University of Strathclyde

Department of Architecture

Urban Design Guidance for Benghazi, Libya: Linking Urban Form and Local Culture for Social Housing Regeneration in Libya

By

Walid Omeir

A thesis presented in fulfilment of requirements for the degree of Doctor of Philosophy

2013

Author's Declaration

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

Signed: Date:

Acknowledgements

Finishing a PhD is truly a challenging task, and I would not have been able to complete this task without the motivation of my belief in acquiring knowledge – a belief that is inspired by the first Quranic (Muslim holy book) verse “Read (Commencing) with the name of Allah, who has created everything” (Verse: 1, Chapter 96: Al-`Alaq)

I express my gratitude towards my supervisor, Professor Sergio Porta, with whom I would like to share a poem written by Ahmed Shawqi, the prince of Arabic poets, in the 20thcentury, when he said " Stand in respect for the teacher, give him full appreciation. A teacher is virtually a prophet".

Finally, I would like to express my gratitude to my parents and siblings, whose prayers for me have been the source of comfort and strength during my life. Also, many thanks go to my wife for inspiring me to pursue and finish my studies for a doctorate. Thank you to everyone who gave support that has made the hours spent on my study worthwhile.

Contents

List of Tables

List of Figures

Abstract

Efficient and effective urban guidance for regeneration areas, coupled with quality design, are recognised as necessary to make a positive effect on the social wellbeing of communities. Unfortunately, the Libyan urban planning system and urban regeneration suffer from inefficiency and ineffectiveness. The aim of this study is to improve the existing urban regeneration practice in Libya and to respond to the lack of urban design guidance in regeneration projects. This study proposes urban design guidance that achieves this aim by providing a new, authentic approach to rehabilitate deprived areas in Benghazi, Libya.

The methodology followed adopts the use of the Typo-Morphological approach, coupled with the Libyan/Islamic socio-cultural norms as roots and measures to deliver genuine solutions for the rehabilitation process. This methodology is utilised by studying three distinct neighbourhoods in Benghazi, Libya. The analytical framework is based on six elements of urban forms that are socially defined.

The outcome of this study is urban design guidance which is easy to use, reliable, genuine, and tackles the communities' social-cultural needs. This guidance is proposed to the Libyan urban planning authorities to lead to a better quality of life and more sustainable building environment in Benghazi, Libya. This guidance is the key contribution of the thesis.

In addition to the main outcome, the thesis provides several theoretical and practical contributions. To the best of the author's knowledge, this study is the first one to apply typo-morphology approach in Libyan urban design. Also, it is the first to link Libyan/Islamic socio-cultural norms with the urban form of Benghazi, Libya. Practically, six analytical elements and various tools are produced by the applied typo-morphological categorisation that represents a systematic analytical framework. Moreover, the author has originated the social block analytical element, and analytical tools such as measures of public open spaces configuration, housing privacy and walls' permeability. Also, the author has further developed other elements and tools, originated by other scholars, to suit the Libyan context.

Chapter 1: Introduction

Chapter 1: Introduction

1.1. Aims of the Thesis

In the 1960s, Libya in general, and Benghazi as its co-capital city, enjoyed wealth and consequently rapid growth in many sectors. Economic wealth, education, health and housing services were among the many attractions for people to immigrate and reside in Benghazi. Benghazi became a magnet for people from the hinterlands and neighbouring countries. This development took place in parallel with an expansion of government urban projects, which accommodated and contained this growth. However, this urban growth followed international concepts which might contradict with the local socio-cultural dimension of Libyan society.

The UN Habitat World Urban Forum and the World Planner Congress meeting in Vancouver, 2006, called for a shift away from the current assumption that either "market forces" or "local communities" would eventually solve the difficulties of problematic cities in developing countries. UN Habitat has encouraged planners and practitioners to develop a different approach, which is comprehensive, and places people's socio-cultural needs and livelihoods at the centre of their planning strategies (UN Habitat, 2006).

Venessa Watson, 2007, in her contribution to "Urban Planning and twenty – first centuries: looking to the future: New approaches to urban development and assistance", stated that the reason for the insufficient planning system in the global south were because they are heterogeneous to their region's context. In addition, she referred to the fact that many of these countries have inherited their planning systems and approaches from previous centuries of colonial governments or have imported them from a western context to suit specific local, political and ideological ends. Although the context in which these systems operate has changed, more often than not the systems themselves remained unchanged, as is largely the case in the Libyan planning system.

According to Watson, this adoption of western planning ideas could be due to the fact that most new planning ideas originating in the developed north. However, she adds that, although these ideas have been assumed to have universal success, they are in fact responses to the often rather particular conditions of advanced capitalism and the western idea of liberalism (Watson, 2007).

Similar to many developed countries, the Libyan planning system seems to have an inadequate response to rehabilitating deprived areas in terms of planning policies and urban design approaches, which has resulted from adopting and copying other foreign planning systems. As stated before, the planning and urban design theories in this century and the previous are mostly derived from international and western schools of thoughts. Therefore, the methodological approach of this thesis is to use urban design theories, publications, experiences and approaches that focus on the history and socio-cultural dimension of the built environment, such as Typo-Morphology, in order to develop a homogenised urban design guidance and an analytical approach for Benghazi/ Libya.

The study will suggest an urban Typo-Morphological approach as a tool to help urban designers to play a key role in delivering quality design. Using urban Typo-Morphology as a tool will help designers to have a better understanding of the socio-cultural dimension within a spatial context, and thus to deliver high quality urban design for the country's regeneration projects. The outcome of the study will be driven by the socio-cultural needs of Libyan communities, by understanding the spatial morphology of Benghazi's historical quarters. The urban Typo-Morphology elements will be the main tools of the study approach.

1.2. Urban Design Guidance as a Tool for Promoting Social Cohesion, Responding to Communities Socio-Cultural Needs in Deprived Areas

Public spaces and amenities are far more successful if located at accessible, well-connected points. Good urban design can make areas more attractive to higher-income residents and the businesses and services, which supply or employ them. It is

important to sustain social diversity within developments to help ensure that the benefits of regeneration are widely shared. Social inclusion and exclusion is one of the main topics to dominate recent urban regeneration programmes. The physical outcome of urban design should adopt the social and cultural aspects that shape the local communities of deprived areas (Vaughan *et al.*, 2005).

Urban design is critical to the success of urban regeneration. One of the mechanisms for delivering quality urban design as a contribution to regeneration projects is by guiding urban design practitioners to respond sensitively to regeneration sites and their settings. The most important aspect is to guide urban designers to act positively in reducing social exclusion and improve both the economic and social cohesion. Both social deprivation and accessibility issues are considered to be two of the main measures and reasons for deprivation in stressed communities (Social Disadvantage Research Centre, 2001). Therefore, urban design guidance in regeneration is considered to be a crucial tool in achieving a better understanding of the regeneration aims and objectives with regard to lifting deprived areas into a better position, economically, socially, environmentally and physically. It aims to solve the problems of deprived communities, or at least contribute to the overall regeneration strategy for mitigating the problems of deprived areas.

Urban design guidance plays a key role in delivering quality design. The creation of high-quality, successful places depends on the skills of designers, as well as the vision, and commitment of the planning authorities. Urban design guidance is considered to be a companion to Planning Policies and subsequent Planning Policy Statements. It aims to encourage better design and to stimulate thinking about urban design. The guidance is relevant to all aspects of the built environment, from the design of buildings, spaces and landscapes, to street network systems; and for planning and development at every scale, from streets, neighbourhoods, villages and cities, to regional planning strategies (DETR, 2000).

1.3. Background of the Libyan Planning System and Urban Regeneration

1.3.1. General Overview of Libya:

Libya, which is located in North Africa, covers an area of 1,759,540 square kilometres and it is ranked as the 17th largest nation in the world (90% of the country is desert). It has the longest Mediterranean coastline 1770 kilometres (1100 miles). Its climate is mostly dry and desert-like except in the north, which has a Mediterranean type of climate (General Information Authority of Libya, 2009).

The majority of the population of 6.4 million is between the ages of 15 and 64 (68.8%), but a significant portion is under the age of 14 (27.3%). About 97% of Libyans are Arab-speaking Sunni Muslims of mixed Arab and Berber descent. Arab identity is strongly promoted: Arabic is the only official language (Anderson, 2009). Ninety per cent of the population live on 10% of the area along the coast in Tripoli and Benghazi. Libya's population is growing by 3.5% annually. More than 85% live in cities (UPA, 2010).

Geographically, the country has been divided into three separate regions; Tarabulus (Tripolitania) in the North-West; Barqah (Cyrenaica) in the North-East and Fazzan in the South-West. The coastal area along the Mediterranean where most of population live is interrupted by two hills to the East and West, gradually ascending as it moves towards the desert in the south (Otman, and Karlberg, 2007).

The country is now divided into four urban planning zones: Tripoli, Benghazi, Sebha and Al Khalij (see Figure 1.1). Most Libyans live in the narrow coastal strip of the country, where most of the major cities are located such as the two principle cities of the country: Tripoli and Benghazi (Otman and Karlberg, 2007). Benghazi, with its population of 670,797 (census, 2006), is the principle city of the eastern north part of Libya, acting as co-capital for Libya (General Information Authority of Libya, 2009).

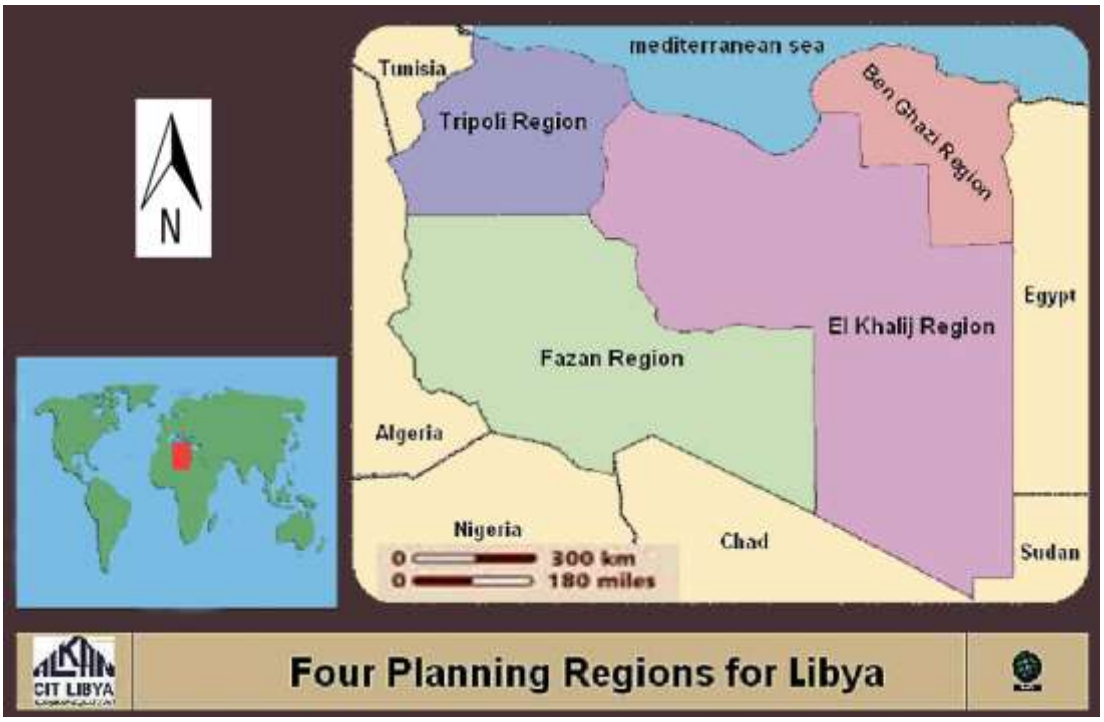


Figure 1.1: Four Planning Regions for Libya. *Source:* General Information Authority of Libya

Libya has a variety of climatic and topographic conditions. Both the Mediterranean Sea and the desert affect Libya's climate. In the winter, the weather is cool with some rain on the coast, and in the drier desert, temperature can drop to around 0^{o}C at night (General Information Authority of Libya, 2009). Less than 2% of the Libyan land receives enough rainfall for settled agriculture, the heaviest precipitation occurring in the Jabal al Akhdar Mountain, in eastern Libya (Weather and Climate in Libya, 2010).

