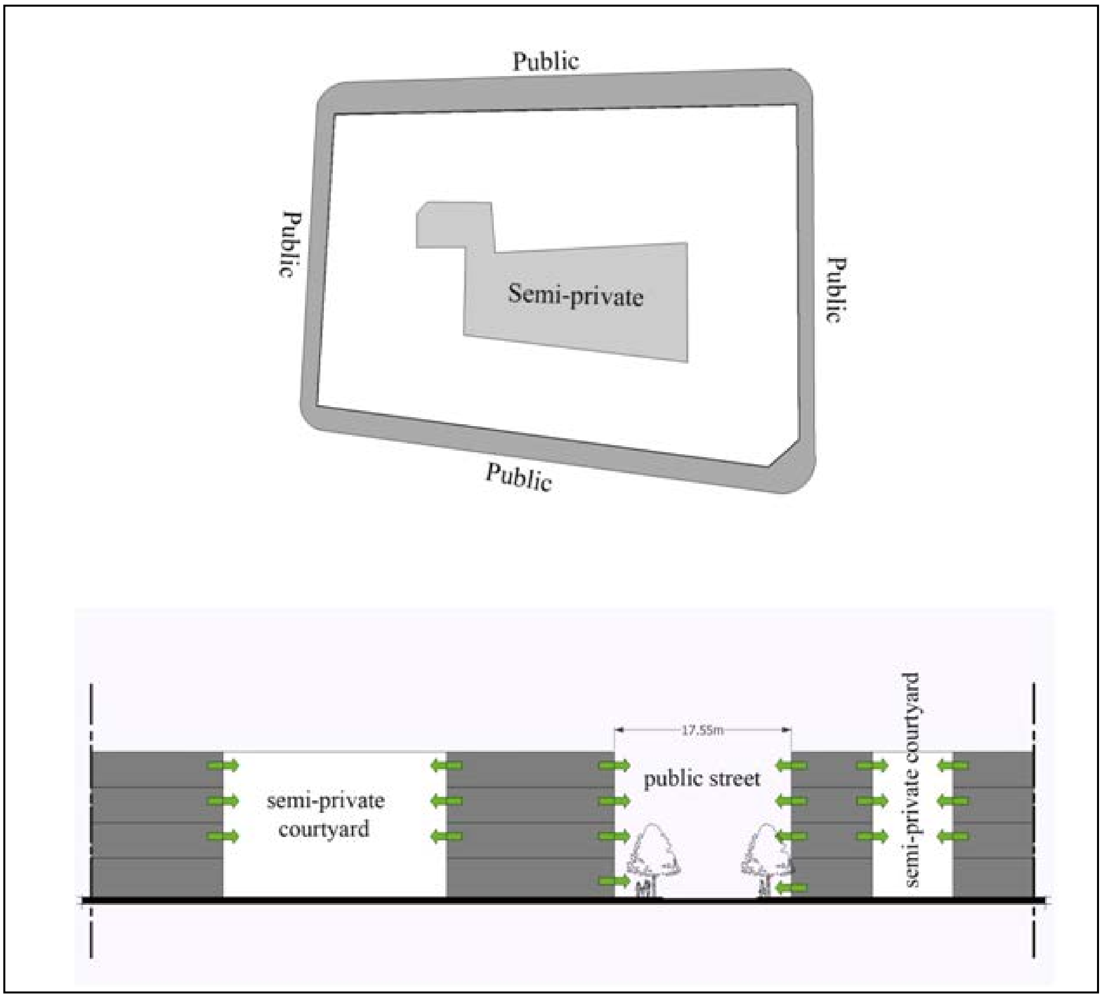


Figure 9.12: The hierarchy in privacy within the Italian Quarter

The most important feature in the Italian neighbourhood is that urban blocks are built with no internal subdivision. As a result, the plots are larger and they all coincide with the block sizes. They present to the observer a memorable image of connected places that contain a variety of interiors with different kinds of public, semi-public and collective spaces. However, blocks are predominantly formed by a single, or very few, large, monumental building, rather than by a number of smaller individual plots as in the Old Town.

There is a clear distinction between the public realm and private space within the Italian urban fabric, as the majority of public spaces are kept away from the semi-private open spaces and restricted at the edges of urban blocks, where the diversity of land uses takes place. The building type in this urban formation does not provide open private spaces for each single residential unit. In addition, regardless of the building land use, this building typology imposes a unique pattern, where its fronts have a direct relationship with the street space, which provides semi-private open spaces for children to play and for family members to gather, and at the same time, encourage the social interaction between neighbours of the same block (Figure 9.12).

Since the main aim of this approach is to create a more advanced urban fabric, new ideas of designing urban blocks were introduced in Tripoli. These concepts offer various degrees of privacy, where some blocks are entirely accessible by the public, while others are partially open and a few are considered as closed urban blocks for certain users (Figure 9.13). The network of the public streets drives the composition of different sizes of urban blocks based on a regularly gridded structure. In such fabric, streets are considered to have strong physical character: their volume generally delivers a strong, positive sense of enclosure and identity.

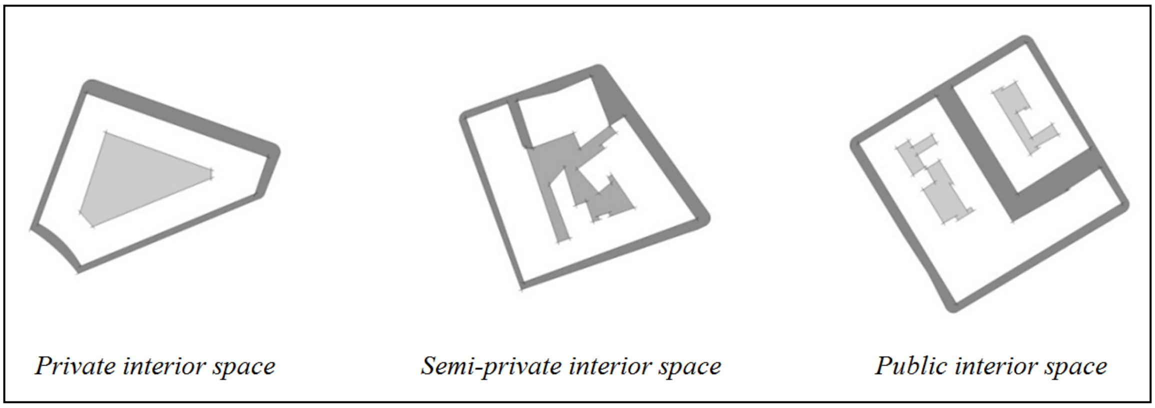


Figure 9.13: Variety in block privacy within the Italian Quarter

The urban blocks in this fabric accommodate a diversity of urban life, with clear differences in size and shape, as well as in diversity in façade composition on front, side and rear streets. In addition, the upper residential units have a different degree of privacy, and expose an instant conversion between private and public space, where some of them are accessible from the main streets while others are only accessible from side or back roads.

The Garden City consists of very large, residential-only sectors, which are served by isolated commercial retail units. Nowadays, the streetscape of the Garden City is dominated by dull, unwelcoming places, where blank fences frame the majority of private plots and where streets lack attractiveness and social quality. Although the subdivision of blocks is similar to the Old Town, where each plot is occupied by one single-family unit, the relationship between indoor and outdoor spaces is subverted, as buildings lay isolated within the plot and are entirely separated from the street.

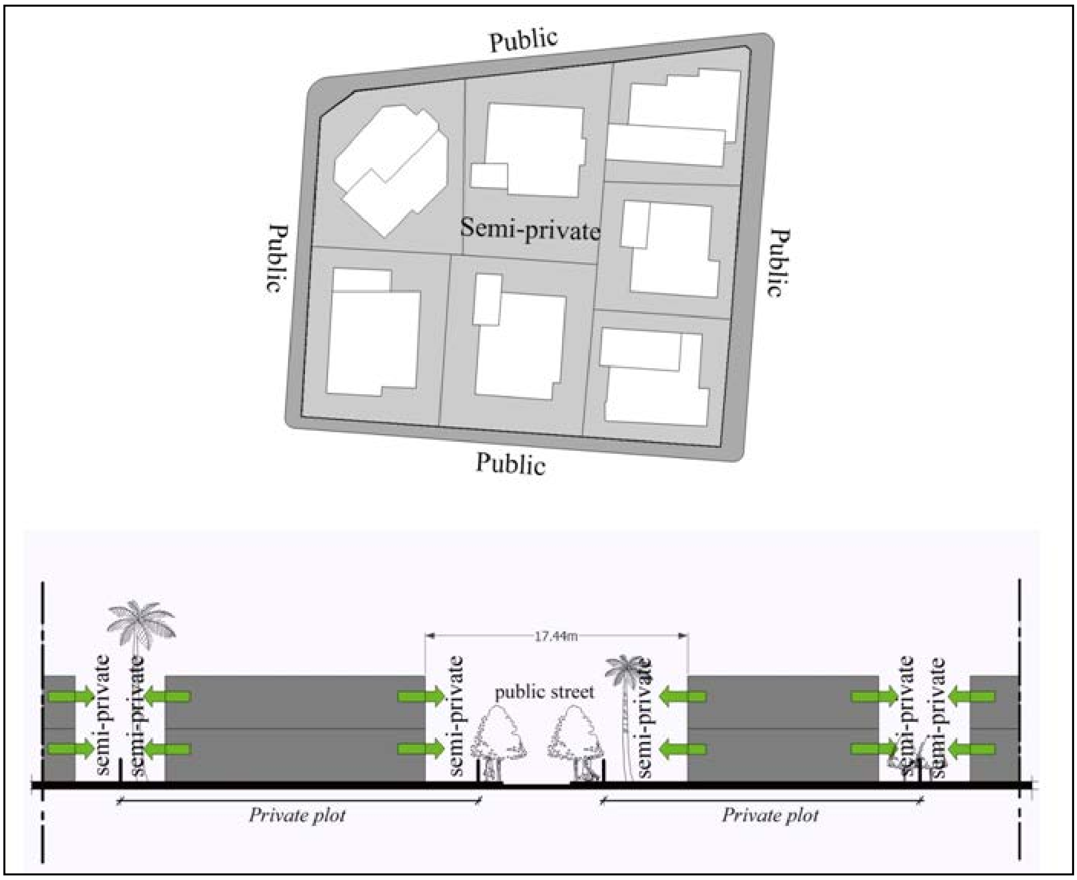


Figure 9.14: The hierarchy in privacy within the Garden City

This model reduces the fabric's compactness and the original, traditional identity that still permeates both the Old Town and the Italian Quarter is lost. When the Garden City was developed, the urban block became merely a piece of land bounded by public streets, and the area within it was distributed by the local municipality to build individual houses (Figure 9.14). Rudlin and Falk (1999) state that most of the modern streets are subject to be seen as means of gaining access to and from a site, unlike in traditional cities, where streets represent the public domain that is defined by the enclosing urban blocks.

The urban block of the Garden City is considered to be a collection of several separated buildings with private gardens, which are located around each individual building, to allow light and air to reach interior spaces. Typologically, this new plan followed a different ideology to adapt the dwelling to better suit modern requirements within a rigid basic layout. While supplying each house with a private green space, a playground and a place to park, these modern programmatic requirements consequently limited the neighbours that a resident may have.