1.3.2. Unemployment, Population Decline and the Shortage of the Housing Stock

In the early 1980s, Libya was one of the wealthiest countries in the world; its GNP per capita was higher than that of countries such as Italy, Singapore, South Korea, Spain and New Zealand. The high revenues generated by oil and the small population gave Libya one of the highest GDPs per capita in Africa and should have allowed the Libyan state to provide an extensive level of social security, particularly

in the fields of housing and education (United Nations Economic and Social Council, 2006).

This promising economic situation did not last after the 1980s as many problems destabilised Libya economically and politically during the military regime. These problems were due to the military dictatorship, corruption, and poor planning in general. For instance, in 2009 unemployment was the highest in the region of North Africa at 21% (Reuters Africa, 2009).

Unemployment was mentioned for the first time in 2007 during the military regime by a newspaper called Oea. "Unemployment among men is 21.55 percent and 18.71 percent among women," Also Oea highlighted, without giving an explanation, "The percentage of school girls going on to university degree level reached 12.88 percent, compared with 10.37 percent for boys,…Libyan boys drop out of school more often than girls". Moreover, "More than 16 percent of the country's total 886,978 families have none of its members earning a stable income, while 43.3 percent of the households have just one" (Oea newspaper, 2007). This newspaper was suspended in 2010 because it published an article about government corruption (Reuters, 2010).
In addition, Routers Africa (2009) linked the unemployment issue with poor housing conditions in Libya "About 26 percent of families have two members bringing home a salary, adding that the average family size was 6.95 members. More than 33,000 families live in unhealthy housing conditions" (Reuters Africa, 2009). Shortage of housing stock is linked to the decline of population growth during the Italian invasion period, concentrated development of settlement areas and to the failure in planning policies and low government spending during the military regime period.

Based on census figures in 1911 and 1950, during the Italian colonial period, the Libyan population of 1.5 million had no increase for almost 40 years which was due to war casualties, emigration and famine (Otman and Karlberg, 2007). The occupation caused severe disruption of coastal agriculture and domestic trade (Otman and Karlberg, 2007). Moreover, it brought to a halt any housing development for the Libyan population, with the exception of the central major cities' - Tripoli and

Benghazi - development which was built by the Italian government for its Italian settlers. The Italian extension of these city centres were occupied by Italian inhabitants and physically surrounded and limited in their urban form by the extension and growth of the old Othman city centre and its Libyan dwellers. This hindering of a natural housing expansion caused a population decline in the Libyan inhabited major cities and towns, and forced many to immigrate to rural areas.

During the military regime era, 1969-2011 the population growth rate declined again. The period between 1980 and 2006 experienced a major decline in the Libyan population rate as it dropped from 3.2% to 1.83% (General Information Authority of Libya, 2009).The cause for the population decline was due to the military regime failure in delivering stable economic, political, and social policies. This failure was first admitted by top government officials in 2006, dominating the official newspapers headlines (Oea newspaper, 2007).

Instability in the military regime government policies in terms of housing and urban planning has (Libyan Urban Planning Authority's (UPA) official publication):

- Meant that the average marriage age increased from 25 to 32 for males, and 19 to 23 for females. The publication referred to housing shortage of around 440,000 new houses needed over the next 10 years. This indicates that the shortage in housing stock available for young married couples had significantly affected the population growth.
- Marginalised the urban planning authority.
- Caused the absence of appropriate and clear urban planning policies and structure
- Precipitated inappropriate private housing areas emerging in the Libyan urban form and architecture style, due to the absence of new housing schemes based on appropriate Planning and Architectural policies
- Ushered in a more prolonged period of deprivation and deterioration in social housing areas.

- Encouraged the commissioning of national urban projects through unclear procurement methods, which lacked proper supervision from the planning authorities. As a result, this has left such projects vulnerable to corruption.

Moreover, centralised and generalised planning policies and standards have ignored the differences between the Libyan regions. For example, the approved housing and community facilities planning policies and standards for a historical heritage town in the depth of the desert, like Ghadames, are almost the same as those for Benghazi. Mr. Bashir Azlitni, the head of the national generation plan for Al Khalij region, highlighted this problem "Physical planning and architectural standards must be provided for each sub-region and even for each city or town, which have different local conditions from others. They should fit with the local socio-economic conditions as well as the geographic and climatic conditions for the area in need of development and / or upgrading" (Azlitni, 2005, p. 3).

In conclusion, population growth in Libya for the last 100 years has suffered two declines: the first decline was caused by war and foreign invasion, while the second one was caused by insufficient housing projects and lack of clear planning policies during the military regime. In addition to this, neglecting the social housing needs during the military regime has pushed these areas into deprivation and spread poverty among their dwellers.

Therefore, adopting appropriate planning and clear policies for any country is crucial, and not just a luxury. Spontaneous policies that dominated the Libyan planning in the mid 70's till 2011 had been admitted by top Libyan officials. After the revolution against the military regime in 2011 (Arab Spring), strong signs and some positive acts are now to be seen on the Libyan horizon, which have opened the gate for more responsive acts and an optimistic future that has been long awaited for by the Libyan people to benefit and enjoy their country's wealth.

1.3.3. An Overview of the Construction and Housing Industry in Libya 1960s-2011

The construction industry has, predictably, played an important role in economic development in a country with minimal infrastructure before the 1960s, and especially after World War II. The construction industry got started as a result of the oil exploitation during the 1960s. According to an official governmental survey that was conducted in 1969, when the military coup occurred, the actual housing shortfall was placed at upward of 180,000 dwellings (Ngab, 2007).

Both the public and private sectors were involved in housing construction until 1975. Private investment and contracting accounted for a large portion of all construction until the nationalisation of the private sector in 1975 and the new property ownership law (1978 housing law) went into effect in 1978 (Ngab, 2007).

In 1975, the military regime began to nationalise the construction industry. Before the military coup, there were about 2,000 contractors; many of whom were either small proprietorships or partnerships (Ngab, 2007). During the military regime, the minister of housing implemented nationalisation by merging contracting firms into larger firms which were capable of carrying out large construction projects. Firms with capital in excess of LD30, 000 (1 Libyan Dinar was equal to 3 US$ in the 60s) were converted into corporations, and the majority of shares were nationalised (Ngab, 2007).

In addition, the government set up some state-owned construction companies such as the National Industrial Contracting Company, the General Corporation for the Construction and Maintenance of Roads, and the General Corporation for Civil Works in order to build factories and to carry out civil engineering projects as planned by the national urban scheme (Ngab, 2007). The implementation of nationalisation and state companies catapulted Libya to become the world's leading per capita consumer of cement towards the end of the 1970s (Ngab, 2007).

However, this boom was artificial as those nationalised construction projects were mainly concerned with building factories to enhance the government's public image rather than fulfilling community needs such as housing facilities. Even worse, those factories closed down shortly after opening and people became redundant since the factories relied heavily on government subsidies without any real economical drive.

The 1978 Housing Law "A property is owned by its resident" limited each family to only one dwelling and had an adverse effect on the housing conditions of Libya. This law initiated social chaos because it gave legal permission for tenants to take over the properties they were renting and gave permission for people to take over any vacant properties that did not belong to them. This law led to the end of the private rental sector which totally eliminated property investment by the private sector.

Between 1970 and 1986, the government invested more than 10 billion US dollars in housing and infrastructure, targeting to build 277,500 housing units all over Libya. To reach these targets, and in the absence of any private Libyan construction companies and firms, Libya made construction contracts with foreign firms (Ngab, 2007). However, the construction industry in Libya faced serious challenges and difficulties due to the rapid development and dependence on foreign experts who did not follow genuine policies born from the Libyan social context and location.

Since 1984, the military regime declared general huge budget cuts due to the unstable social and economic situations; hence budget allocations for housing and other infrastructure projects were tightened. Many housing contracts were suspended or cancelled, leading to the mass departure of foreign workers (Ngab, 2007). The unstable social and economic situations negatively affected the construction industry more than any other sector due to the severe cutbacks in the number of foreign workers in Libya in the mid-1980s. Between mid-1983 and mid-1984, the number of construction workers dropped from 371,000 to 197,000. Shortly afterward, the construction industry came to a halt (Ngab, 2007).

In the 2000s, the shortfall in construction also raised the prospect of overcrowding and the creation of new deprived housing areas as the country's increasing population threatened to overwhelm the supply of housing. As from 1986 - 2000 the construction industry slowed to a halt. The capacity of the Libyan construction industry was unable to meet national housing demand. In 2006, the government planned for a new construction boom to be implemented through The National Plan. The implementation of this plan was to mitigate all other failed activities of the past decades. However, planning and policies over the past decades, and the lack of managerial, financial, and technical capabilities created many difficulties for the industry. The new demands for rapid social, economic, political and technological changes further strained the fragile industry. To meet current and future needs and challenges, new policies, changes and restructuring of the building industry are required (Ngab, 2007).

1.3.4. Urban planning in Libya: Libyan Urban Planning Authority (UPA)

In the 1960s, the Libyan Urban Planning Authority was formed to endorse and approve new proposed master plans, services plans and infrastructural plans and to intervene in controlling and developing these plans during the implementation phase, production of an analytical report on policies pertaining to balanced growth among regions, review of existing conditions within the selected regions with emphasis on development constraints and future prospects for robust urban planning (UPA, 2010).

Libyan Urban Planning Authority endorsed three national plans. The first planning phase was called First Generation aimed to prepare Master and layout plans for the more important cities and towns. The First Generation was intended to cover the period 1968-1988, however, it was ended in 1980. The early termination of this planning program was due to the unstable economic and social conditions during the late 1970’s (Azlitni, 2005).

A planning phase emerged immediately and was called Second Generation. This planning program covered the period 1980-2000. Unfortunately, the Second Generation national plan was mainly a replication of almost the same plans produced

in the 60s, as the government did not pay much attention to developing or implementing any existing or new urban plans. For example, very few social housing projects took place in the period of the Second Generation. It is estimated that approximately 15,000 dwelling units were built in Benghazi during the 20 years of the Second Generation. This has led to a serious problem in housing stock and, in consequence, it contributed to the decrease of Benghazi population growth rate.

The Third Generation planning phase has been set to cover the period 2000-2025 in order to avoid the shortcomings of the previous plans. Although the title of the Third Generation project shows the year 2000 as its effective starting date, the actual commencement date was 2005 (Azlitni, 2005). Unfortunately, the planning authority body in Libya was perceived merely as a delivery vehicle for the Third Generation national plan. It shares the character of a construction project by way of structuring the implementation phases and time duration, with little concern for developing national planning policies and guidance.

Solid policies and guidance should rest on the main pillars of all national plans, with long term aims and objectives that are developed using up-to-date planning techniques and strategies. The traditional way of planning will cause problems in the future as Azlitni stressed (Azlitni, 2005, p. 7) “The ignorance of such solutions which are provided by traditional means of construction has created a set of problems to the new development plans”.

The current absence of appropriate and detailed policies and guidance might bring some shortcoming in the future - shortcomings that are similar to those that happened in the late 70s - which Libya is still suffering from. Such shortcomings were starkly portrayed in the First Generation national plan that was delivered through foreign companies which implemented the spatial plan with focus mainly on the physical construction side, but with very little planning policy and guidance that brought socio-cultural aspects into focus. If these policies and guidance had been set appropriately, they could have directed further development and minimised possible failure.