When comparing the case studies in terms of block area, one can find that the box plot of the Old Town is comparatively tall, which suggests a wide range of block area especially when knowing that the traditional form has the largest and the smallest block area among the three case studies. The Italian Quarter has less diversity in block area, which ranges between 800 and 9,200 m^2, whereas the Garden City has the smallest range in block area that varies between 2,000 and 8,000 m^2. The interquartile range of the Italian Quarter and the Garden City is almost the same in size, yet in the Italian Quarter the majority of blocks range between 1,600 and 3,600 m^2, whereas in the Garden City they range between 3,200 and 4,800 m^2. The Old Town, on the other hand, has the largest interquartile range, and the majority of blocks range between 2,000 and 6,600 m^2 (Figures 9.15 & 9.20).

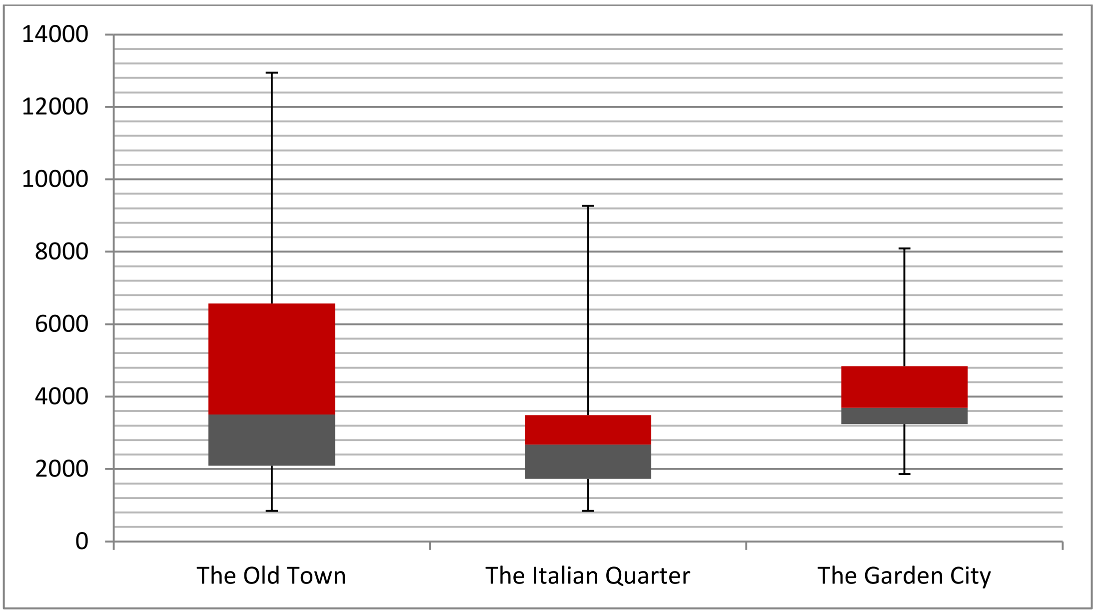


Figure 9.15: The block area within the three cases

The perimeter of blocks (figure 9.16) shows that the Old Town has the tallest box plot among the three case studies, which range between 120 and 1,050 m^2. The majority of block perimeters, however, range between 200 and 520 m^2 as the interquartile range falls on the lower part of the box plot. The Italian Quarter has the second most diverse range of block perimeter that range between 120 and 370 m^2, followed by the Garden City that range between 180 and 360 m^2. The majority of block perimeters in the Italian Quarter fall in the lower part of the box plot, while in the Garden City the interquartile range is evenly distributed in the box plot.

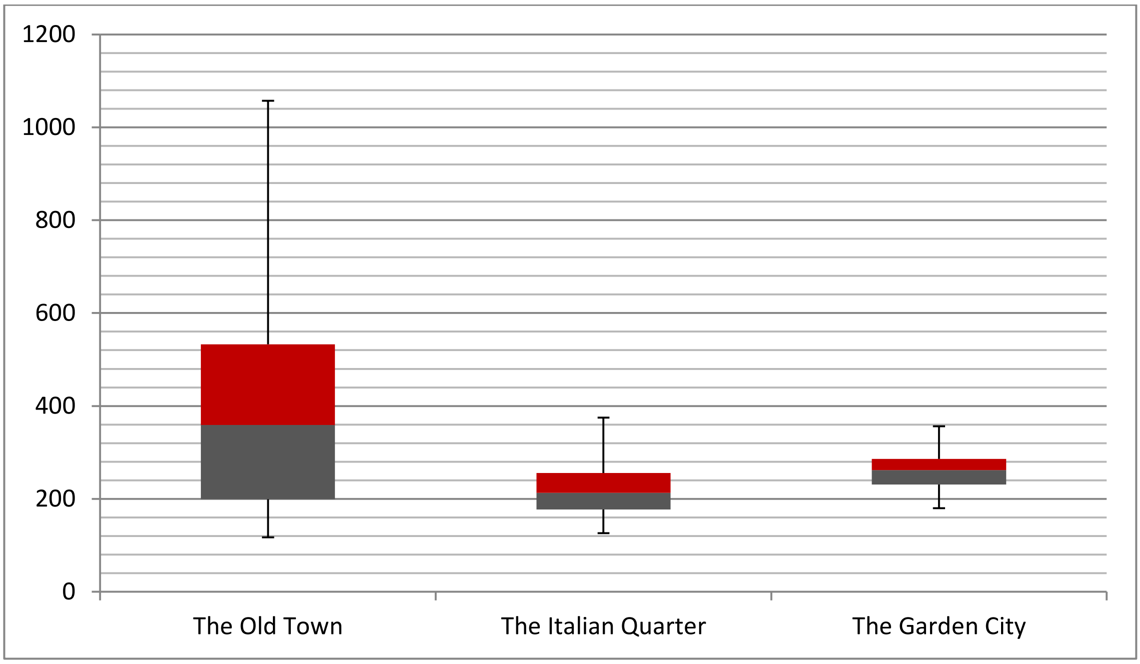


Figure 9.16: The block perimeter within the three cases

The Garden City has the least variety in block length among the three case studies, which range between 60 and 100 m. The interquartile range of the Old Town and the Garden City are distributed almost evenly in the box plot, yet the Old Town has the tallest box plot, which suggests a wide range of block length. The figure also shows that block length in the Italian Quarter range between 48 and 146 m, although the majority of blocks range between 58 and 96 m in length, as suggested by the interquartile range (Figure 9.17).

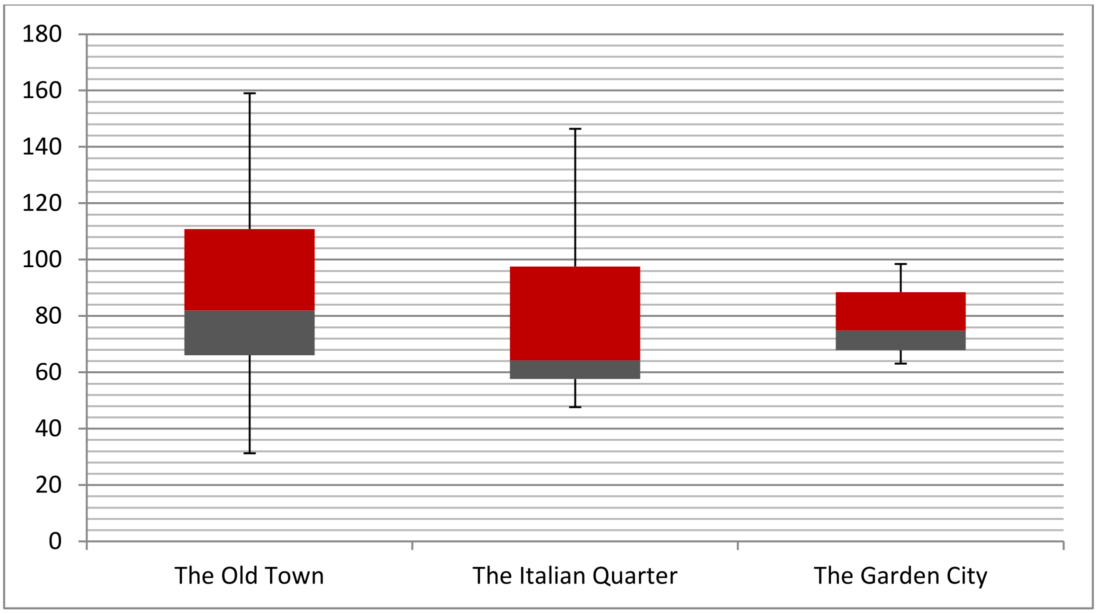


Figure 9.17: The block length within the three cases

The block width ranges considerably within the three case studies, but the range of variations is similar. The Old Town and the Italian Quarter show almost the same box plot in size, although the box plot of the Old Town is higher than that of the Italian Quarter. In both cases the majority of blocks fall on the lower part of the box plot, unlike in the Garden City where the interquartile range is evenly distributed in the box plot that falls between 44 and 68 m (Figure 9.18).

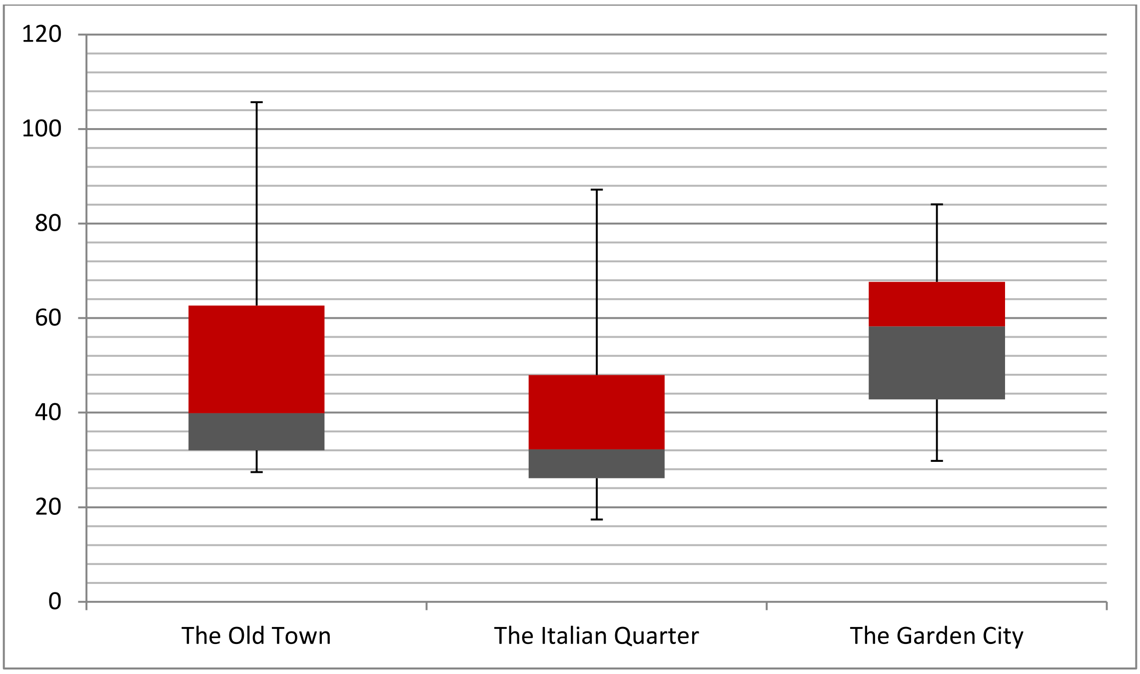


Figure 9.18: The block width within the three cases

When comparing the three cases in terms of length/width ratio, we find that the Italian Quarter is comparatively tall, which suggest a wide range of L/W ratio, as block proportions exceed 8:1. The Old Town comes second, as can be seen from the box plot, followed by the Garden City with the smallest range. The interquartile range for the three cases is unevenly distributed as the majority of blocks fall in the lower part of the box plot (Figure 9.19).

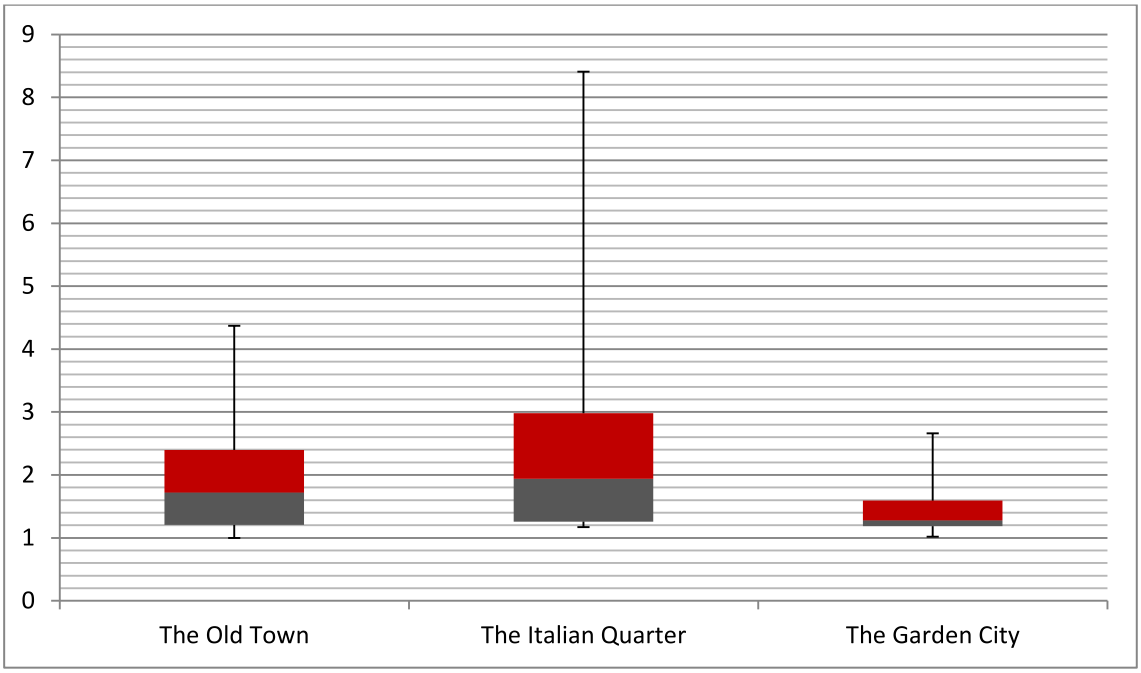


Figure 9.19: The length / width ratio of urban blocks within the three cases

This study shows that there have been three phases of urban development that have defined the contemporary city centre of Tripoli (Figures 9.20 & 9.21). The first follows the traditional way of structuring urban form, while the second phase, which occurs in the Italian urban Quarter, preserves compactness in the pattern of designing urban fabric, including urban blocks and the street network. However, the third phase, realised in the Garden City. Theories and models of modern planning define a set of principles and rules that have fundamentally subverted essential elements of the traditional urban structure. The modern paradigm deconstructs the coherence of the traditional urban block and reconstructs new relationships between the public street and the urban block that ultimately break the link between street and plot.

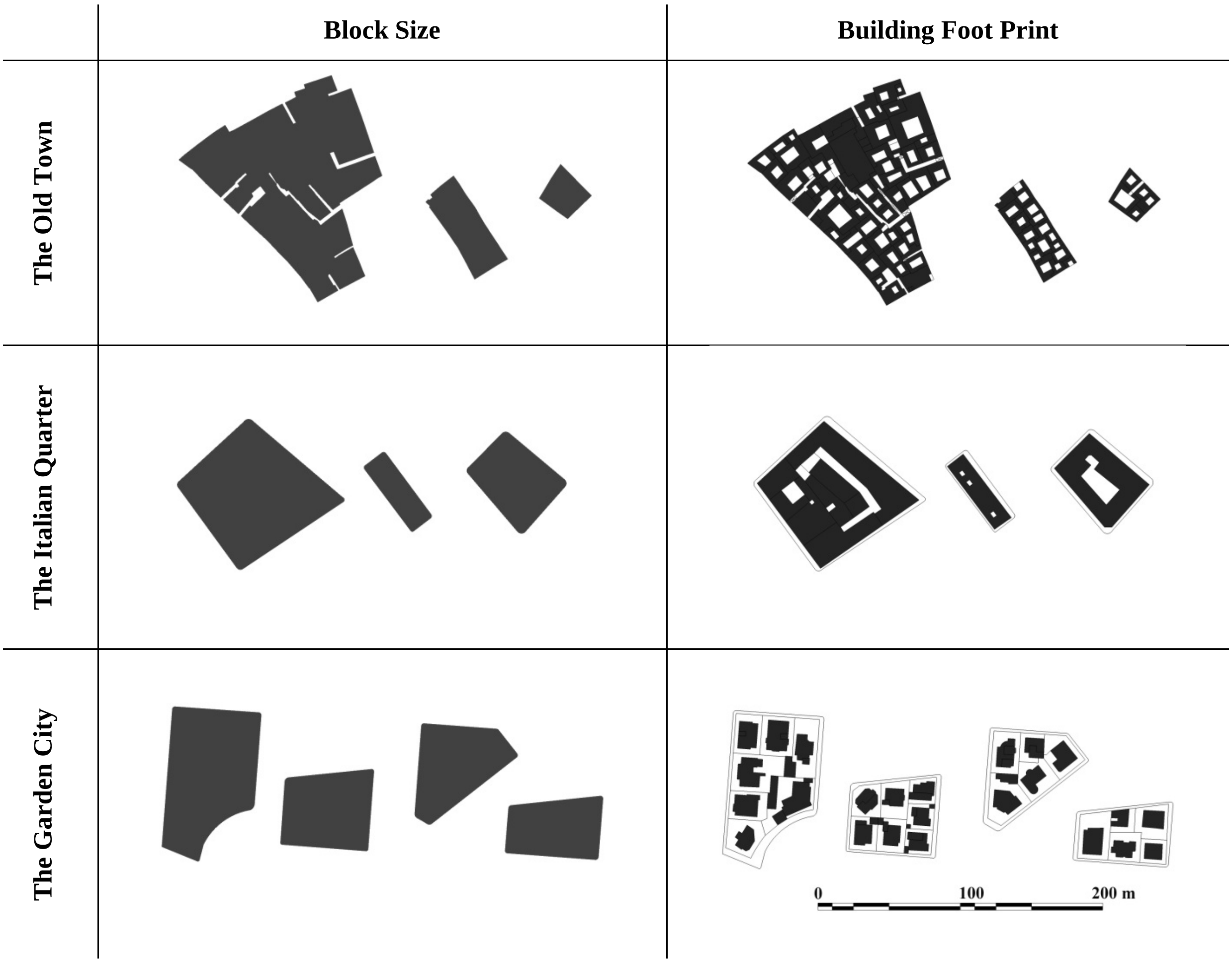


Figure 9.20: Urban block size and shape, and building foot print within the three cases

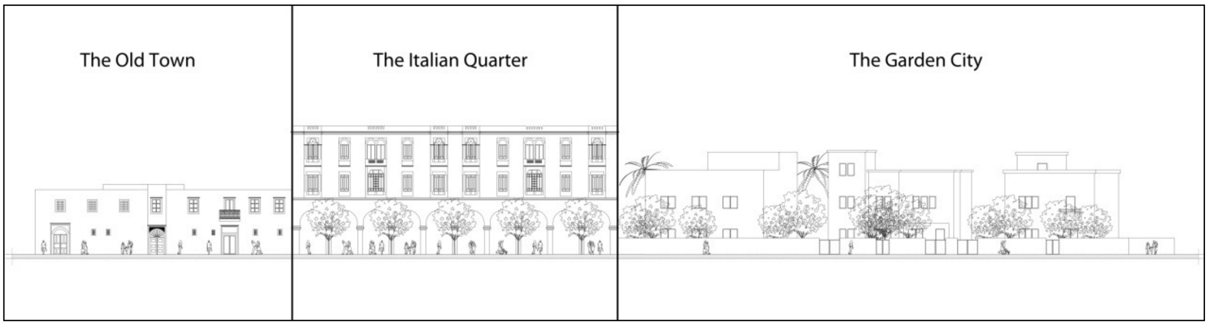


Figure 9.21: The comparison between characteristics of street front in the three urban forms

From the plot box analysis it is clear that there is more diversity in the traditional urban form, while the Italian Quarter and the Garden City are consistently more homogenous. Clearly, the three cases are very different in terms of area and perimeter, but not length. This signifies that what is really changing is the depth of blocks: the Old Town blocks exhibit more diversity of depth than the other two cases. In the Old Town, there is very high diversity of sizes (area), but the length to width ratio is rather homogeneous. This implies that the same geometry is simply scaled up or down to a great extent, a feature unique to the urban fabric of the Old Town.

9.4 Street Front Quality and Social Life

In regards to the quality of the street fronts in each of the case studies, this study reveals that in the Italian Quarter, which offers the longest *good* street fronts among the case studies with 3981 liner meters. The Old Town shows the second longest *good* street fronts, with 3,514 m, keeping in mind that this length is only 29.7% of all the traditional street fronts. The neighbourhood with the shortest distance of *good* street fronts is the Garden City, with only 1,385 m, taking into account that this length constitutes only 20.6% of the total street fronts in this neighbourhood. The *average* longest street fronts can be seen in the Old Town with 5,629 m, the second *average* longest total street fronts is in the Garden City with 4,242 m and the least is in the Italian Quarter with 2,671 m. Almost 50% of *bad* street fronts are located in the Old town, represents 2,685 m, while the other two cases have convergent rates of *bad* quality street fronts with 1,288 m in the Italian quarter and 1,082 m in the Garden City (Table 9.1). Proper up keeping of these streets in the Italian Quarter helps this urban fabric preserve the best quality fronts among the three cases, which generate diversity of land use at the ground floor and consequently enhances the social life in the neighbourhood. *Good* street fronts promote street liveability and walkability, and support feelings of safety, protection, comfort and delight.

Neighbourhood	Good	Average	Bad	Total Street Length
The Old Town	3,514m 29.7%	5,629m 47.6%	2,685m 22.7%	11,828m 100%
The Italian Quarter	3,981m 50.2%	2,671m 33.6%	1,288m 16.2%	7,940m 100%
The Garden City	1,385m 20.6%	4,242m 63.2%	1,082m 16.2%	6,709m 100%

Table 9.1: Quality length of street front within the three cases

In the Italian Quarter, main streets still form the longer length of street fronts, followed by connecting streets, while cul-de-sacs represent just 4.4% of the total street front extension in this urban neighbourhood. In the Garden City, on the other hand, more than 50% of the street fronts are connecting streets, with main street fronts being the second, while cul-de-sacs represent just 0.8% of the total street fronts in this urban fabric. The analysis also shows that cul-de-sacs in the traditional urban form are the main component of the street network, whereas, in the other two urban fabrics, cul-de-sacs do not play a major part in structuring the street network. Moreover, and according to the centrality analysis, the streets of the Italian Quarter are mostly counted as main streets, while in the Garden City most are connecting streets. It is important to note that the traditional urban form has the best hieratical order within its network structure, which reflects social requirements of Islamic ideals.