1.3.5 Urban Regeneration

The Libyan welfare system during the 1960s – kingdom time - was ranked among the most comprehensive in the world. Subsidised food, free services in education, health and housing facilities, plus utility services like electricity, water, and transportation, were all available at low prices to the poor which eased the lives of all citizens. The main consideration of the government's urbanisation plans during the 1960s was to accommodate its people and immigrants who could not afford to buy good quality housing. The government's responsibility was therefore, to start to build several social welfare housing areas with the help of foreign consultancy, local and international construction companies (Russo, 2004).

According to the United Nations Economic Commission for Africa (1966) the estimation for the average technical life of a dwelling is approximately 40 years: 50 years in cities and large towns, 33 years in medium-size towns, and 20 years in rural areas (Italian Consult, 1976). In Libya, it might had been considered that the quantitative need of the vast majority of the population during the 1960s would appear to have been met and most of the necessary supporting infrastructure provided, but the present requirement to replace or regenerate the housing stock, after almost 50 years since the time of building, is to be immense.

Also, previous international studies on Libya have indicated that by the year 2000, on average 41% of the 1960's housing stock in Libya would be in need of refurbishment or replacement (Finnmap Oy Consultants, 1981). In Benghazi, the 146,000 o housing units would have to be refurbished by the year 2000. Table 1.1 shows a summary of the estimated needs for the some major cities of Libya based on a study conducted by Italian Consult. The overall total number of dwelling units that Libya as whole would need to rehabilitate by the year 2000 is 1,200,000 (Italian Consult, 1976).

Table 1.1: Housing Needs by Planning Areas.

Region	Planning area	No. of standard dwelling unites 1973	Total dwelling units needed. 1985	2000
Benghazi	Tobruq	8.050	17.510	33.400
	G.Akhdr	27..170	54.840	101.400
	Benghazi	53.230	90.000	146.000
	Total	88.450	162.350	280.000
Tripoli	Misrath	37.150	67.490	152.000
	Tripoli	88.690	165.830	268.000
	Ez Zawiyh	30.210	58.160	115.400
	Total	156.050	291.480	535.400
Gheran	Tarhuna	9.060	15.170	24.800
	Gheian	15.710	30.670	48.000
	Nault	5.250	5.840	10.800
	Total	30.020	51.680	83.600
El- Khalij	Ejdabiah	6.540	19.160	45.000
	Sirt	2.920	28.830	84.000
	Total	9.460	47.990	129.000
Calanscio	Calanscio	3.340	23.330	46.000
	Total	3.340	23.330	46.000
Sabha	El Jufra	2.800	6.660	14.000
	North Sabha	12.770	23.510	63.200
	South Sabha	10.390	18.000	48.000
	Total	25.960	48.170	125.200
	Grand total	**313.280**	**625.000**	**1.200.000**

Source: Italian Consult (1981).

Against the previously mentioned background of the Libyan urban social housing stock, it would be desirable for the shortage of replacing or rehabilitating the housing stock in Libya to be covered by regeneration policies and urban design guidance, designed to be more actively concerned with the development of housing environments reflecting the essence of the Libyan way of life and Islamic architectural traditions.

1.4. The Lack of Urban Design Guidance in Libyan Urban Regeneration:

1.4.1. The Crisis of Lack of Guidance

Urban poverty has become an emerging problem for Libya. The economic and political instability in Libya since the First of September military coup in 1969 put

the country into a position of urban poverty and decline. In the recent history of Libyan urbanisation, unstable political changes are considered to be the main factor profoundly affecting the evolution of the built environment (Bukamur, 1985). The instability caused by political changes has had negative consequences on the planning policies and the physical planning of Libya in general. Since these political changes, the country has used various different, inconsistent types of physical framework, in which urban design did not take place in an adequate context.

In 2006, after almost 30 years of neglecting social housing, the Libyan planning authorities started to address these issues and to review its policy profiles, by implementing physical regeneration plans and starting to take steps toward improving the standards in deprived areas in more structured way. The government approach was to work on a large scale to rehabilitate these deprived areas. The rehabilitation project area held up to 14 neighbourhoods, and occupied a total of almost 15% of the overall area of Benghazi, with almost 20% of the population.[1] The government approach to tackling deprived areas, called 'Urban Rehabilitation Projects for Deprived Areas', has caught on since 2006 and is now spreading all over the country. Those projects were commissioned by the central government without supplying adequate design guidance to control the quality of outcomes from process.
At the time of the military coup, the majority of problems were due to the fact that regulations, planning and housing services had little regulatory structure and had started to be withdrawn. Consequently, the social housing areas started to deteriorate rapidly as a result of the weak, remote and central urban planning approach. Adequate urban planning became a key issue. The role of urban planning and design was often in indirect conflict with the political ambition and instability. Through the 1980s and after the mentioned withdrawal of an adequate planning system, local authority social housing started to decline and became negatively associated with conditions of mismanagement, decay and deep-rooted social problems.
In 2006, tackling these problems of deterioration and decline in social housing areas was seen by the Libyan central government and their consultants as a way to fight

[1] These data were collected when the author contracted with the Benghazi planning authority to conduct an urban regeneration design project in two deprived areas in 2007.

ugly urban sprawl and slums, however they focused only on tackling the physical problems, and their plans were not supported by appropriate urban design guidance. The planning authority commenced these projects which have been awarded to local architectural practices. The local practices' approach to a project was mainly based on designing new master plans without any supporting research documents or guidance. The government approach and practice of urban design remains by far underdeveloped, despite the international progress in the field, for example in the UK. The inherited defects of the traditional planning approach led to an inefficient outcome to tackle social inclusion and consequently, to an unsatisfactory urban environment.

1.4.2. Lack of Socio- Cultural Identity

Many theoretical and practical examples of cultural identity basis for urban design guidance have been used around the world (Bianchini and Parkinson, 1993). The consideration of culture in urban design guidance in the UK for example is increasing, and is related to an increase in the understanding of the links between culture and more conventional techniques (Wansborough and Mageeana, 2000).

In Libya, after the fall of the Ottoman Empire, the last Islamic state (Khelafa in Arabic), the existing planning rules were replaced by new building and planning rules imposed by the colonial administration, which still exist and create conflict between the communists and their built environment (Ben-Hamouche, 2009). These new rules were alien, full of ambiguity and did not respond to Libyan needs, failing to provide solutions as to how to progress Benghazi's urban form to fit a modern age while at the same time preserving cultural identity and social aspects.

Ignorance of the local socio-cultural dimension in the current Libyan national plan, the Third Generation national plan, would result in a failure similar to what happened in the previous ones. This need for adopting the social-cultural dimension was stressed by Mr. Bashir Azlitni, the head of the national generation plan for Al Khalij region, "At present many plans have not worked out mainly because they did not properly consider the local conditions needs. Consequently if urban environments are indeed an expression of culture, it is necessary for any planner and designer to understand the culture

of the people for whom he is planning and designing as well as their various local conditions" (Azlitni,2005,p. 7).

1.4.3. The Lack of Urban Design Expertise

Despite the Libyan government's enthusiasm to take on major housing projects in the 1960s, their plans were hindered by the widespread shortage of manpower, both skilled and unskilled. Similarly, the planning authorities were suffering from a shortage of skilled urban planners and designers in both the private and public sectors.

At the time of gaining independence, and as consequence of the war, the Libyan population in the 1960s was 4 million (60's census), and Libya suffered from low work force and a shortage of skilled professions. Therefore, the Libyan government had to overcome this shortage by relying on foreign workers. Both skilled and unskilled workers, most of them from nearby Arab countries, and foreign western consultation firms, were the life line of the building boom during the 1960s and 1970s (www.mongabay.com).

As for skilled professional works during this period, the United Nation's figures from 1968 show that there were only 12 architects and 10 engineers in the Ministry of housing, and 20 architects and 19 engineers in the ministry of public works (United Nations Mission for Housing in Libya, 1969).

The majority of the foreign and even local expatriates were following international and western concepts, which were widely distributed throughout the construction projects. Different building codes (British, Egyptian, Yugoslavian, USA and many more) were being imported and adopted for the design and execution of all housing projects (Awotona, 1990). Both then and now, legislation and planning policies were and are insufficient to ensure that foreign and local expertise would respect the socio-cultural dimension of Libyan society.

In addition, in the 40 years since the 1969 military coup, the emigration of large numbers of skilled Libyan professionals out of Libya has risen due to political instability, which has added more burdens on the building sector situation. Furthermore, often, qualified Libyans cannot contribute as a result of political nationalisation laws that hinder their efforts to found large construction and consultation firms that could tackle sensitive and large projects. Also, the phenomenon of corruption that has spread in the Libyan construction sector has resulted in profoundly negative effects which usually lead to poor quality outcomes and incomplete projects, in addition to marginalising good quality and authentic expertise (Business Monitor International, 2009).

1.5. The Need for a Socio-Cultural Approach in Libyan Urban Design

Social culture is a crucial element of the urban fabric and public realm, as its spaces, streets and squares all help to create the identity of a city, and aid economic and social success. In order to ensure a healthy and meaningful regeneration process, socio-cultural concepts should be embodied in the urban design process, through understanding the urban morphology and linking it with the community's social and cultural values and principles.

It should also be mentioned, regarding the administrative side and planning establishments, that the adoption of a socio-cultural approach to urban design by various authorities is successfully spreading around the world. In UK for example, the 'Administration of Urban Planning and Community and Rural Development' stated that one of the techniques that have been used as a tool for urban development in recent years is that of a socio-cultural process. This is viewed as a means of restoring and improving the quality of urban life through the enhancement and development of the unique characteristics of a place and its people (Wansborough and Mageeana, 2000).

To improve the understanding of how this can be achieved in practice, it is necessary to study the theoretical relationship between the social culture and the built

environment in order to make the involvement of urban design professionals more effective. The following paragraphs will demonstrate the meaning of the socio-cultural element in this thesis and its ideological base, and will briefly describe the modern Libyan layout and its conflict with the local social culture. Additionally, the socio-cultural concepts and urban form used within the thesis will be further enhanced and understood throughout the literature and analytical chapters.

1.5.1. Socio-Cultural Definition and Ideology Base in this Thesis

It is important to begin by defining the term of socio-culture as used in this study. The socio-cultural element used in this research is seen as a more complex body, a process as well as a result, a way of urban lifestyle as well as a product, a form of urban texture, form and feeling as well as people's daily customs of consumption (Montgomery, 1990). "there is the 'social' definition of culture, in which culture is a description of a particular way of life, which expresses certain meanings and values not only in art and learning, but also in institutions and ordinary behaviour" (Williams,1961, p. 57).

Most general urban design theories are in some way related to the social process that occurs in the spatial form of the city. In the west, for example, the humanist movement's school of thought seeks to enhance this relation. The humanist position is not as clearly and systematically formulated as the functionalist. Rather, it is a collection of intentions, techniques, and design ideas offered by a different group of thinkers. It emerged in the 1950s and 1960s, not as a new theory but as a reaction to the unsatisfactory results of functionalist thinking and design. Humanists have been more interested in discovering the links between social processes and spatial form, as they seek to understand and improve the existing and underlying social relations and structures in the built form (Wayne and Logan, 1989).

On the spatial design side, the humanist pioneer, Webber has been one of the strongest advocates in encouraging planners to form a greater awareness of the social process. He stresses the importance of shaping spatial forms that respond to the social process and leave the traditional planning approach. Humanist choices are

based on individual needs and relations rather than on planning concepts. The humanist urban designer pays attention to socio-cultural elements and informal ordering systems. Moreover, the humanist designer supports the mixed use of the urban environment. Whereas functionalist streets are principally for automobiles, humanist streets are "domesticated" or localised, and become places for people (Wayne and Logan, 1989).