From the quality amount assessment of the street fronts (Table 9.2), we can see that the majority of street fronts in the Italian Quarter are in *good* condition, whereas the street fronts in the other two neighbourhoods are mostly in *average* condition. In addition, the highest percentages of *bad* quality street fronts are located in the Old Town for two reasons; first, it is the oldest urban fabric in the city of Tripoli and second, it receives very little maintenance on degrading structures. Moreover, direct contact of the street environment with buildings significantly encourages staying social activities, and provides good protection from walk-through movement.

Neighbourhood	Good	Average	Bad	Average Quality Factor
The Old Town	86625 40.2%	99165 46.6%	29485 13.7%	18.2
The Italian Quarter	99793 61.5%	48364 29.8%	14062 8.7%	20.43
The Garden City	31301 26.2%	75608 63.4%	12386 10.4%	17.78

Table 9.2: Quality amount of street front within the three cases

Therefore, the joy of being in the traditional or the Italian urban fabrics is generated by the architectural detailing on the building elevations. Besides their high quality of architectural details, most of their main street fronts provide pedestrians with pleasant placements, where they can find niches and recessed surfaces to comfortably perform their social activities, while standing or sitting against these architectural elements and enjoying the pleasure of the social scenery.

Jan Gehl (2010) emphasises that the preference for staying towards the edges of a space is closely tied to the human senses and social contact norms. The poor street edges in the Garden City are one of the main conditions that negatively affect the liveability of the streets there. The “piano effect” - the articulation of the façade in buildings - is mentioned by Jan Gehl (2010) as another characteristic behaviour that helps create a spatially well-defined place, rather than a mere place along a wall, which helps generate social life. These special places could be; corners, columns or niches that encourage staying activities. Most street fronts and edges in the Old Town and the Italian Quarter are potentially attractive standing and sitting zones that interact with good façade details. The smoothness and lack of detailed façades in the Garden City, on the other hand, have the opposite effect: they generate through movement, rather than encouraging staying activities. Therefore, the traditional and Italian urban street fronts, with their columns, steps and niches, play a major role in enhancing social life along their public spaces, while the Garden City lacks such characteristics that support street life. While the single-use land dominates the Garden City, a diversity of land uses, such as café and public buildings, creates a significant city life in the Old Town and the Italian Quarter. The presence of outdoor services within the city centre of Tripoli bring recreational life and offer an attractive combination of social options, especially when considering its convenience with the climatic conditions, which has been a cultural concept for many years.

Accordingly, the centrality analysis reveals that the hierarchy of the street networks, of all the cases, accurately reflects the city life within Tripoli’s city centre, where most social activities are performed along main streets rather than the connecting streets, and the least are performed in cul-de-sacs. In addition, the quality of street fronts plays an important role in enhancing these activities along different degrees of the street segments. The findings show that the Italian Quarter has the highest level of common city life, including walking, standing and sitting, in regard to human necessities and physical activities.

There are almost three times more social activities along main streets in the Italian Quarter during peak-times than during off-peak times. The Old Town exhibits some similarities in the pattern of social behaviour of the Italian Quarter’s main streets, while the social life in the Garden City shows some flatness in the differences between peak and off-peak time along main streets. The social activities in the Old Town during peak times are as double as those occurring during off-peak times. The main streets of the Old Town still preserve better quality of social life than those of the Garden City. The social life along main streets of the Old Town is between 5~7 times more than the social activities performed along main streets of the Garden City during peak times, while it is only 2~3 times more during off-peak times (Table 9.3).

	Street Quality	Main Street		Connecting Street		Cul-de-sac	
		Peak Times	Off-peak Times	Peak Times	Off-peak Times	Peak Times	Off-peak Times
The Old Town	Good	877	386	342	176	59	133
	Average	703	344	301	149	48	118
	Bad	510	215	178	89	28	73
The Italian Quarter	Good	2131	981	1177	412	38	66
	Average	1975	907	1039	360	26	56
	Bad	1426	671	854	294	21	38
The Garden City	Good	111	118	56	79	-	-
	Average	78	86	42	64	-	-
	Bad	97	105	22	49	19	35

Table 9.3: Total social activities in the three cases

There are as twice as many social activities during peak-times along connecting street of the Italian Quarter, than during off-peak times. On the traditional connecting streets, there are between one third and one fifth of the social activities that occur in the Italian Quarter during peak times, and between a half and one third of those that occur during off-peak times. The flat rates of social life in the Garden City change little between peak and off-peak times along connecting streets. The frequency of recorded social activity varies between some neighbourhoods. There are between 21 and 39 times more of these activities during peak times than in the Garden City, while there are only between three and five times more of these activities than during off-peak times. There are four times more social activities during peak times in the Old Town than during off-peak times. There is still a better quality of social life on the connecting streets in the Old Town than on those in the Garden City. There are eight times more social activities along connecting streets in the Old Town than along the connecting streets in the Garden City, during peak times, but only as twice during off-peak times. This pattern of social behaviour is reflected in the centrality of street segments, where main streets are much more liveable than connecting streets, in addition to the diversity of land use along these types of streets, which play a major role in generating social life along them, especially during peak times, when shops and public services are open.

The frequency of social activities along cul-de-sacs shows different pattern. Firstly, the Old Town has the best social activities along cul-de-sacs, where these activities are doubled in off-peak times than during peak times. Secondly, the social life in the Old Town is twice those in the Italian Quarter and the Garden city during both peak and off-peak times. It is important to note that the only cul-de-sac in the Garden City shows a similar amount of social activities in the *bad* quality cul-de-sacs within the Italian Quarter. These results reflect the significance of cul-de-sacs in the street network structure of the traditional urban form, and the insignificance of this street type within the other two urban forms. In addition, this analysis shows that there is more social life along cul-de-sacs within all the cases during off-peak times, as the dead-end places become socially active when people are off work, although many urban designers believe that this street type has a negative impact on through movement within the street network.

In terms of city life, stationary or moving activities have a higher association with centrality and network connectivity in all the selected cases. The centrality measurements in the three case studies reflect the same ideology. Therefore, the centrality analysis in general mirrors the relationship between social activities during peak and off-peak times, and the diversity of land uses. Such a relationship does not exist in the Garden City, due to the fact that the neighbourhood was initially designed for a single land use.

The five-point scale of analysing street quality shows that city life is enhanced as the quality of street fronts improves, even at the same degree of street centrality. Therefore, the perception of better front quality means a good quality of social, necessary and optional activities during both peak and off-peak times, and generates a sense of community. The city life study shows that the Italian Quarter, as stated in the Chapter Seven, has the most liveable streets, as most ground floors have commercial uses and therefore, the urban fabric becomes an attractive place, not only at the local scale but also at the regional scale. The local residents of the Italian Quarter cannot personalise their public spaces, since the social activities in this urban fabric are not just generated by local residents, but also by participation of outsiders who are encouraged by public institutions, cafes and commercial uses on the ground floor. Although social activities in the traditional urban fabric ranked second in liveability, this traditional urban neighbourhood has a higher sense of community on most streets due to the fact that social life is mostly a contribution of the locals. The spatial front structure, the relationship between indoor and outdoor spaces and measures of personalisation increase this sense of belonging, where it reaches its pinnacle at the scale of cul-de-sac. In the Garden City, the sense of identity and community decline due to a lack of diversity in land use, personalisation and a relationship between public and private spaces. This follows the concept promoted by many researches, such as Jacobs (1961), Duany and Plater-Zyberg (2006), and Nasar and Julian (1995), who state that traditional neighbourhoods and mixed use areas have a higher sense of community than modern developments.

Interestingly, in the Old Town, people can engage in various types of social interaction in front of their main door and therefore, neighbours regularly know each other. As a traditional style of socialising, chatting and standing at the main entrances to the dwellings is one of the social interactions between neighbours, especially women, most commonly seen in cul-de-sacs. On the other hand, although most of the flats in the Italian Quarter share a main door, the social interaction between neighbours in front of this main door, or in the staircase, occurs less frequently when compared to that of the Old Town. There is almost no sign of social interaction in front of the main doors in the Garden City, as the open green space located between the public space and private spaces provides a good environment for performing such activities. Accordingly, in the Old Town, there is a correlation between the interaction at the main entrance of the residential unit and the frequency of social interactions. The same cannot be said about the Italian Quarter or the Garden City. In addition, in the Italian Quarter, most of the building fronts are used as cafes or shops, while in the Garden City there are open green spaces around the buildings that are used for planting and car parking. In the Old Town, streets are often seen as semi-public spaces (cul-de-sacs). Streets have sabats, pergolas, benches and niches, which all enrich street environment and encourage social activities. Further, each dwelling in the Old Town has its own “public room”, which is located between public and private spaces. This “public room” does not only connect the dwelling with the adjacent street, but also acts as a gradual transformation zone of the degree of privacy.

Cycling is not very common in any of the three cases, due to the fact that the roads are not designed with consideration for cyclists. Moving on foot and interacting with people around the urban block or the neighbourhood are correlated in the Old Town and Italian Quarter, but not in the Garden City. Therefore, the perception of walking has the highest correlation with the sense of community in the traditional and Italian urban forms. This reflects what Hollie Lund (2002) states in regards to perceptions of walking and the sense of community. She discloses that opportunities for interaction, safe and interesting walking environments and pedestrian-friendly spaces have a strong impact on one's sense of belonging and society.

9.5 Constitutedness

Although the constitutedness index values do not reflect the social life within the three case studies, it does however reflect the spatial configuration of the street front structure of each of the case studies. The findings show that cul-de-sacs in the Old Town have the highest constitutedness value. This street type also has the best permeability and street intervisibility values, which reflect the strong relationship between the public space and the private dwellings that are accessible from it. The streets in the Old Town, in general, exhibit the best values of constitutedness, permeability and intervisibility, noting that constitutedness values increase as the walker approaches the cul-de-sac. In other words, cul-de-sacs have the best constitutedness value, compared to connecting and main streets. This outcome also reflects the number of units per specific length of street front, as constitutedness responds to the number of units. The number of units decreases as the walker approaches main streets. Main streets have the fewest units 3.6 per 20m compared to the other two types of streets, where most plots are large. Connecting streets have the second most units 3.8 per 20m, where most plot sizes are average. Cul-de-sacs have the largest number of units 6.0 per 20m, as most plots are small in size.

The Italian Quarter shows a different behaviour in regards to the constitutedness value. The findings show that connecting streets have the best constitutedness value, followed by cul-de-sacs and then main streets. However, main streets have better permeability than cul-de-sacs. It is important to note that the street intervisibility values in this urban form reflect the constitutedness values. Contrary to the traditional urban form, the number of units in the Italian Quarter does not correspond with the constitutedness values, as cul-de-sacs have the most units with 13.9 per 20m and main streets comes second with 13.6 per 20m, and then connecting streets with 11.4 per 20m (Table 9.4).

	Variables	The Urban neighbourhood		
		The Old Town	**The Italian Quarter**	**The Garden City**
Main Street	**Permeability**	0.94	0.623	0.5
	Street Intervisibility	0.89	0.616	0.319
	Constitutedness	0.915	0.6195	0.4095
	Number of Units/ 20m	3.6	13.6	1.4
Connecting Street	**Permeability**	0.97	0.698	0.5
	Street Intervisibility	0.94	0.917	0.315
	Constitutedness	0.955	0.8075	0.4075
	Number of Units/ 20m	3.8	11.4	2.0
Cul-de-sac	**Permeability**	1.0	0.531	0.5
	Street Intervisibility	1.0	0.75	0.437
	Constitutedness	1.0	0.6405	0.4685
	Number of Units/ 20m	6.0	13.9	3.2

Table 9.4: Constitutedness and its variables within the three cases

In the Garden City, the analysis shows approximately the same findings in the constitutedness values between the three street types. This refers to the sameness in the permeability values in all the streets and the flatness in the street intervisibility values along the streets. However, cul-de-sacs show the better value of constitutedness than the other two types of streets, then main streets and lastly connecting streets. It is important to note that the behaviour of the number of units in the Garden City matches the traditional urban form, where the cul-de-sac has the most units with 3.2 per 20m, followed by the connecting streets with 2.0 per 20m, while the smallest number of units is on the main streets with 1.4 per 20m.

The analysis also shows that the Old Town has the highest constitutedness among the three case studies, especially when noting that all units have direct interactions with the public spaces, which creates a higher topological depth than the other two cases. The Italian Quarter has the second highest constitutedness value, as this value is a result of the fact that shops occupy the ground floor, while residential units occupy the upper floors. The shops provide good typological depth, permeability and street intervisibility, which all generate the value of constitutedness. However, this value is reduced in the upper floors due to the small value of the topological depth and the street intervisibility. Therefore, the multi storey buildings that dominate the Italian Quarter decrease the constitutedness value although the ground floor of most buildings is occupied by retails, catering services, banks and public constitutes. The Garden City has the least constitutedness value due to the fact that all buildings are provided with green open spaces that separate the private spaces from the public streets, which affects the topological depth and the street intervisibility. In summary, the constitutedness value reflects the relationship between the private and public spaces in the three urban neighbourhoods. As the permeability and street intervisibility increase, the constitutedness increases.

9.6 Conclusion

The findings exhibit that each case study has its own characteristics that clearly stand out and distinguish them one from another. The first case study, the Old Town, is found to be a comfortable, attractive and diverse in land use and street front composition. The second case study, the Italian Quarter, is found to be a more peaceful, safe, pleasant, comfortable and relaxed place. Both the Old Town and the Italian Quarter are found to be more central and vibrant than the Garden City. Finally, the third case, the Garden City, is found to be quieter, spacious, plain and more ordinary.

There is also a difference in terms of management and maintenance characteristics. The Italian Quarter has better street fronts than the other two. This is because the Italian Quarter usually has a regular maintenance carried out by the municipality of Tripoli, which preserves the general condition of the street network and especially the main streets. The Old Town preserves the second most attractive urban form within the city centre of Tripoli. The Old Town is managed by a special public local organisation that is mainly responsible for preserving individual buildings instead of dealing and maintaining the urban form in a comprehensive way. This method of management tends to keep most main streets in good condition, as the majority of the important buildings are dispersed amongst these streets. Whether it is due to financial or administrative problems, this local organisation does not cooperate with the residents and the city's municipality, resulting in ineffective maintenance procedures. The Garden City, on the other hand, has the least attractive urban form within the chosen cases, although it has a large number of high-class houses, occupied by the wealthiest people in the city. The dullness of plot fences, a lack of diversity in land use and the supplementation of each single house with a private garden, lead to the abandonment of the streets in general, regardless of their centrality and betweenness indices.

From the analysis of the social activities and the street front quality, in all three cases, city life is strongly correlated with the maintenance and management of the street front, along with the street centrality. The preferred methods of transportation differ in each of the three case studies. In the Garden City, the automobile is the most common method of transportation, one that dominates the network system, while the Old Town, pedestrian movement prevails as its traditional urban structure is designed prior to the invention of car. The Italian Quarter has an equal combination of pedestrian and vehicular movement.

In addition, the study shows that constitutedness does not reflect social activities through the city streets, but rather it reflects the relationship between private and public spaces in different degrees of street centrality. When comparing the three case studies, the traditional urban form of the Old Town has the best constitutedness values, followed by the Italian Quarter and then by the Garden City. It is important to note that the traditional urban form shows the best constitutedness values, which signifies that this urban form has the best relationship between private and public space.

Chapter Ten:
Research Conclusions

10.1 Introduction

The main aim of this research has been to build a body of knowledge that could help to understand the relationship between urban form and urban life within the city centre of Tripoli. This thesis investigation examines three urban neighbourhoods in the city centre of Tripoli. This examination is carried out in such a way so as to find and extract the potentials of the traditional built environment. The overall findings of this research provide concrete evidence of the close relative between the urban form of Tripoli’s city centre and the socio-cultural norms in the city. This confirms the premise stated earlier in the literature review in regard, to the mutual relationships between inhabitants and their built environment, where urban form and urban life simultaneously shape, and are shaped by each other. Through centuries, people have depended on the quality and quantity of the urban elements for their survival.

This chapter reflects the findings of the research methodology regarding three matters: Firstly, on the findings in answering the research questions, secondly, on the Islamic principles which have affected the built environment in the Islamic world, and finally, on the comparison between tradition and modernisation, as well as this research’s contribution to knowledge and institutions for future research.

The purpose of this study is to examine the urban structure of the three neighbourhoods that compose the city centre of Tripoli giving special reference to the contribution of community needs. This method of inquiry enables an examination of a wide range of variables, which are related to the main elements of urban form; street quality, constitutedness and city life. This provides a perspective of various factors that affect people's evaluation of their social needs and built environment. From the assessment of urban structure and street quality of the historical urban fabrics in Tripoli, as well as the social activities of the local people, it is clear that a method is needed to create a development strategy that would create a balance between peoples’ desires and the urban landscape. The application of a decision-making technique has indicated which aspects of an urban design framework should be modified, in order to allow the evolution of a planning policy that would be capable of meeting the objectives and aspirations of the local society in Tripoli.

In search of a correlation between the physical environment and social values, the research finds that a place's identity is a combination of similarities and differences, creating a sense of uniqueness where individuals and societies are identified and distinguished from other ones. Therefore, a sense of a place is dynamic, as it is created through a continual existence through time and space. Since the physical environment and its main urban components, including urban blocks and street networks, appears to make a strong contribution to the sense of place and identity, these physical elements are created according to general cultural and social values, principles and beliefs as well as economic aspects.

Further, the research notes that the current loss of cultural identity in Tripoli, experienced in the peripheral development areas, is directly related to the inadequate interpretation and deficient consideration of traditional urban forms, which exist in the most central areas of the city and which do not only represent the historical part of Tripoli, but that also show the homogeneity of its urban structure. Due to the separation of local cultural traditions from modern urban forms, the motivation of this study is to bridge the gap between the architectural design approach and urban morphological structure and the necessary contextual considerations.

10.2 Research Objectives

In Chapter One, there are two main objectives that are addressed in relation to this phenomenon: the first objective is represented by the following questions: what are the characteristics of urban forms in different historical neighbourhoods of Tripoli's city centre? How have these urban forms transformed? The answers to these questions, which are covered in Chapter Six, are the key to interpret the morphological urban structure of the three neighbourhoods and their transformations over time. The other objective is represented by the question; how does the quality of the built environment affect city life and the sense of community? The answer of this question, which is covered in Chapters Seven and Eight, provides a clear understanding of the correlation between the built environment within the three cases and their social behaviour. To evaluate this relationship, the study first uses a morphological analysis and then makes a correlation between urban form and urban life. The morphology analysis shows the performance of the main urban elements, including urban blocks and the street network, and how they have transformed over time. It identifies three stages of transformation: Traditional, Italian and British developments. The research links the findings of the street quality and the spatial structure of façades or constitutedness with the social activities along different streets according to their centrality. The research addresses a number of variables that connect people to their physical environment and that shape a sense of identity to a place; centrality, street quality and constitutedness including permeability, street intervisibility and topological depth between public and private spaces.

Consequently, it is insufficient to apply only one research method to understand the issues related to the formational and functional processes in cities. As interdisciplinary methods are more likely to provide a better understanding of socio-spatial relations within the urban form, this study thus explores the relation between the street centrality, street quality and spatial structure and social interaction within the three different urban patterns of neighbourhoods. By relating and comparing the outcomes of each case study, a more holistic comprehension of the dynamics involved is achieved.

As mentioned in the research problem, motivation and questions, the study emphasises the lack of social relations in modern settlements, in comparison to the traditional urban forms. In reference to the literature review, neo-traditional neighbourhoods and compact urban fabrics are considered to be new sustainable solutions by New Urbanists, as well as by the urban regulations of many local authorities around the world. However, this has not been applied in Libya yet. Talen (1999) reveals that there are a number of intermediate aspects that affect the sense of community and Hillier (1996) states that the spatial configuration of urban street is only one of these aspects.

Through a morphological approach and theoretical analysis, this research work by Conzen, Muratori, Whitehand, Kropf,Larkham, Moudon, Lefevre, Castex, Alexander, Lynch, Gehl, Hillier, Porta and many other researchers, whose main concerns and objectives are to understand the urban structure of cities and to analyse how cities function. These various analysis and beliefs have resulted in the formation of three urban morphological schools; the Italian, the British-German and the French, all which were based on different methods in interpreting and examining the urban form of the city. In reference to the urban morphology and research methodology chapters, this study starts with an analysis of the whole, or the "macro-scale", and subsequently explores the sub-units or the "micro-scale". However, studying the attributes of a street network and an urban block at a small scale is mainly to understand the whole picture of the city centre of Tripoli according to the centrality, which was used as a base by Alexander, Jane Jacobs, Alan Jacobs, Jan Gehl, van Nes and Sergio Porta in their applications.

This research has pursued a morphological approach in understanding the historical formative processes within the city centre of Tripoli. As Lynch (1981) indicates, understanding what has happened in the past will lead to a better way of shaping the future. From past to present, a number of theories, movements and approaches were mentioned in this research with regard to the relationship between city structure and city life. Some concentrate on the physical structure at the macro-scale, while others relate to the street quality, spatial configuration or social life, at the micro-scale. As cities change and evolve through time, Modoun (1997) emphasises that understanding the physical structure “form”, analysing the conception of urban space at different scales; “resolution”, and exploring the history of a place; “time”, are all important to understand the performance of any urban fabric. Lefebvre (1991) states that every city has its own reality, yet there are some general urban components that pave the way to compare cities or to explore their own identity.