Recently in the Islamic world, an emerging Islamic urban planning and design school of thought is taking shape. This school of thought is not yet clearly defined, but it has very deep historical and religious roots. The principles that most of the pioneering scholars of this ideological urban movement are striving for, are for Islamic planning principles to be restored and updated by international and western ideas and techniques, thus taking advantage of the vast worldwide urban planning knowledge and experience, in order to fine tune the practicality and success of implementing these principles in the 21st century modern Islamic world. Famous pioneers and scholars of this school are investigating the old urban fabric from a socio-cultural and religious perspective such as (Akbar, 1981; Hakim, 1999; Ben-Hamouche, 2009) and many others are trying to formulate an Islamic urban planning and design theory to be implemented in the Muslim built environment (Hakim, 2008). Both the Humanist and Islamic concepts will form the ideological base of this study of the Benghazi urban fabric, the former focusing on the individual relation to the urban environment through the socio-cultural relations of localities, which are defined by the latter.

1.5.2. Modern Urban Layout in Libya

One of the main features of the deprived social housing areas in Libya is that the design process has followed international concepts which might contradict with the socio-cultural values of Libyan society in those deprived areas, as they are mostly based on imported designs stemming from other countries' experiences, without any modification to suit the local character of Libyan society (Bukamur, 1985).

In Libya, since the 1960's, public housing projects have tended to spread widely in terms of constructing dwellings and new neighbourhoods. Many of these dwellings

and neighbourhoods lack the historic morphology root and urban characteristics of Islamic Arabic architecture. They neither reflect the traditional Islamic planning concept, which stresses the idea of close interrelation between the various aspects of life, nor the Islamic concern for privacy in the residential quarters (Bukamur, 1985).

The design of mass housing blocks was stimulated by industrial western theories and was based on zoning percentage and codes. Thus, the morphology of these urban areas is not integrated with the Libyan human scale and its needs. However at the time in which they were built the Libyan urban authorities viewed the components of urban areas as functionality zones rather than the mix use concept which suits the human scale and needs.

Azlitni (2005) describes the current conflict between the modern planning standards and the local cultural and social needs in Libya "They [The approved housing and community facilities planning standards] concentrate on quantitative rather than qualitative needs…. such planning standards have helped break down the strong social fabric and relations which have existed in the past" (Azlitni, 2005, p. 3)

1.5.3. Conflicts between Modern Urban Layout and Socio-Cultural Needs

People in Libya are, subconsciously, strongly guided by rules of conduct based on Islamic socio-cultural values. This occurs all over the Islamic world, where the old wisdom and rules of planning and building are in the mind-set of the way in which the public shape their built environment. Mustapha Ben-Hamouche stated, when commenting on this phenomenon, "…old rules often continue to exist in these countries as an informal practice, and often away from the official administrative machine, a fact that has led to a state of legal ambivalence in most of these countries" (Ben-Hamouche, 2009, p. 32). Hence, despite the colonial planning system, the role of old Libyan Islamic planning ideology has often continued to exist through informal practice and without the control of the central planning authority.

Libyan socio-cultural and economic dimensions have changed for many reasons. The shift from a traditional economy, based on small scale trading, farming and animals,

to the more complex 21st century age of economical, educational, health and service provisions, has had a profound and irreversible effect on Libyan society. It is therefore not logical to argue that it is right to impose the old Libyan Islamic planning systems as they were 100 years ago on the Libya of the 21st century, but it is logical to take the main principles and values of the old understandings and update them to suit the recent context.

With regard to the aforementioned, this research attempts to integrate two important elements, the socio-cultural and urban form. Understanding the socio-cultural process in the Libyan built environment will be further explored in Chapter 2.

1.6. The Application of Typo-Morphological Approach in Libyan Urban Design

Typo-Morphological studies describe the physical form of the urban fabric and explain the production of human settlements. The human settlement is the basic element of the urbanization process. In its physical expression, it represents the culmination of planning, design and development activities. It expresses both needs and resources. Typo-Morphological approaches manifest how the built environment is made by classifying analytically the elements which structure the physical form of the urban fabric over the course of history, to include streets, blocks, plots, buildings and open spaces, etc. Typo-Morphological approaches are helpful to environmental and social design research because they provide a conceptual framework for understanding the dynamic dimension of our built environment (Moudon, 1997).

Typo-Morphological analysis approach has remained a technique mainly associated with the historical study of urban form. With the emergence of urban design in Europe and North America during the late 20th century, and through the influence of the widespread architectural theorists such as (Rossi, 1984; Krier, 1990; Rowe and Koetter, 1984) urban morphological studies began to emerge in mainstream urban design and planning practice. Drawing on the concepts of urban type and plan-analysis as a synthesis of form and meaning, expressing the close link between the

physical character of urban form, its historical development and its social functions, this thesis will use Typo-Morphological analysis, employed in combination with socio–cultural background, to understand which urban form better suits Libyan neighbourhood communities. Typo-Morphology theory and analysis will be further explored in the literature and methodology chapters (see Chapter 3 and Chapter 4).

1.7. Research Focus and Question

This thesis focuses on social housing regeneration in the Benghazi, Libya context. There are two reasons that drive this focus. First, housing regeneration projects in Benghazi are led solely by the local planning authority of Benghazi city and are carried out on a large scale, although the work has paused during the revolution period. Second, the author of the thesis has practical work experience in these projects as a leading member of the team responsible for developing the Master Plan for one of the social housing regeneration areas in Benghazi. This experience has enriched both the problem identification process (e.g. no guidance, no planning polices) and the proposed guidance that links local socio-cultural and urban forms to fill the total absence of regeneration guidance for deprived social housing in the Benghazi planning system.

The research focuses on two main problems in the Libyan context that were identified by the background provided previously, and the thesis author's field work experience:

First, contemporary development of social housing does not respond to local socio-cultural needs,

Second, the current planning system is not able to deliver guidance effectively for design.

In response to these problems, the following research question has been set:

How can urban design guidance respond to local social-cultural needs in adherence with typo-morphology elements, for use in Benghazi, Libya?

Building on the identified problems and derived research question, this thesis explores the link between Libyan social-cultural norms and urban form to establish an analytical framework. The application of this framework to the Libyan context is a new step forward from the current situation.

1.8. Research Objectives

Previous research studies have suggested and proved that, despite many attempts to improve the housing quality individually, the failure to involve the socio-cultural dimension in the overall urban regeneration plan with clear aims and objectives has "failed to substantially alter the geography of poverty" (Orford *et al.*, 2002, p. 34). If urban regeneration projects in Libya are to improve, the method requires a comprehensive approach involving all levels of regeneration stakeholders and integration. The practical benefits of integrating the socio-cultural dimensions of urban design in the overall regeneration process are further explored throughout this study. The benefits can be seen on both physical and social levels of the built environment, thus justifying the important need for a socio-cultural approach to urban design.

In Benghazi Muslim society there are many other benefits that a socio-cultural approach could draw, such as helping to create better social relations within and between communities that stand for the values of their cultural principles, by implementing the Islamic building law's measures of the built environment inside these areas. Socio-cultural improvements through urban design will help reduce local feelings of alienation and exclusion caused by the effects of globalisation in the urban form. Local people should have the chance to live in harmony within a built environment that does not contradict their socio-cultural values. Harvey (1993) promotes that urban design is a tool to ease the transition between managerialism and entrepreneurialism in urban governance.

Regarding planning governance and urban design in general, governments and planning authorities in many countries have clearly adopted the implementation of the socio-cultural concept within their wider strategies. It is possible to identify the cultural and economic shifts which have served to legitimise the wider role for culture and the specific reasons for the greater use of socio-cultural strategies by local governments as a means of city development and regeneration (Bassett, 1993).

This study argues that the adoption of the Typo-Morphology approach driven by local socio-cultural norms will result in a more effective approach to regeneration projects in Benghazi and will add positively to the concept of urban design, highlighting its crucial role in the process of regeneration in the Libyan planning system. This requires the concept of urban design to be driven from an understanding of the urban form in both physical and socio-cultural dimensions. The study will conclude with findings and recommendations for future regeneration projects which can act as a guide for all design professionals, and urban planning policy-makers in Benghazi, Libya.

To conclude, this study will produce a vehicle for guidance in urban regeneration which takes into consideration the socio-cultural aspect of Libyan communities, in order to contribute to the overall regeneration process. Thus, the study promotes the use of urban design guidance based on a socio-cultural and Typo-Morphology approach, to act as one of the tools for benchmarking rehabilitation projects in Libya. This is done through introducing a group of urban design analysis tools, techniques, and elements that can be practically implemented in the Libyan built environment. The study can be perceived as a vehicle to assist planners, policy makers, urban designers, and urban consultants, in achieving the main aspects of regeneration projects from improving social inclusion, economic growth, and physical appearance, to sustainability.

1.9. Thesis Organisation

The structure of the thesis is divided into seven chapters; introduction; literature review of social-cultural norms drivers of urban form, literature review of the typo-morphological approach to urban form; methodology; descriptive analysis of the chosen case studies; exploring the link between socio-cultural values and urban form in Benghazi, and guidance and findings. Chapter one introduces the subject to be examined in the thesis, urban planning system and urban regeneration in Libya, the crisis in urban design guidance in Libya and the need for a socio-cultural urban design approach in Libyan projects, coupled with a brief introduction to the Typo-Morphological approach, and also outlines the approach and structure of the thesis. Chapters two and three provide the core of the literature review for the thesis study. Chapter two focuses on Libyan society and urban life for the individual as well as the principles of Islamic building law, as an essential norm in urban structure and socio-cultural life, and an additional focus on the physical side of these norms. Chapter three discusses the crucial urban Typo-Morphological theories in the urban form to provide the physical frame work – Typo-Morphological elements - for the thesis analysis. Chapter four details the research methodology of analysis in the context by the previous two chapters. This is followed by chapter five which includes the descriptive analysis of the three cases: the two old historic quarters and the deprived modern neighbourhood. This chapter introduces the case studies of the thesis as well as the general urban characteristics of Benghazi, including a discussion of the urban development of the city. Chapters six, seven, and eight explore the link between socio-cultural values and urban form in Benghazi. These chapters contain the main body of thesis data and an analysis of the research, which seeks to understand the relationship between the socio-cultural values and the urban fabric of the Benghazi built environment and measure how each case study performs against these values. Furthermore, they explore the transformations of the Typo-Morphological elements as a result of modern urbanisation. Finally, chapter nine consists of the conclusions, which will be presented as urban design guidance outlines, detailing findings and suggestions for future urban regeneration and development projects for Benghazi's built environment.

Chapter 2:
Socio-Cultural Norms as Drivers of Urban Form

Chapter 2: Socio-Cultural Norms as Drivers of Urban Form

2.1. Introduction

The methodology of this study is designed as a platform on which to base policies to improve the quality of life in impoverished communities and to find out "what is good for people". Understanding what is good for people in spatial terms, requires an understanding of their socio–cultural relation with the urban form. The genuine city or quarter contains manners and signs which indicate an environment constructed for its users (Webber, 1963). The study methodology is based on developing an understanding that societal aspects of a community may lead to a certain outcome in the built environment. To do so, it is necessary to develop an approach regarding the mode of spatial social experience. The methodological approach of this study seeks to construct a practical interpretation to the link between socio-cultural elements and the physical Typo-Morphology of an urban quarter or neighbourhood. To do so, it is necessary to develop a method which includes both the social and physical urban form. Thus, this section will cover the socio-cultural norms which are the drivers behind Libyan communities. Section 2 will then illustrate the theory of Typo-Morphology in order to produce the thesis methodology of urban form analysis for the case studies.

2.2. Neighbourhood analysis based on the individual social bonds

Recent urban regeneration debates are driven by the socio-cultural aspects of neighbourhoods, which leads to the conclusion that the individual human as a source of social relationship has a point of importance. (Olson, 1982) arrived at an understanding that socio-spatial urban studies should not only consider social groups as the main components of neighbourhoods, but should place significant importance on the individual relations distributed throughout the neighbourhood. This led to the identification of spatially "personal/ individual neighbourhoods" as the common form of social interactions in well urbanized environments (Olson, 1982).

Many researchers have pointed out that the loss of neighbourhood social life locally may have a negative effect on quality of life locally. Researchers such as Fischer support the argument that the absence of community interactions at the

neighbourhood level may not create psychological problems as long as an individual can seek sources of interactions elsewhere (Talen and Shah, 2007). Other researchers such as O'Brien and Ayidiya (1991) conclude that, although an individual might find social interaction beyond his or her own neighbourhood, the individual's quality of life will be considerably affected by the extent to which he or she experiences neighbourhood community social interactions.