10.3 Tradition versus Modernisation

Since the 1980s, and owing to changes in the economic status and rapid urbanisation in Libya, new types of settlements have been formed around the edges of Tripoli, which could be considered as gated communities that are segregated from the surroundings and connected by only a few abandoned roads. Initially, the Old Town functioned as a gated city, prior to the arrivals of the Italians. Even today, some of its parts are still surrounded by its castle and the remaining parts of its wall, while its management system is carried out by a local public organisation. However, the traditional urban form is no longer a gated community and it is now integrated into the surrounding urban fabrics, where some of the physical urban structures are blurred with the perimeter context. Seeing as the Garden City is based on the British approach in designing new urban neighbourhoods after the Second World War, it suffers from a lack of vitality as there are less people, less activity, and less movement. This reflects the post-war movement in the United Kingdom, where houses become segregated from the surrounding public spaces. Therefore, this type of settlement reduces the communication values between the inhabitants and between the indoor and outdoor spaces.

The traditional structure of the Old Town indicates that the fundamental characteristics of the traditional courtyard house are in harmony with the family's tradition of isolating itself from the public, and its need for a private domestic life, as these courtyard buildings are in- ward physical structures. The traditional courtyard houses have a tremendous impact on shaping both the physical and social structure of the Old Town and its public spaces. The houses of the Garden City, on the other hand, have less privacy and their open green spaces provide only semi-private spaces, which are slightly exposed to adjacent neighbours.

The traditional open space in the Old Town has taken different forms according to its function, location and relation to other physical elements in the town. These open spaces are normally attached to public buildings with special importance, such as mosques and markets, yet there are no central plazas similar to those in the Italian Quarter. Their function depends on the different parts of the urban form and on socio-cultural requirements. In addition, the compact urban structure of the Old Town results in a unique type of built environment for its residents, where the harmony and unity of the lifestyle of the traditional communities comes from the harmonious design of its spaces. All these were the result of unwritten rules based on generally accepted principles related to habits, beliefs, behaviour and most importantly, the Islamic jurists.

The isolated, fragmented projects in the peripheral development areas of Tripoli have introduced a rather artificial composition of “tradition” and “modernity”. By applying modern development models, local cultural traditions are ignored and omitted from taking part in the development process. Because of the current transformation processes in the peripheral areas of Tripoli are imposed by a unilateral concept of “progress”, the issue at stake is how to correlate the local identity and its built environment, and how to foster significant urban forms that both strengthen and express local identification with deep-rooted social values. Within this context, we firstly should analyse the urban conditions that generate cultural identity, and find a way to maintain and revive their relationship, and secondly, we should focus on the continuity of traditional urban forms, which reflects local traditions and generates homogeneity between historical urban neighbourhoods and contemporary development areas.

Furthermore, the insipid developmental concepts that are initiated by the Modern Movement in the late 19th century have demonstrated a lack of long-term viability. Accordingly, and as in many other parts of the world, modern architecture and its increasingly alienating values, has ignored historic continuity and has failed to meet local social needs in the production of new urban neighbourhoods. Through the Modern Movement, the common cultural ground, which existed throughout earlier periods, was replaced by new urban forms that significantly broke the historical continuity. The result was a break in the natural flow between the past and the future, and at the same time, a decrease in the interaction between city life and city form. In turn, this has produced a set of dichotomies of opposite terms in today's struggle; modern versus traditional, rational versus emotional and technical versus cultural (Healey, 2007). These cultural and environmental considerations are now being advocated with an increasing strength and insistence, followed by the strong belief that the rampant homogeneity caused by modern development trends are undermining the richness and stability of the inherited natural and cultural micro-systems (Healey, 2007).

Halim Barakat (1993) states that a sense of community cannot be produced by applying rational thinking alone. Rather, it must include all the human perceptions of urban space, in order to achieve a harmony between cultural identity and built environment. He adds that modern urban neighbourhoods degenerate into dead shells, where their aesthetic principles become random and identical, with no indication of any deep understanding of the relationship between city life and city form. However, through the metaphysical approach, lively and meaningful manifestations of reality can be accomplished. Therefore, the process leading to the formation of cultural identity relies on the continued understanding of reality and shared visions of the community as a whole. The formation of a significant built environment creates a correlation between human values and attitudes, and architectural qualities. The sense of community and spiritual values that link past, present and future need to be experienced through specific forms and conditions of human existence. Without the interaction between a clear vision and a concrete human picture, culture will remain either meaningless or unproductive. The same can be said about the creation of the built environment, particularly if it becomes an abstract and a merely quantitative production process.

In the fragmental reality of modern peripheral areas in the city of Tripoli, the city core constitutes a major physical repository of wholeness and identity. The three selected urban neighbourhoods within the city centre of Tripoli still represent assets for the city's planning requirements, and are becoming a reference for larger urban developments. The research shows that the urban structure of Tripoli's city centre is impregnated with a record of life and of human thoughts and activities, where the whole is much greater than the sum of the parts. Bianca (2000) emphasises that the meaning of an urban entity stems from the interaction between individual buildings and open urban spaces, where the interplay between dwellings, places of work and meeting places generate different patterns of movement and social habits.

Bianca (2000) states that as the built environment transforms gradually over time, the memory of past generations of users can be incorporated and perpetuated. Therefore, the Old Town reflects the genius loci, as it is conditioned and imprinted by especial factors of particular communities, who have collectively shaped their living space. The continuity of this rhythmical tradition provides important urban qualities that relate to local social capital, and that should be carefully managed through a contemporary perspective, so it can be perpetuated by the following generations. The study states that analysing the three urban neighbourhoods does not only demonstrate the success of the past urban forms, but in fact it re-interprets the past to overcome the dichotomies that result from an insipid pursuit of a narrow vision of modern progress. The research analysis explores and evaluates the three urban structures to re-establish an organic link with the past, not for the sake of nostalgia, but for the sake of finding the advantages of these urban matrices in order to catalyse future developments with a careful integration and consideration of the outstanding past.

A critical review of the achievements and failures of modern city planning during the last five decades in Tripoli reveals that the characteristics of urban structure prior to the discovery of oil in Libya are not taken into consideration when developing new areas. This research provides a creative interpretation of the principles embodied in the three urban fabrics, as they offer the opportunity to overcome the effects of the relatively recent mental and physical disintegrational processes of modern planning values that are introduced by foreign consultants and indiscriminate decision-making. This holds true for the recent planning strategy in Tripoli, that follows an alien, dogmatic and often deceptive process.

Consequently, the motivation in analysing the values embodied in the historical urban form of Tripoli does not imply rejecting evolutionary forms of change, nor does it means the replication of such urban form. The approach seeks certain essential structuring principles that can be revived, adapted and perpetuated, to enhance the interaction between social life and the contemporary built environment. The research findings reveal that the spatial urban configuration of the three cases could provide a crucial antidote to certain negative aspects of globalisation and modernisation, namely; delocalisation, standardisation and interconnectedness, which lead to an erosion of local cultural values and identities. Consequently, continuity cannot be accomplished by a simple reproduction of similar urban elements, but it can be produced through the understanding of the processes that have successfully shaped these urban forms. The continuity can then foster the construction of an inspiring built environment, which reflects local social life in its physical configuration.

10.4 Islamic Principles

The social changes in Tripoli during the last five decades have been a response to the appeal of European life styles that is widely admired among the upper class. Wealthy people are the ones responsible for welcoming Western culture in to Libyan society. Their children, who gain higher education degrees from European countries, are influenced by the Western way of life including clothes and social manners, and look at Westernisation as a symbol of modernisation. Replacing traditional Libyan values with the acceptance of Western standards is the first step that has turned cultural values into unfamiliar social standards. This is one of the reasons that has generated a modern suburbia that is completely different from traditional urban forms. Now, after more than half a century, this alienation and its emotional consequences are being reconsidered, and traditional cultural values are again becoming more powerful and effective.

Since the middle of the last century, the modernisation process in the city of Tripoli, like in many other parts of the Muslim world, has exhibited a dramatic socio-cultural change, which in away has caused confusion about the compatibility of Islam in coping with these changes. The last five decades have shown a rapid development in the city of Tripoli that has been accompanied by the ideology of decision-makers, and as a result has started Islam as a religion to be seen as a spiritual rather than a practical guidance. Under the name of modernity, Islam is considered to be a merely spiritual entity instead of being linked to daily life. There is no doubt that most modern social and technological concepts implemented in Tripoli are developed and applied by non-Muslims. Most of these concepts fail to fulfil the traditional and contemporary needs of Muslim civilisation and therefore became socially challenging.

Mohammed Arkoun (1989) states that the problem of the consistency of Islam with modernisation is not only caused by the perceived identification of modernisation with the Western or non-Muslim world, but it is also due to the failure of most local Muslim organisations to generate a congruence between modernity and the principles of Islam. He adds that some contemporary Muslim scholars believe that the inability to interpret modernisation according to Islamic terms, or to bridge the gap between modernity and Islamic law “Shari’ah” is the consequence of pressure imposed upon the process of urban development within Muslim societies. As mentioned previously, this pressure in Libya has been due to political, economic and social problems, which made developing a modern Islamic way of thinking in the planning process almost impossible, and consequently has led to an importation of ready-made Western solutions that become the immediate and dominant alternative. Moreover, as stated by Bozena Strzyzewska (1980), the gap between the compatibility of Islam and modernity is also widened by some irrational opinions of Western orientalists. According to John Esposito (1980), many Westerners, particularly theorists, consider recent socio-political and political events that occurred in the Islamic world during the second half of the twentieth century to be one of the factors that has led to the confusion between the incompatibility of Islam with the contemporary life and technology. However, Derak Hopwood (1983) indicates that the Islamic principles are strongly preserved in some cities in North Africa, where the modern developmental process is limited.

Furthermore, Saleh Al-Hathloul (1992) reveals in his discussion of the traditionalisation of the contemporary Muslim built environment, that the blame should not be put on Western theorists, since some Arabic scholars have failed to find a homogeneity between traditional Islamic principles and contemporary socio-cultural and physical urban forms that could help in identifying the relationship between Islamic principles and modernity. He sees modernists and traditionalists as the two main parties in the Arab world: the first believe that tradition cannot be a source of modernity and they consider it as an obstacle in the way of development. Therefore, they reject the idea of nominating Islamic tradition as a controlling authority and they ignore every traditional value. The traditionalists, on the other hand, consider Islamic tradition as the only authority and alternative that should be used in shaping the future. Mortada (2003) explains that traditionalists are not necessarily calling to isolate Muslim society from contemporary reality and imitate their traditional past, but rather they are calling to evaluate the cultural significance of these modern trends, and to use them in a way that strengthen Islamic principles and co-exist with the contemporary socio-cultural and urban matrix. Al-Hathloul (1992) emphasises that in addition, the contradiction between these two opinions in Muslim communities creates a dualism, which is not only represented throughout the planning system, but that is also reflected in educational and administrational rules. These rules, most of the time, conflict with each other, as some of them represent the continuity of the past while others are rooted in modern thinking.

Fahid Nawaiser (1991) claims that Islam, as the main and first source of Shari'ah, is considered to be a mobilising ideology in providing an interconnected set of concepts and beliefs and guiding a Muslim's everyday life. However, the Prophet Muhammad encourages believers to identify their own built environment by observing Islamic behaviour and values, as well as by adopting non-Muslim principles, as long as Islamic cultural identity is maintained and enhanced. Therefore, Islam allows Muslim communities to develop their existing local norms and values and accept foreign behaviour and thoughts that are consistent with Islamic principles and within a framework of specific conditions. These conditions, as mention in Chapter Three, should enhance the application of Shari'ah, reflect the concept of social solidarity, prevent the harming of public rights, provide essential different land uses and public spaces that are essential to a Muslim community, and finally respect people's private lives. It is important to keep in mind that the selectable, adaptable and compatible new roles, ideologies and behaviours should generate and promote the homogeneity within the accurate body of Islamic principles "Shari'ah".