Hunter (1979) proposed that the inherent emotion in the 'personal relationships of proximity and the common fate of shared space' defines a social bond among residents. This social interaction is the core essence of the neighbourhood, and it transforms physical space into a social bond. Other important studies about the social dimensions of neighbourhoods include Warren's (1978) neighbourhood typology which is based on three dimensions of social organization: first, the level of individual characteristics with the local facilities, second the level of social interaction between families and close neighbours, and finally, the level of interaction between the neighbourhood and the larger neighbourhood area. This section of the study of the socio-cultural relations of the Libyan/ Muslim society will be driven by these three levels.

2.3. Libyan Society's Socio-Cultural Relations/ Interactions in the Light of Urban Space and Inner Social Bonds

The idea of socio-cultural bonds/interaction is one of the driving forces behind much of the research on the logic of neighbourhood socio-cultural cohesion, which is commonly conceptualised as the source that is understood through social relationships (Coleman, 1988; Leventhal and Brooks-Gunn, 2000). For the Libyan Arab Muslim community, Islam plays an important role in shaping most of those socio-cultural bonds and components.

'Socio-cultural relations' here refers to the activities in which the individual engages, such as daily visits to the Mosque, the market and schools, in addition to informal visiting and the social networks which residents develop in their neighbourhood. The

social life of Benghazi's old neighbourhoods is based on good levels of interactions between neighbours. Next-door-neighbours enjoy a certain level of respect for one another and a there exists a certain type of social obligation to offer help when it is needed. While female interactions with their neighbours mostly take place inside their house-plots, male interactions take place in different ways and places, for example, gathering in the mosque or meeting in the streets and the market. The following section will attempt to categorise the socio-cultural relations and values for the individual within the neighbourhood boundary. These relations will form the basis for analysis of the urban Typo-Morphology of the case studies.

2.3.1. The Individual's Relation to the Mosque in Terms of Urban Facilities

Islam is a very private religion bonding the Muslim with God and requiring the Muslim standards of behaviour and attitude set out in the Quran and clarified in the Prophet Mohammad's sayings and actions. In the Muslim holy script, the Quran, the verse clearly states the importance of performing daily prayers. Islam stresses that congregational prayers should be performed in Mosques especially in Friday prayer and the Mosque (Masjeed in Arabic) is the basis and cornerstone of Muslim society. It is the place where believers congregate. It is the physical centre where individuals, neighbours and passers-by congregate to perform their daily prayers and get to know each other, engaging in a variety of socio-cultural activities.

The Mosque plays an extremely important role in a Muslim's life. In terms of the urban form, the neighbourhood Mosque is a uniting element in the socio-cultural relationships between community members. The role of the Mosque as a centre of urban communities' socio-cultural activities will be revisited in later paragraphs.

2.3.2. The Individual's Relation to the Family in Terms of Urban Facilities

Family is the core cell for the Libyan Muslim communities and neighbourhoods. One of the most remarkable features of Muslim society is the importance attached to the family. The family unit is regarded as the cornerstone of a healthy and balanced society, with mothers and fathers acting as guardians for this unit. Unlike in other

individual-centred cultures, policy makers in Islamic society emphasise and regard the family as the core around which to centre their policies. In terms of urban design, this relation falls within the plot context, and will be excluded from the morphological study of the research.

2.3.3. The Individual's Relation to the Extended Family in Terms of Urban Facilities

The traditional Muslim family is extended, often including three or more generations. An extended structure offers many advantages, including stability, coherence, and physical and psychological support, particularly in times of need. In term of urban space, the relations mentioned above can be seen in some cul-de–sacs, and within the block context of the Ottoman and Italian quarters.

2.3.4. The Individual's Relation to Neighbours in Terms of Urban Facilities

The Prophet Mohamed (peace be upon him) said: "He is not a believer who eats his fill while his neighbour beside him is hungry" and "He does not believe whose neighbours are not safe from his injurious conduct". Neighbours in Islam have right by Islamic law. One of the most important elements of doing well to your neighbour is that you do not intrude into their privacy. For example, having your wall or roof in higher position, in a way that overlooks your neighbour's courtyard is considered illegal by the Islamic law. In addition, one of the important rights given to neighbours in Islamic law is the right to buy for a fair price from your neighbour if it is on the market, as well as the right to sell a piece of land from your house, as long it does not harm your neighbour's access or house structure. Furthermore, the law grants the right to connect your properties on both sides of the alley (Harah in Arabic), in semi-private streets by a bridge (Sabat in Arabic) as long as you are causing no harm to the neighbour and there can be free public movement under the bridge.

2.3.5. The Individual's Relation to the Neighbourhood in Terms of Urban Facilities

This bond will usually strengthen through the daily walk to mosque, market street or other neighbourhood facilities such as schools and community centres. The social relations mentioned above reflect the neighbourhood needs from which spatial requirements should be developed. These relations, in term of urban space, would not be understood clearly unless they are linked to the Islamic law and the Islamic building law. The following paragraphs will demonstrate a brief introduction of the Islamic law, Islamic building law, and the main drivers which shape the urban form.

2.4. The Perception of Religion in Libyan Society and the Role of Islamic Building Law

In the conciseness of Libyan society people's lives are dictated and driven by Islamic law (Shari'a in Arabic). Shari'a gives individuals a sense of responsibility and engagement in the development and operation of that society. The conurbations of Islam for Libyan society reflect the traditional socio-cultural life of the people within them. These socio–cultural traditions spatially defined Libyan communities and the way in which people carried out their activities in the surrounding building environment. The socio-cultural traditions are not only performed within buildings but also in the associated urban spaces around them. These urban spaces and buildings were the setting for socialising, trading, and leisure, as well as religious or cultural assembly. The buildings and urban spaces not only provided assembly areas but also represented the society's needs (Lockerbie, 2010). The following paragraphs will illustrate briefly the main socio-cultural norms of the Islamic urban form through stating the role of the main Islamic (Shari'a) law drivers of the building environment.

2.4.1. Islamic Law (Shari'a) and the Islamic Building Law (Figah El-Bina'a)

Islamic law is perceived as a reflection of faith rather than just a comprehensive set of legal prescriptions. Thus, it is necessary to understand some of the main principles and logics behind the Islamic law, illustrated as follows:

In Islam, there are two primary sources of Shari'a : The first source is the holy Qur'an which is the main source of Shari'a, and the second source is Suna'a which essentially refers to aspects of the daily life of the prophet Mohamed (peace upon him) as reflected in his sayings, works, acts and tacit approvals.

In addition to these primary sources of Shari'a, jurisprudence (Figah) is considered to be the third source of Shari'a. Figah is defined containing the opinion of Muslim scholars and professional expertise of jurists on particular issues on which neither the Qur'an nor the Suna'a provide exact reference. Judgements (Figah) usually come from a group of unique research and facts of analogy on relevant issues. Jurisprudence (Figah) takes into consideration certain supplementary references to understand Shari'a. For example, people's customs (Urf) on certain issues that do not contradict with any Shari'a law are adopted by Figah rule. Urf is the unprecedented judgment motivated by society's interest and customs, which neither the Qur'an nor Suna'a refers to, as long it does not contradict with Shari'a law (Cushmen and Myers, 1999).

In the Muslim world, before colonial times and the adoption of civil secular laws, people where ruled by Shari'a – Islamic law- which regulated and organised their daily life. Among these laws come Figah El-Bina'a – The jurisprudence and understanding of the Islamic built environment- to support people in organising the relationship of their built environment with each other and within their neighbourhoods and communities.

This Figah law was established to protect property partners and neighbours from harming each other, and comes under the umbrella of the main Shari'a law of the Prophet Mohamed (peace upon him) in regulating neighbouring relationships in the built environment said "No harm and no causing of harm"(Ben-Hamouche, 2009).

In Libya, despite the Italian colonial administrative, and the 1969-2011 secular, governments, old Figah rules often have continued to exist as an informal practice, and away from the central planning authority control. Libyan people are

subconsciously strongly guided by the rules of conduct that are based on Figah El-Bina'a. This fact is seen all over the Islamic world, where old wisdom, as encapsulated in the rules of Figah, are in the mind-set of the public's way of shaping their built environment. To summarise, Figah El-Bina'a is viewed as the branch of the Shari'a that organises the built environment and most importantly the built relation among neighbours, the components of which are briefly described in the following paragraphs.

2.4.2. Islamic Building Law (Figah El-Bin'a) and its Components in Terms of the Built Environment:

2.4.2.1. The Neighbour's Rights According to Islamic Laws (Figah El-Bin'a) within the Libyan Built Environment and its Effect on The Block / Plot Diversity

In the old quarter urban blocks of Benghazi, like other Islamic urban blocks in the Muslim world; urban blocks go through phases or changes in the regularity of their plots and blocks shapes. It is difficult to find blocks that contain regular segmented of plots in any of the Benghazi old town urban fabric. The subdivision of the block into plots followed socio-cultural rules dictated by the form of inter-locked plots and irregularity (AL-Naim, 2006).

The socio-cultural mechanism behind the internal shaping of Islamic urban blocks is predominately a reflection of paying/partially paying or selling/partially selling plots, as a result of inheritance or growth of wealth (AL-Naim, 2006). The mechanism would not be part of the life cycle of the Islamic urban morphology unless it was backed and regulated by Shari'a Islamic law, specifically, in Figah El-Bina'a Islamic jurisprudence of building. The following scenario offers an example to explain how this mechanism or life cycle of Benghazi old town blocks took place. When a family becomes an extended family through the marriage of the son or daughter and creation of a new family, or when the father dies, the plot is divided, according to the proportion of Shari'a inheritance law, into small plots. This means that there is a life cycle for the houses in old town communities. The large plots were divided until they

became very small, then they might be re-connected or completely re-integrated as one large plot (AL-Naim, 2006).

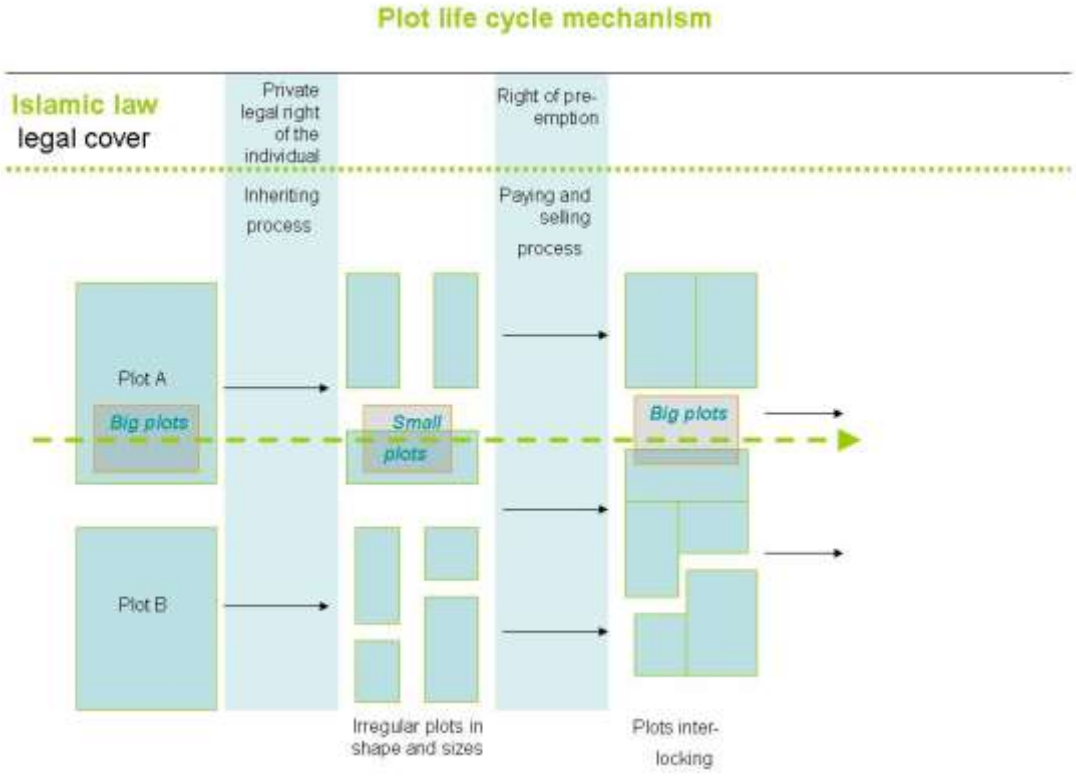


Figure 2.1: The Effect of Neighbours Rights according to the Islamic Building Laws (Figah El-Bina'a) on the Block Life Cycle Mechanism and Plot Diversity in Shape and Size. *Source:* By Author**.**

The life cycle mechanism would maintain the block's social identity and cohesion of the community, as it allows flexibility to reflect the social needs and changes of its inhabitants. It keeps the community members of the block within the block for as long a period as possible of their life. The mechanism supports solidarity, and supplies the neighbours - as one social group - with substance to maintain their own values, within the same location. This contrasts with the modern blocks of Benghazi where a family have to relocate to another area when the family expands or shrinks.

By conducting an investigation into the reasons behind this freedom of block/ plot diversity in shape and size within the block, we find that within Figah El –Bina'a there are Shari'a Islamic-based rights that regulate the selling and buying rights

among neighbours and especially adjacent wall-to-wall (contiguous) neighbours. These rights are mostly divided into buying and selling rights, and construction rights related to walls for prevention of overlooking.

2.4.2.1.1. Private Legal Right of the Individual (Wilaya Khassa)

Wilaya Khassa in Arabic is the Shari'a right of a person to act on his/her property, without having to seek permission of the ruler or any outside authority. In term of the built environment, the impact of this right has empowered property owners with a large margin of freedom of action to benefit from shaping their own properties. One of this right's implications is that it indicates that property owners could sell even part of their land or property, like a room for example, to an adjacent neighbour. Consequently this gives plots of land an element of diversity in their shape and size by shrinking and expanding and forming inter-locking shapes (Ben-Hamouche, 2009).

This freedom empowered by Shari'a law also has boundaries and constraints which come from the main Shari'a law: "No harm and no causing to harm", and also "Allah is beautiful and likes beauty", and can be summarised in the following:

- Prevention of overlooking into private and inner areas in other people's plots.
- Prevention of damage or causing harm to others, especially for neighbours and pedestrians. However, in a very few cases there might be a need to tolerate lesser damage in order to avoid a greater one.
- All plots should be accessible from streets or cul-de-sacs.
- Older established facts must be taken on board by adjusting to their presence and conditions
- Communities' customs (Urf) must be respected as long as they do not conflict with other people's rights or Islamic values and Shari'a. However, taking into account that time might change these customs, new solutions will be needed

- Prevention of visual harm, by avoding ugly property facades and seeking harmony in the architectural style of neighbourhoods.

Returning people's legal power regarding their plots of land is a step far beyond the concept of public liaison. The public liaison concept is based on consultation and is not legally binding, while Wilaya Khassa gives people their legal rights and power to make a balance between dwellers and the planning authorities (Ben-Hamouche, 2009).

2.4.2.1.2. Right of Pre-Emption (Shufaa)

Shufaa gives the right of priority to associates, co-owners, or neighbours to buy, over other buyers, at fair prices. For example if someone sold a plot or part of it without the knowledge of his neighbour, especially the adjacent wall-to-wall neighbour, the prospective neighbour buyer or associate has the right to redress through courts (Ben-Hamouche, 2009).

There are great implications of the Shufaa right on the block form of old towns. The implications can be seen in inertial relationship between the plots on both the physical layout and the social cohesion of the blocks and neighbourhood in general. One of its physical consequences is the re-unifying of fragmented or subdivided property or plots. Over the course of time, this would lead to both the expanding of some shares and the shrinking of others which could gradually cause their disappearances.

By having the two previously mentioned laws, (Figah El-Bina'a) Islamic building law gives associate neighbours and relatives of an inherited plot their freedom to sell and buy small pieces of their plots as long as it does not harm their neighbour in specific and the public in general. This is considered to be one of the main drivers of the life cycle of Islamic town urban blocks. Thus, it helps in keeping the social cohesion that is based on blood relationship more strengthened.

In addition, the mechanisms of these rights have been successful to a great extent in binding communities around the value of their social relationships. This relationship will have developed and grown over a long period of time, which means the whole urban form is based on social relationships rather than income classification. In Benghazi, most of the modern 1960's areas are planned on the concept of the zoning system, which usually results in differentiating between residential areas based on income classification. It is hard to find small and big plots in these areas located side by side in the same block or even the same neighbourhood.

However, in the old quarter, a variety of small and large plots are found adjacent to one other. The plain face of the block makes it hard to distinguish between the large and small plots behind. Thus, another positive element of the physical morphology of these blocks is in housing the rich and poor in the same block under the umbrella of social relationship, enhanced by the plain face. Usually, small physical indications can indicate the income status of the house owner, for example the main door or entrance, which can be decorated in different styles to reflect the wealth of the family. However, it is still hard to know the size or the boundary of the plot behind these doors.

2.4.2.2. The Role of People's Customs (Urf) in the Islamic Libyan Building Environment

Figah is not just applied to Muslim Arab societies that share the same cultural values, but is also interpreted differently in Muslim societies from different cultures. These different interpretations are researched by various Muslim schools of jurisprudence (Mazhab in Arabic). There are four schools of Islamic Shari'a law, known as Maliki's, Hanafi's, Sahafi's and Hanabali's, each with a local origin whose customs and practices have influenced its (Figah) jurisprudence (Cushmen and Myers, 1999).

Mazhab is not a distinct sect in Islam, instead it is a general school of interpretation or Figah (jurisprudence) made up of people who follow the founders' way of interpretation. For example, Maliki Mazhab is the applied Figah in Libya; however,

in regard to the building environment there are no major differences among the four Mazhabs.

Mazhab provides the legal base to Urf (local customs) as long as it does not contradict with the principle of Shari'a (Islamic law). Urf (customs) could give the planning authorities the Islamic legal rights to intervene on planning issues that are not resolved or found in Shari'a. Hence, the Shari'a law that are fixed are very few and most deal with preserving the right of people on their property and preventing harm among neighbours and people in general.

People's customs (Urf) are changeable according to location and time variables. An example of the location dimension of Urf can be seen in Ghadames. Ghadames is located at the edge of the Sahara Desert, close to the Libyan-Algerian border, and is an ancient city of Berber ethnicity (non-Arab) of the Sahara. Ghadames is the oldest habitable town in the entire Sub-Sahara with historic routes that go back to the Palaeolithic period (UNESCO World Heritage Site, 2010).

Ghadames had its own culture long before Islam arrived. After Islam spread many cultural and social elements (i.e. Urf) that do not contradict with Shari'a laws were preserved through Figah (jurisprudence). One of these elements is the rooftops of the city, which act like another city street network with complete open streets and lanes. This network was and still is exclusively used by women, to move from one house to another and from one neighbourhood to the other (see Figure 2.2). Hence, there are no requirements of this segregation, nor does it contradict with Shari'a, and these practices are still approved and empowered by the local custom (Urf).

Figure 2.2: In Ghadames Women use Special Streets Built above the Roof. *Source:* Temehu.

Another example is the extent to which a building's facade or internal walls are decorated, which varies among different communities in the Islamic world. For instance, the rich Islamic Ottoman buildings in Egypt are different from the plain Ottoman buildings in Libya. Shari'a does stand clearly against excessive decoration, but this depends on how people interpret excessive and vulgar in their Urf (custom). Hence for example, having a decoration or painting in a house in Libya with a cost of USD 2,000 is not perceived as too extravagant, on the other hand this cost could be viewed as un-Islamic and a waste of money in neighbouring countries like Sudan (see Figure 2.3).

Figure 2.3: Richly Decorated Facade from the Ottoman Empire, which can be found in Egypt and other parts of rich regions in the empire. *Source:* Tourslibya.com

Figure2.4: Libyan Simple Plain Faced Walls in Some Parts of Ghadames. *Source:* Temehu.

An example of how Urf can vary depending on different time dimensions is exemplified in the addition of new building types to the urban environment of Libya. Recently, during the last 20 years, wedding halls have emerged rapidly all over Libyan cities and towns. Before that period it was unaccepted to have a wedding in a rented hall and instead, families celebrated at the groom's family house. The Urf (custom) has changed, and nowadays the custom is for people to have wedding parties in rented wedding halls (facilities).

Urf within its legal framework of empowerment and Figah of certain Mazhab, act as preservation mechanisms for many local cultural elements, and for different Muslim communities across the many Islamic lands.

2.4.2.3. Visual Protection and Privacy

The house in Islam is quite clearly defined as a sanctuary oasis for individuals and families. This notion demonstrates the key to understanding the planning of Islamic towns. Privacy in Muslim societies is considered to be one of the most important elements contributed by Islam to the structure of the city. It is important to highlight, however, that the element of privacy is not only to create physically distinct characteristic regions, but to create protected regions. Thus, Islamic building law

regulates the position of windows, the heights of adjoining buildings and the joint responsibilities of neighbours toward one another so as to protect visual privacy. Similarly, within the dwelling the idea is to segregate public from private space so to preserve the privacy rule (Saleh, 1998).

To sustain the privacy rule, the Maliki jurists cite the legal Shari'a law term of "No Harm and not causing harm". The law was applied as a means of arbitrating socio-spatial and behavioural disputes arising from concerns relating to privacy, the seriousness of visual and auditory space, and proximity to spaces of noise, smell, sight and odours (Kahera and Benmira, 1998).

The previously mentioned clause of "No Harm and not causing harm" in Shari'a law, can be conceived in the context of benefit or detriment to an individual. In this sense, harm is what one individual benefits from at the expense of another, such as changing a "pre-existing" residential property to a "new" factory with noise or sewage which will harm adjacent parties. Causing harm, on the other hand, refers to an action that harms without benefiting the acting party, such as opening a "new" (unnecessary) window to gaze into a neighbour's enclosures, thereby breaching their privacy. The rather more rigid segregation between commercial and residential quarters in the classic Islamic city has been attributed to the need to separate private from public space. Such segregation certainly did have important effects on the urban form (Saleh, 1998).

2.4.2.4. Waqaf

Waqaf refers to the private Muslim charitable perpetuity, a Muslim not-for-profit institution similar to the modern Non-Governmental Organisations (NGOs). This institution has been involved in the sustainability of the social and economic development of society, operating in a fully independent and self-sustaining manner in handling various projects of social and economic import (Sabit, 2004).

The word Waqaf is used in Islam with the meaning of "holding certain property and preserving it for confined benefit of certain philanthropy and prohibiting any used on

disposition of its outside that specific objective so as to seek the pleasure of Allah" (Sabit, 2004, p. 2).

Over time, Waqaf have developed and maintained a significant role in urban regeneration, especially in funding the social and economic aspects of deprived areas to help poor and distressed communities. (Sabit, 2004). This system has different types of socio-spatial implementations that contribute to welfare facilities of localities like school mosques, small shops for the poor, urban street elements like water taps or even resting places for pedestrians.

Waqaf has helped governments to reduce their burden in deprived areas, in fact the contribution of Waqaf funds to sustaining the national economy is now substantial (Sabit, 2004). Bringing the Waqaf system into the mainstream of regeneration, via urban morphology analysis to be embedded in the urban design, will certainly have important effects on the urban form. The location of Waqaf facilities on the general plan and street network of the urban fabric is an important element of this study and will be examined in various chapters and sections throughout the thesis.