Therefore, such permission in facilitating a Muslim's life shows the flexibility of Islam that motivates the contemporary international cultural exchange. Through the previously mentioned conditions, Muslims can choose to take the advantage of modern values as long as the Islamic norms are preserved and modern mistakes are avoided. It would be unsuitable for Muslims to accept any characteristics that are subject to criticism even by non-Muslims. Since urban planning and design are value-laden activities, acceptable foreign planning and design concepts must be selected and evaluated in regards to Shari'ah in an Islamic context in order to provide a beneficial experience. Accordingly, modern planning and design concepts should only be applied in parallel with the requirements of the Islamic culture. In addition, urban planning and the designing of the Muslim physical environment require the integration of Islamic jurisprudence and practical elements of life. Therefore, there is a critical necessity to embed the principles of planning and design of the Muslim environment in the sources of these teachings, particularly the Qur'an and Sunnah.

10.5 Contribution to Knowledge

The research has sought to make a significant contribution in discovering the potential of the city centre of Tripoli. This is done through investigating, analysing and interpreting the pattern of urban blocks and the street network within the three urban neighbourhoods. This research also looks at the importance of the relationship between city form and city life, and the way in which social practices and the sense of community are affected by the urban form. The research focuses on past trends of urban development and the social life that currently exists in these places in an attempt to discover the relationship between existing historical urban structure and the conceived perceptions of community life. The analysis quantitative measures the interaction between urban structure and the social performance in relation to the needs and desires of society.

Firstly, the research started by a historical investigation regarding the urban form of Tripoli's city centre. The historical investigation procedure explores the long currently exist prominent rich history of the city of Tripoli, whose inception was 2000 years ago, and shows that there three neighbourhoods within the city centre of Tripoli, that have been developed over time (Belgasem, 2007 and Haynes, 2003).

Although the historical urban development of Tripoli's city centre has been partially covered in Hayne's (1955 & 2003) studies of the Tripolitania period and McLaren's (2006) studies of the Italian urban neighbourhood, the research studies the historical urban development of Tripoli's city centre in a novel. The research has found that the three urban neighbourhoods within the city centre of Tripoli have roots that reflect various motivations and societal norms; the Old Town is based on a Roman grid structure and follows Islamic principles in its urban formation, the Italian Quarter pursues a Mediterranean style in development, while the Garden City is originated form Howard's concept of entitling every resident to their own corner of the world. During the last fifty years, the urban development is far away from any concrete resource in shaping the built environment (Shawesh, 2000).

The historical urban evolution of the city centre of Tripoli shows how the local Libyan tradition is rooted in Islamic principles. Many scholars, including; Bianca, Mortada, Akber, and Hakim, play a major role in uncovering the relationship between Islamic behaviour and the built environment in which it manifests itself. However, since Libya has a long history with the Mediterranean Basin civilisations, the social life in the city of Tripoli is not just rooted in the Islamic principles, but is also related to the culture of other civilisations that have, or still exist around the Mediterranean Sea. In response to Islamic values and the Prophet Muhammad's guidance, Islamic communities can adopt any other cultural values, as long as they do not contradict the Islamic principles "Shari'ah". However, it is important to note that Shari'ah usually relates to two major aspects of the Muslim's life. The first one is known as Ibadat, which relates to religious observances and regulates the relationship between people and their creator "Allah". For Muslims, the built environment is a space where individuals and societies orient their life to worship Allah and where human activities are guided by Islamic law. Ibadat will not have an impact on societies if they are non-Muslims or non-believers. The second major aspect that Shari'ah relates to is known as Muamallat, which relates to the relationships among people and addresses matters and conflicts arising from their interaction. In my opinion this second aspect of Shari'ah can easily be adopted to any community, regardless of their religious background. This is because the main goal of Muamallat is to strengthen the relationship between individuals and create harmoniously and unified communities.

Secondly, this thesis applies the Multiple Centrality Assessment as a tool for identifying the central parts of each neighbourhood within the city centre of Tripoli. Areas of 400 x 400 m^2, representing the most central parts of each case are chosen, according to the centrality analysis that is based on the studies of Sergio Porta. Then, an analysis is conducted in regards to the main elements of the urban morphological structure; street network and urban blocks, based on the approach of the three known morphological schools and their scholars. This analysis finds the significant characteristics of each urban form and exhibits quantitatively and qualitatively the differences and similarities between these three urban forms.

Thirdly, the research follows the approach of Jan Gehl (1994, 2002 & 2010), Nasar (1998), Robert Hershberger (1969), and Cullen (1961) and explores the quality amount of street fronts, according to the street centrality within the three cases. The study shows that in order to find an accurate quality amount of street front, certain factors, such as the street front factor and, the street front length should first be identified. Associating quality factor of street front with its length produce the precise quality amount of each individual street front.

Therefore, from this detailed analysis of quality amount, a comparison is made in order to find the differences and similarities between the selected urban neighbourhoods within the city centre of Tripoli based on theories and studies of Jan Gehl (1994, 2002 & 2010), Nasar (1998) and Amos Rapoport (1990, 1982, 1977 & 1976). Then, the social life on the selected streets is evaluated according to street centrality. In each neighbourhood, the social activities are measured along three different types of streets; main streets, connecting streets and cul-de-sacs. Social life is further differentiated by different types of physical activities; walking, standing and sitting, which are also distinguished as either stationary or moving activities, and by the degree of human necessities as necessary, optional and social activities. Then the relationship between the quality of street fronts and social life is understood as how these variables relate to each other within each case study, and later between the three urban forms. Fourthly, the research investigates the degree of constitutedness within the three cases, based on the approach of Bill Hillier and Akkelies van Nes. In order to improve the accuracy of this analysis, the study measures the constitutedness according to street centrality in each case study, and then links constitutedness to social life as a means of finding the relationship first between these two factors in each case study, and then between the three neighbourhoods. The results of the constitutedness analysis, including permeability, typological depth and street intervisibility, show that constitutedness is more or less associated with city life, providing that all of its components or just one of them affects street liveability. However, the analysis of the constitutedness does not mirror the amount of social activities, but rather the relationship between the public and private spaces. The analysis also shows that streets in the Old Town, especially cul-de-sacs, are more constituted than those located in the other two cases. In addition, the diversity in land uses at the ground floor is another factor that affects the relationship between street constitutedness and social life.

The overall research findings reveal that there is a link between the structure of urban form, the quality of street front and street constitutedness, and social life. It is clear that the Old Town has a distinctive urban form in relation to social life, which can be analysed and understood in order to influence and structure contemporary urban developments, as social traditions are well-preserved and extended through this urban form. It is important to note that the homogeneity between traditional urban form and the socio-cultural practices in the Old Town is a result of many years of continual, mutual adjustments to accommodate the local social behaviour. However, this urban form, as it exists now, is no longer convenient for contemporary life. This study, nevertheless, might be a call to re-adapt the advantages of the Old Town, as well as the Italian Quarter and the Garden City, for future developments.

10.6 Institutions for Future Research

Historically, each city develops its own characteristics that respond to local developmental pressures, like social, cultural, religious or historical ideals. This research aims to understand how the society and the city centre of Tripoli are shaped through reading those characteristics. Each urban fabric is a result of a street network and urban blocks, where the movement channels create fragmentation and the development builds up urban blocks. However, the urban structures of these main urban elements vary from one place to another. This approach might be a starting point for producing strategies and design suggestions that strengthen the relationship between local social life and the form of the city. As an example, McDonald (2005) states that inserting a small grain into a large grain and integrating the traditional pattern with a modern pattern might promote city life. He emphasises that the challenge of the contemporary environment to find a way to combine different street types, preserve pedestrian movement and street front quality, as well as to create walkable, accessible, integrated and connected built urban environments. Achieving harmony within future urban developments that reflect the local socio-spatial environment requires full collaboration between researchers, planners, architects, the community and local authorities in order to understand the most desired urban characteristics within the city and then to propose better urban schemes.

Avoiding faulty development plans and decisions that might harm the future relationship between city life and city form, as well as preserving integration between residents, communities and local municipalities, are important factors in the development of cities. Various measurements, such as; the centrality, the accessibility and the connectivity of urban patterns strongly relate to the quality of streets, the quality of life and constitutedness. A constituted street means minimum topological depth and maximum intervisibility between public and private space, which enhances the safety and liveability of the built environment. The street intervisibility might decrease and the topological depth might increase if a street is narrow and indoor spaces are exposed. However, personalising front yards maintains the privacy of the dwellings and keeps a self-policing sentiment on the street. Combining commercial and residential uses is a real challenge for Libyan urban designers, where it is important to maintain a dwelling's privacy, and also make the place attractive for pedestrians who pass by. The main question is how to apply contemporary planning strategies that provide diversity in land use and at the same time preserve the privacy of each residential unit. The answer cannot be a simple duplication of traditional Islamic urban form, but rather it is finding a way to understand and interpret the concepts of traditional urban models and apply these concepts on metropolitan scale in the future urban development. One of this reach's aims is to understand the predominant arrangement system of the traditional Islamic environment at both macro / micro-scales. This is a call not to study the physical elements separately but to include their relationships to each other as well in order to make a significant contribution to the character of a place.

This thesis raises as many questions as it has answered. Certainly, it opens up further prospects for both theoretical and empirical studies. This section suggests further studies, which need to be thoroughly researched and published in order to expand the current knowledge base on this subject. The diversity of further research does not only outline the limitations of the thesis, but also its inherent richness as an ongoing research theme that has many possible courses of investigation. This research demonstrates that the urban form of the city centre of Tripoli is the reflection of historical evolution of urban development over time. The selected urban neighbourhoods are based on different morphological urban structures, as each case study is from a different historical period. In addition, the evolution of the urban form of Tripoli's city centre exhibits how urban form has transformed over time and might be the first step for further investigation in order to reach a more comprehensive understanding of the interaction between urban form and urban life of the city.

Accordingly, the research aims to assist the creation of a new vision of urban form that is relevant to the local built environment and local society, and to help current design practice in Tripoli meet the requirements of contemporary life and establish a sense of community. Therefore, establishing an accurate database that is relevant to the historical information of urban forms including historical maps, plans, literature and photos should be available in facilitating the field survey and supporting the researchers for further investigations. Such an analysis should become an application that helps decision-makers and public institutions in the current urban planning system to function appropriately and to guide future urban developments.

The study focuses mainly on the main urban elements of urban structure at the “micro” block scale and at the “macro” neighbourhood scale. Although the morphological approach is widely used in the Western world, its application and influence on interpreting the urban forms of the Libyan cities is not yet practiced. Moreover, some terms and concepts introduced in the urban morphology chapter have little contribution to the analysis of the urban form of Tripoli’s city centre, although they are associated with the Islamic principles of built environment. It is therefore recommended that the morphological approach be used in a more comprehensive way in future studies of Tripoli.