2.4.2.5. Mosques

Mosques have constituted a dominant core social hub in Islamic societies and neighbourhoods during centuries of Islamic faith. Mosques in Islamic countries play a significant role in the urban fabric, where they are situated at the heart of the neighbourhood's social life. Traditionally, mosques act as a core to the market place, and are usually surrounded by other public social facilities such as libraries and other community centres. In addition, Mosques provide a strong landmark that give neighbourhoods an identity and character (Azab, 1997). This study will place a special emphasis on Mosques as the main generator for communities' cohesion and will consider them to be one of the main urban elements in the urban form process.

2.4.2.6. Market Street (Souk)

Street markets (Souk in Arabic) in Muslim communities were historically considered the second urban spaces to be established after the Mosque. This principle dates back to the time of Prophet Muhammad, when he funded the first Islamic state and the Mosque and then the market were the first places to be built (Azab, 1997). The market place is an essential part of any urban form, and there is debate over where it should be located to gain optimum benefit to serve the local communities and give opportunity to attract a wider market.

Chapter 3:
The Typo-Morphological Approach to Urban Form

Chapter 3: The Typo-Morphological Approach to Urban Form

3.1. Introduction

Before the 20th century, the production of built form was mostly an indigenous matter. Most cities across the world were producing built forms rendered to suit their unique and local building contexts. Urbanism was fairly homogeneous to serve its local context better (Komorowski, 2006). During the 20th century, Modernism conquered the building environment. The concept of cultural local identity in urban design has gained considerable strength during the last decades. Moreover, urban design ideologies have gained ground as planning strategies have been introduced, and the historic town has become the model for the conversion of cities (Lillebye, 2001).

The concept of local identity in urban design addresses the indigenous urban form both socially and spatially in regard to its local context. Efforts to guide place making toward better quality have been achieved by localising the urban form. Hence, theories have merged, advocating the advantage of using indigenous design structure in order to bring better standards of urbanism. In urban design literature there are several broad perspectives through which urban design theory is understood. There are several theories, such as the form-based design theory, functional theory, visual theory, perceptual theory, social theory and temporal theory. These theories often overlap and can share many characteristics (Carmona *et al.*, 2010).

Carmona *et al.* (2010) points out that the form-based theory is known for promoting more focus on the continuity of the social and cultural context of localities. Typo-Morphology is merged within form-based sub-theories, and is known for its firm/strong focus on cultural continuity in the transformation of urban forms over time. Typo-Morphology has emerged from both Typo and Morphology concepts. Both of these theories have developed practical methods to enable research studies analysing the built environment and to help in designing new spaces within a local socio-cultural context. Typo-Morphology is perceived as a very important theory in

preserving local urban form and supporting its continuity when there is new development (Carmona *et al.*, 2010). In the Libyan co-capital Benghazi, the global form was implemented during its expansion in the last decades. These contemporary expansions lack the main fundamental elements that shape the traditional local urban form of the city. The traditional urban form elements were harmonised with the socio-cultural context of the urban environment.

The aim of this chapter is to introduce Typo-Morphological elements in order to create a tool to analyse the case study of Benghazi city, Libya. The Typo-Morphology theory and its methods are used in this research to help preserve the socio-cultural life and individuality of Benghazi's urban form and to enhance its continuity in new developments. In order to do so, this chapter firstly defines and explores both theories of typo and morphology through their schools of thought and scholars/proponents. Secondly, it will familiarize and illustrate the research of the analytical urban form elements to understand their features within the social context. The Typo-Morphological elements which are produced will be justified by the previously introduced socio-cultural norms of Libya in Chapter 2.

3.2. Typology

Typology is seen by many as a theory for comparative study of physical characteristics or other features of the built environment into distinct types. In the following discussions, the historical conversion of type and typology concepts since the period of the Enlightenment will be illustrated according to their three phases of development, based on historical and methodological explanations. The first concept was developed within the rationalist philosophy of the Enlightenment, the second relates to the Modernist architectural movement, and the third emerged after 1960s Neo-Rationalism (Güney, 2007). This discussion aims to bring to light the significance of the concepts of type and typology that are important for architectural intellectual history and enrich the understanding of the socio-cultural dimension. Also, the use of type and typology promotes analytical methods, which can help to recognize and understand the basic urban types, and enhance our analytical ability to

notice the variations and similarities among urban objects by shedding light on the unseen relations among them. Thus, in this study, the aim of using Typology is to assist in enhancing our understanding of urban form within its historical conversion and socio-cultural contexts.

3.2.1. Definition of "type"

In the philosophy and psychology of observation, 'typos' gains a meaning similar to that of 'model' in describing a set of essential physiognomies that present a group of tangible individual meanings related to the type. It could be understood that the meaning of type suggests a configuration or a model in which something is made (Vallas, 1973). This understanding is reflected in the definition of type "by which something is symbolized or figured, anything having a symbolical signification, a symbol, or emblem" (Webster's College Dictionary, 1997).

The concept of type gained significance in the period of the Enlightenment during the eighteenth century. During this period, the intellectuals of the Enlightenment were inspired by Newton's revolution in physics that led them to endorse the application of systematic logic in all forms of human activities. Within the context of the built environment, the first typological attempt developed out of the rationalist philosophy of the Enlightenment and can be traced back to the French art writer and archaeologist Quatrèmère de Quincy in his work Encyclopédie (1825). Quatrèmère de Quincy's definition of type is as follows: "The word "type" presents less the image of a thing to copy or imitate completely than the idea of an element which ought itself to serve as the rule for a model" (Quatrèmère de Quincy, 1825, as translated by Vidler, 1977, p. 148). Quatrèmère's reflection on the elaboration of type was presented by Vidler (1977, p. 148) as "all the degrees of moral imitation, imitation by analogy, by intellectual relationships, by application of principles, by appropriation of manners (styles), combinations, reasons, systems, etc.". Since then, the result of this writing has been significant and has developed an intellectual debate in the architectural field during the twentieth century (Güney, 2007).

Lavin (1992, p. 61) interpreted and reflected upon Quatrèmẻre's concept of type by linking its use to the conversion of architectural components as an object made by humans - "type used to express an abstract notion of the historical urban form context, continuity in architecture produced by men". Also, Bandini (1981, p. 109) emphasised the cultural depth that type provides in understanding the built environment "Type is a constant, it is recognisable in all architecture, and it is also a cultural element". With regard to the concept of typo in rationalism, the theorist Abbe Laugier in 1753 was one of the first to apply rationalism in design principles. He considered the origin of architecture to be the 'primitive hut', and categorised its structure into elements which consisted of post, beams, and the pediment roof. He regarded these elements to be the most indispensable ones for any building (Güney, 2007).

However, within modernist architecture, the concept of type experienced a loss of significance; the idea of type was reduced to the notion of labelling. Gregotti, an Italian architectural historian underlined the concept of type changing into stereotype "a production oriented model becomes anti-specific and universally applicable and scientifically based" (Gregotti, 1985, as cited in Güney, 2007, p. 9). In Gregotti's opinion, type has become a mass industrial product model which is based on scientific ideas, but requires a symbolic quality. The concept of type in the Modernist era of/during the 20thcentury could be seen in Moneo's perception of type which was categorised into three major themes: functional determinism, the rejection of precedents in support of pure forms, and the concept of prototype against mass production. He defined the prototype as rationality, fictionalization, and a design guidance tool. The norm of the first theme is mainly based on the concept of functionalism which reflects the consequential relation between function and form. This was exceptionally symbolized by Durand when he argued that functionalism abandoned the past as a source of form framework knowledge, despite this knowledge being the most significant element in the form-making process, and thus the concept of type became obsolete (Güney, 2007).

However, during the 1950s many considered that the concept of type and typology was re-introduced and gained significance, as could be seen in Aldo Rossi's (1984) book "The Architecture of the City". The author has rejected functionalism as a primary determinant of form because of its lack of ability to clarify the persistence of certain forms despite functional changes. The concept of type focuses on the symbolic dimension through which type provides local collective memory (Rossi, 1984). The notion of type was re-introduced during the Neo-rationalist period of the 1960s, and was seen as a reflection against the loss of identity in Modernism, which was widely spread all over the world. The main criticism against Modernism spread as a result of over Functionalism and the admiration for sophisticated new building technology which led to the separation between the physical form and its human dimension. The Neo-rationalist movement was considered to be a genuine return to the European traditional urban form with its ideal quality of the built environment (Chen, 2009).

To conclude, typological views and methods have two requirements / make two assumptions regarding the concept of type: first, the ability to identify and discover basic types and secondly, the ability to understand complex relations. This way of thinking might actually be instrumental in the production of a more useful and logical way of exploring differences by matching them in a scale and identifying the unseen relations between them within the architectural discourse.

3.2.2. The Benefit of Typology in Urban Design

Since Quatrèmère de Quincy's introduction of type in the 18th century, building typology has been a leading model that has provided designers with working methods. Typology was used by architects to enable them to sustain a useful distinction between different kinds of types of functions such as the mosque, theatre, museum, or house, and types of forms such as the mosques domes, minaret, basilica, atrium, or pyramid. Typology represents the rule of appropriation that shows the dynamic interchange between form and function. The relationship between both types of forms and functions can be seen in the dynamic interaction between the dome of the mosque and of the atrium of the office, which is a relatively natural

relationship. Moreover, typology induces cultural depth of building typologies which are evidently related to particular socio-cultural gathering places. In particular, typology has persevered and still is used because of its feature as a generative tool which can be used to rationally visualize new building forms (Güney, 2007).

The following discussion will demonstrate the benefit of using typology in this research, demonstrated by the socio-cultural context, historical continuity and generative tool.

3.2.2.1. Socio-Cultural Context

"Type" relation to culture was originally confronted in the field of religion by referring to the study of symbolic illustration of scripture types. Typology in paleoethnology referred to the logic of sets that are defined through the unity determined by the recurrence of a particular cultural type. In psychology and sociology the idyllic types are studied as a focal point in the ordering rules of exploration on multiform in socio-cultural groups of type. During the mid-twentieth century, typological study became an essential way of thinking, providing a common ground of communication between physical logic and socio-cultural sciences which is largely dependent on typological references (Hebbert, 2005).

The concept of 'Type" as the structural principle of form specifies certain logic and rules, which can be understood by local communities. It establishes a unique identity significant to the culture and resilient to alien forms (Jencks, 1991). For example, the mosque minaret is a cultural indication of Muslim communities in a given region. The minaret's symbolic "type" is a strong cultural sign that is embodied in every Muslim village, town, and city around the world. Hence, "type" provides a language that presents specific meanings through substantial symbolic signs, containing certain structural elements that form its perception dimension.

The latest Neo-Rationalist development regarding the significance of type emphasises the relationship between the typological elements as parts and as a whole within the space syntax approach. Recently, in the late twentieth century, the concept of space syntax methodology developed in relation to the notions of "genotype" and

"phenotype" which emerged from the discipline of biology and this is applied in social sciences in general, specifically in architecture (Hillier, 1974). Genotype is defined as abstract relational models controlling the arrangement of spaces. Genotype is the fundamental managing principle of phenotypes which are authentic realizations of genotypes in a different physical setting (Güney, 2007). By observing the syntax aspects of phenotypes, it is possible to disclose the underlying genotype that is shared by the phenotypes examined. Space syntax theory proposes that genotypes are reproductions of not only the spatial arrangement but also of the notions of social and cultural patterns. Hillier (1996) considers the spatial configuration as concise aspects of design that are problematic to talk about because architects have what he called "unconscious social knowledge" when designing in general. Thus, Hillier's (1996) views about the aim of space syntax are described as an inquiry into this "unconscious configurationally basis of social knowledge".

Therefore, "type" is essential for socio-cultural design diminishing local feelings of alienation and exclusion caused by the effects of modern globalization. Design based on "type" is being used as a tool to ease the transformation of socio-cultural meaning and expression in urban forms (Bianchini and Parkinson, 1993). In this thesis, the use of "type" concept provides the ability to actively understand, match, or even imitate socially and culturally constructed meanings of a given urban fabric.