The research concludes that the built environment is not just an expression of archetypes in architectural form, but it also bridges a gap between a place and the place’s social needs and activities. There are reciprocal relationships between residents and their neighbourhood. Each one shapes and is shaped by the other. For a long time, the quality and quantity of the morphological urban components have reflected the sense of community and the forming of the built environment. However, recent project developments neglected the conformity of Tripoli city centre and created inappropriate built forms that precluded the link between people’s values and the urban form. Any future development should be planned by incorporating a cultural approach that identifies the value system of local people and the meaning of place in their environment. This study paves the way that might recycle and reintroduce traditional Islamic experiences into contemporary planning activities. This step could be associated with the advance thoughts, principles and theories of Western schools that do not contradict the Islamic values of the built environment or the identity of Muslims’ communities. It is important to note that if the relation between urban form and socio-cultural practices is ignored, the destabilisation of local people's cultural heritage will occur, and inevitably resulting a loss of people’ cultural identity.

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Appendices

Appendix 1: Quality Factor, Length and Amount of the Old Town

	Quality Categories	Quality Factor	Length of Street Front	Quality Amount
Main Streets	Attractive Streets	29	269	7801
		28	354	9912
		27	220	5940
		26	307	7982
	Pleasant Streets	24	536	12864
		23	353	8119
		21	202	4242
	Average Streets	19	1040	19760
		17	899	15283
		16	502	8032
	Dull Streets	14	95	1330
		12	176	2112
		11	161	1771
	Unattractive Streets	09	94	846
		08	75	600
		07	43	301
	Total		5326	106895
Connecting Streets	Attractive Streets	27	202	5454
		26	238	6188
	Pleasant Streets	23	189	4347
		22	139	3058
		21	194	4074
	Average Streets	19	737	14003
		17	437	7429
		16	431	6896
	Dull Streets	13	129	1677
		12	112	1344
		11	162	1782
	Unattractive Streets	09	95	855
		07	60	420
		06	21	126
	Total		3146	57653
Cul-de-sacs	Pleasant Streets	22	113	2486
		21	198	4158
	Average Streets	19	434	8246
		18	348	6264
		17	436	7412
		16	365	5840
	Dull Streets	14	387	5418
		13	315	4095
		11	248	2728
	Unattractive Streets	09	231	2079
		08	127	1016
		07	61	427
		06	93	558
	Total		3356	50727

Appendix 2: Quality Factor, Length and Amount of the Italian Quarter

	Quality Categories	Quality Factor	Length of Street Front	Quality Amount
Main Streets	**Attractive Streets**	29	1132	32828
		28	333	9324
		27	196	5292
	Pleasant Streets	24	409	9816
		23	600	13800
		22	160	3520
		21	640	13440
	Average Streets	19	692	13148
		18	228	4104
		17	340	5780
		16	46	736
	Dull Streets	14	174	2436
		11	348	3828
	Unattractive Streets	09	89	801
	Total		5387	118853
Connecting Streets	**Attractive Streets**	29	54	1566
		28	24	672
	Pleasant Streets	24	25	600
		22	307	6754
		21	71	1491
	Average Streets	19	370	7030
		18	651	11718
		17	288	4896
	Dull Streets	14	164	2296
		12	75	900
	Unattractive Streets	09	180	1620
	Total		2209	39543
Cul-de-sacs	**Pleasant Streets**	23	30	690
	Average Streets	17	56	952
	Unattractive Streets	09	117	1053
		08	141	1128
	Total		344	3823

Appendix 3: Quality Factor, Length and Amount of the Garden City

	Quality Categories	Quality Factor	Length of Street Front	Quality Amount
Main Streets	Pleasant Streets	24	272	6528
		23	456	10488
		22	59	1298
		21	120	2520
	Average Streets	19	811	15409
		18	154	2772
		17	530	9010
		16	167	2672
	Dull Streets	14	51	714
		13	38	494
		12	91	1092
		11	30	330
	Unattractive Streets	08	79	632
	Total		2858	53959
Connecting Streets	Pleasant Streets	23	65	1495
		22	299	6578
		21	114	2394
	Average Streets	19	590	11210
		18	1041	18738
		17	613	10421
		16	336	5376
	Dull Streets	14	204	2856
		13	42	546
		12	179	2148
		11	157	1727
	Unattractive Streets	08	158	1264
	Total		3798	64750
Cul-de-sacs	Dull Streets	11	53	583
	Total		53	583

Appendix 4: The Criteria of Analysing Street Front of the Old Town

Appendix 5: The Criteria of Analysing Street Front of the Italian Quarter

Appendix 6: The Criteria of Analysing Street Front of the Garden City

Appendix 7: The Social Life of the Old Town

		Street Quality	Total people Observed	Common City Activities			Human Necessities			Physical Activities	
				Walking	Standing	Sitting	Necessary Activities	Optional Activities	Social Activities	Moving	Stationary
Main Streets	Peak Times	*Good*	877	619 70%	231 26%	27 04%	339 39%	83 09%	455 52%	619 70%	258 30%
		Average	703	506 72%	176 25%	21 03%	297 42%	60 09%	346 49%	506 72%	197 28%
		Bad	510	398 78%	102 20%	10 02%	245 48%	37 07%	228 45%	398 78%	112 22%
	Off-peak Times	*Good*	386	245 63%	114 30%	27 07%	147 38%	44 11%	195 51%	245 63%	141 37%
		Average	344	227 66%	100 29%	17 05%	145 42%	36 11%	163 47%	227 66%	117 34%
		Bad	215	146 68%	60 28%	9 04%	101 47%	19 09%	95 44%	146 68%	69 32%
Connecting Streets	Peak Times	*Good*	342	210 61%	120 35%	12 04%	145 42%	35 11%	162 47%	210 61%	132 39%
		Average	301	192 64%	99 33%	10 03%	143 48%	28 09%	130 43%	192 64%	109 36%
		Bad	178	120 68%	53 30%	5 02%	93 52%	13 07%	72 41%	120 68%	58 32%
	Off-peak Times	*Good*	176	120 68%	38 22%	18 10%	72 41%	18 10%	86 49%	120 68%	56 32%
		Average	149	106 71%	30 20%	13 09%	70 47%	13 09%	66 44%	106 71%	43 29%
		Bad	89	66 74%	17 19%	6 07%	47 53%	5 06%	37 41%	66 74%	23 26%
Cul-de-sacs	Peak Times	*Good*	59	32 54%	18 31%	9 15%	17 29%	11 19%	31 52%	32 54%	27 46%
		Average	48	29 60%	13 27%	6 13%	18 38%	8 17%	22 45%	29 60%	19 40%
		Bad	28	18 65%	7 27%	3 13%	12 43%	4 14%	12 43%	18 65%	10 35%
	Off-peak Times	*Good*	133	89 67%	28 21%	16 12%	46 34%	21 16%	66 50%	89 67%	44 33%
		Average	118	82 70%	24 20%	12 10%	48 41%	16 14%	54 45%	82 70%	36 30%
		Bad	73	58 80%	11 15%	4 05%	34 47%	8 11%	31 42%	58 80%	15 20%

Appendix 8: The Social Life of the Italian Quarter

		Street Quality	Total people Observed	Common City Activities			Human Necessities			Physical Activities	
				Walking	Standing	Sitting	Necessary Activities	Optional Activities	Social Activities	Moving	Stationary
Main Streets	Peak Times	*Good*	2131	1698 80%	340 16%	93 04%	955 45%	518 24%	658 31%	1698 80%	433 20%
		Average	1975	1620 82%	296 15%	59 03%	942 48%	445 23%	588 29%	1620 82%	355 18%
		Bad	1426	1212 85%	185 13%	29 02%	737 52%	288 20%	401 28%	1212 85%	214 15%
	Off-peak Time	*Good*	981	738 75%	188 19%	55 06%	483 49%	132 13%	366 38%	738 75%	243 25%
		Average	907	707 78%	154 17%	46 05%	481 53%	110 12%	316 35%	707 78%	200 22%
		Bad	671	543 81%	101 15%	27 04%	384 57%	70 11%	217 32%	543 81%	128 19%
Connecting Streets	Peak Times	*Good*	1177	994 84%	148 12%	35 04%	556 47%	198 17%	423 36%	994 84%	183 16%
		Average	1039	904 87%	104 10%	31 03%	533 51%	164 16%	342 33%	904 87%	135 13%
		Bad	854	759 89%	78 09%	17 02%	468 55%	116 13%	270 32%	759 89%	95 11%
	Off-peak Times	*Good*	412	297 72%	95 23%	20 05%	170 41%	70 17%	172 42%	297 72%	115 28%
		Average	360	274 76%	72 20%	14 04%	163 45%	56 16%	141 39%	274 76%	86 24%
		Bad	294	229 78%	56 19%	9 03%	146 50%	42 14%	106 36%	229 78%	65 22%
Cul-de-sacs	Peak Times	*Good*	38	21 55%	10 26%	7 19%	14 37%	9 24%	15 39%	21 55%	17 45%
		Average	26	15 58%	7 27%	4 15%	11 42%	6 23%	9 35%	15 58%	11 42%
		Bad	21	13 62%	5 24%	3 14%	10 47%	5 24%	6 29%	13 62%	8 38%
	Off-peak Times	*Good*	66	35 53%	14 21%	17 26%	23 35%	16 24%	27 41%	35 53%	31 47%
		Average	56	30 54%	12 21%	14 25%	21 38%	13 23%	22 39%	30 54%	26 46%
		Bad	38	22 58%	7 18%	9 24%	16 42%	8 21%	14 37%	22 58%	16 42%

Appendix 9: The Social Life of the Garden City

		Street Quality	Total people Observed	Common City Activities			Human Necessities			Physical Activities	
				Walking	Standing	Sitting	Necessary Activities	Optional Activities	Social Activities	Moving	Stationary
Main Streets	Peak Times	*Good*	111	74 67%	21 19%	16 14%	49 44%	24 22%	38 34%	74 67%	39 33%
		Average	78	57 73%	13 17%	08 10%	41 53%	15 19%	22 28%	57 73%	21 27%
		Bad	97	68 70%	17 18%	12 12%	45 47%	20 20%	32 33%	68 70%	29 30%
	Off-peak Times	*Good*	118	71 60%	27 23%	20 17%	38 32%	14 12%	66 56%	71 60%	47 40%
		Average	86	60 70%	15 17%	11 13%	46 53%	07 09%	33 38%	60 70%	26 30%
		Bad	105	68 65%	21 20%	16 15%	47 45%	12 11%	46 44%	68 65%	39 35%
Connecting Streets	Peak Times	*Good*	56	30 53%	16 29%	10 18%	18 32%	15 27%	23 41%	30 53%	26 47%
		Average	42	23 55%	12 28%	07 17%	17 40%	09 21%	16 39%	23 55%	19 45%
		Bad	22	14 63%	03 14%	05 23%	10 45%	03 14%	09 41%	14 63%	08 37%
	Off-peak Times	*Good*	79	45 57%	20 25%	14 18%	28 36%	16 20%	35 44%	45 57%	34 43%
		Average	64	38 60%	15 23%	11 17%	26 41%	11 17%	27 42%	38 60%	26 40%
		Bad	49	32 65%	10 21%	07 14%	23 47%	08 16%	18 37%	32 65%	17 35%
Cul-de-sacs	Peak Times	*Good*									
		Average									
		Bad	19	11 58%	04 21%	04 21%	08 42%	03 16%	08 42%	11 58%	08 42%
	Off-peak Times	*Good*									
		Average									
		Bad	35	18 51%	10 29%	07 20%	13 37%	06 17%	16 46%	18 51%	17 49%