3.2.2.2 Historical Cultural Continuity

Since the twentieth century, the re-introducion of the concept of "Type" has made it possible for the local cultural context to continue through its symbolism which is resistant to the modernist global phenomena of urban form. In the mid-1980s, the discussion of the concept of "type" by theorists and practitioners of architectural typology of the postmodern considered it to be a modus for restoring historical continuity in the city. Quatrèmere's distinction of "type" was re-introduced into the Italian debate in 1963 by Argan, who assessed the interaction between the "architect's working processes" and their historical conditions and concluded that "when a "type" is determined in the practice or theory of architecture, it already has an existence as an answer to a complex of ideological, religious or practical demands

which arise in a given historical condition.". Argan's type focus enables the examination to be constant, giving well-defined types within its specific historical context and he identified the significant feature of type as a mean "which contains the possibility of infinite formal variation" (Argan. 1963, p. 565).

Typological scholars like Rossi have implemented "Tipo" as an elaborating method of typology and analogy for type that can be operated through historical memory. Rossi's aim was to transmit the historical socio-cultural meaning from its original context to a new environment (Seungkoo, 2003). Rossi has described the city as an object that attributes its own history. These objects leave traces of their history and embody the memory of the city. Rossi referred to these objects as a 'permanence', in which the urban artefacts preserve the history of the city urban form (Rossi, 1984).

'Tipo" is seen as an employing method for preserving the historical memory within its contextual meaning, and as a starting point for generating architectural structure rich with meaning and potential understanding, reading, and replying of the building environment (Rossi, 1984). What is important in Rossi's concept of "type" is that he gave a concrete method of reading the city fragments over the course of history, through type's dual oppositions: part and whole, specific place and global, and history and present (Seungkoo, 2003). The use of oppositions helps to highlight the relationships between different "type" of forms and memory, which was perceived as an analogical process (Moneo *et al.*, 1985). In this research, the notion of type significance in restoring historical memory will be beneficial in extracting the features of the traditional urban form in Benghazi which better served the cultural and social needs of the locals. In addition, the part to whole relation and the comparative method of the use of opposition will be used as a way to distinguish and understand the features and characteristics between objects and urban elements.

3.2.2.3. Generative Tool

One of the significant aspects of the notion of type is the generative feature through which the understanding and classification of the familiarities and differences between various features within the gargantuan world of type are generated. The concept of type considers logical presumptions that help to compartmentalize the phenomena, and to locate them in groups based on their commonalities. This classification enables diversity to turn into unity, which at the same time enables us to generate types based on reasoning and knowledge. Franck and Schneekloth (1994, p. 9) in their book "Ordering Space: Types in Architecture and Design" explored the meaning of type based on the generative feature that "type" provides: "types and ways of typing are used to produce and reproduce the material world and to give meaning to our place in it".

Rob Krier (1988) in his book "Architectural Composition" illustrated a visual graphical method to analyse traditional urban form by focusing on the reproduction process. His concept is to gain an overview of the visual characteristics of an existing urban fabric as a foundation for design manuals needed to plan new developments. In order to do so, Krier has applied the classification process of architectural forms themed to elaborate detailed sets of groupings.

Rossi argues that the source of forms for architecture comes from the accumulation of forms that shape the city. Thus, the city becomes a resource pool of reserved types, and the generator of the typologies whose elements are to be extracted from the urban fabric. Rossi's viewpoint in seeing type as a source of forms emphasises the significance of the universal over the particular, collective over individual, where the individual and the particular are the keys to reaching the collective and the universal which was a key aspect in his logic (Güney, 2007).

Among the Neo-Rationalists, Reichlin stipulated a more positivist view on the modernist idea of type in his writing " Type and Traditional of the Modern" in which he presented his understanding of the famous modernist architect Le Corbusier's concept of type to promote a successful design tool that balances and meets the needs

of different modes of architectural types. The Neo-Rationalists proposed types by presenting them as a generative tool for the extension of traditional towns that would not lead to a great disorder. Moreover, they proposed that designers must understand the associated causes, the attribution, and the conditioning interaction among the various types in order to create quality places (Reichlin, 1985). In this thesis type concept is utilised for its feature as a generative tool that acquires its elements from the quarry of the city as source of knowledge.

In addition to the above benefits of "type", other benefits are explored by researchers, for example, ecological sustainability benefits that result from adopting traditional forms that are usually very robust and have a form which has been modified in accordance with the local people, to respond to the specific weather, environmental conditions, and topographical context (Pitts, 2004).

The above illustrates the advantages of adopting the concept of type and ascertains its primary position as a strong philosophy in urban design practice, its rich logic being used as a base for many architectural design projects and theories. In this sense, many urban design schools have developed their theories upon the notion of "type" and its characteristics. Among those theories, are the three main western urban design schools, the Italian School, British School, and in the last fifty years, the Typo-Morphological School. The following paragraphs will describe these three schools which are crucial to the development of the theoretical framework of this thesis. The socio-cultural dimension of these schools will be a principle focus in developing the analytical methods used within the thesis and the Typo-Morphological elements.

3.3. Italian Typological School

One of the very early research studies based on the Neo-Rationalist concept of type is Muratori's analysis of the urban fabric of Venice in his assessment for the 'Urban History of Venice' (1959), in which he presented the typological analysis. The historic typological analysis of Venice was conducted during a four-year period

(1950-54). This project presented the re-production in a modern version of the sides of Venice lagoon, which encompasses three significant periods of Venice's urban history. He introduced the concept of type as a proper structure in which it is central to specify the continuity among the city's different scales. Muratori explained Venice's historical development as an idea which related the individual elements as parts with the city form as whole. In addition he made an inner architectural comparison between selected urban quarters from different historical periods (Figure 3.1) in order to use types as the generators of the city form by including the individual elements that defined all other urban form scales (Moneo, 1978). Muratori's methodology of planning through phases has been applied in his first work at urban expansion plans to the house quarters of Magliana, Rome. Therefore, Muratori's typological approach of Venice, via different historical phases of urban form analysis, and the approach of Magliana via urban expansion, founded what is known as the Italian Urban School for Typology (Sima and Zhang, 2009).

Figure 3.1 Muratori's Comparison between Venice's Historical Quarter, in 11-12th, 14th, 16th Centuries, and 1950. *Source:* Sima and Zhang (2009)

One of the main characteristics of the Italian school of typology was the use of urban history as a foundation for restoring the sense of continuity in the urban environment. Many regard Muratori's work as a response to the architectural environment crisis during the 1950s when the dominant idea among the Italian architects assumed that one could operate in the city with great effectiveness in remoteness from the local urban form phenomena (Sima and Zhang, 2009).

According to Muratori, urban design and urban planning theory during the first half of the twentieth century have systematically failed to be cultural responsive and have alienated the historical roots of the urban form. In Muratori's opinion, planning and design have become technical devices, which had led increasingly to an impoverishment of the urban design discipline. Muratori's aim was to construct a theoretical framework that would enlighten the creation of urban form and its historical transformation through particular aspects that depend on specific Italian architectural contexts. On this basis, he stressed that setting this theoretical framework is the only way for understanding and reproduction, which could re-establish the role of urban design (Sima and Zhang, 2009).

In addition, the cultural paradigm coupled with Muratori's high intellectual interest enhanced his knowledge of modern architecture and helped in preparing a series of articles on architectural European projects for the Architecture magazine. The first articles during 1944-46 were published, after his passing, by Guido Marinucci and showed Muratori's views of towns as living organisms and as collective works of art. These articles also showed evidence of his concept and his views on the importance of the continuity of built culture and place in planning new buildings. Furthermore, they present the first suggestions of the idea of "operative history", which was later deeply explained and defined in his books on Venice (Sima and Zhang, 2009).

Muratori was also involved in a serious of practical projects which gave him good opportunities to implement his views and theory on real projects. In his early projects in 1937, he presented a model of Rome's Imperial Square at the Universal Exposition. Muratori's projects on the composition of Italian squares were characterised by an experimental interest as he focused on major urban themes in which the surrounding environment is the used as a basis for the framework of the square and buildings adjacent to it. In these projects Muratori was closely involved in the most significant periods of Italian architectural history: Romanesque in Pisa, the Gothic in Bologna, the Renaissance, and the Baroque in Rome. This enhanced his ability to explore style and the complications of the built environment associated with the modern fundamental building techniques that introduced new materials,

such as reinforced concrete. Many researchers who have studied the legacy of Muratori have cited these experiences as the reason for his dissatisfaction of the conceptual gap between the urban plans of whole quarters and those of the individual works of architecture. Based on this, he profoundly concluded that architectural works were poorly connected to the complexity and originality of the urban plan and that they should follow the functions of their urban form which developed during the course of history (Pinho and Oliveira, 2009).

Muratori established a great understanding of the importance of the city's cultural and historical context which he gained from his experience of old Roman districts. During the years of post-war reconstruction, Muratori was indisputably involved in the housebuilding plans of the Instituto Nazionale delle Assicurazioni (INA), which were commenced in 1948 and implemented in all major Italian towns. In this regard he was responsible as a team leader for certain Roman districts, such as Tuscolano, where the town planning and building approach were influenced by the contemporary Scandinavian empiricism. During this period Muratori had the chance to get involved in planning four major public buildings: two churches, one office building, and a headquarters office for a political party, in three different Italian towns. This gave him a deep understanding of the crucial links between the cultural and historical context of the urban fabric, as well as the chance to implement his theory practically. In this work he was able to observe the first urban surveys of the city's core and the theoretical assumptions of his early theoretical articles. His method of doing this was by using the fundamental concepts of type, fabric, organism and operative history. Upon this he wrote "Studi per una operante storia urbana di Venezia", in English: "Study of operative urban history of Venice", which was considered a profound extension of his theory's intellectual framework (Pinho and Oliveira, 2009).

In 1954 Muratori moved to Rome where he became a professor of Architectural Composition. In teaching, he embodied his concept of urban elements as the architectural organism. The main teaching focus was to consider the spatial arrangement of the urban form as the generator of the compositional and structure

plan; hence his students were required to design buildings with highly coherent spatial representations. Upon Muratori's themes of urban fabric, organism, and territory, a number of research studies were conducted by his teaching assistants, such as Marinucci, and the two Bollatis who helped Muratori with his book on Rome. Other assistants had the opportunity to put the typological method into practice while examining Ethiopia in 1964 where 22 towns had to be planned. 12 of them interpreting Ethiopian historical territorial urban formation provided the conceptual base to the process of formulating individual town plans. The Ethiopian experience was preserved in a single synoptic chart labelled as a classic Muratorian procedure that was described in a series of articles by Muratori's student Alesandro Gianninia (Güney, 2007).

3.3.1. Cannigia

After the death of Muratori in 1973, his assistant Gianfranco Caniggia adopted his professor's practice by spreading the Muratori's typology concept in urban form and promoting his conjectural method. Caniggia's work conceptualised the city's urban formalisation as a consistent dynamic typology of procedures, which stands on the typological evaluation of the urban organism (Caniggia and Maffei, 2001). Caniggia's main concern was to transmit Muratori's views and concept in architectural terms which were hindered by Muratori's comprehension thoughts. Therefore, the aim was to reduce and simplify the theoretical part by placing a greater emphasis on the operative aspects. For this reason, he placed high significance on the concepts and terms of "type", "building fabric" and more importantly "basic building", which he considered to shape the matrix of specialized building (Cataldi, Maffei, and Vaccaro 2002).

Caniggia was appointed to teach in Reggio and then Genoa and Florence. In the last two towns he developed a method of research in his planning courses, in which he introduced a structured methodology for the interpretation of towns and their constituents. Thus, his teaching experience helped him in publishing his views in a number of articles like the "Composizione architettonica e tipologia edilizia", in four volumes. The first two volumes published with Gian Luigi Maffei's were on the

interpretation and design of “basic building” (Hillier, 1996), a manual used in many architectural courses and successfully translated to other European language such English, French and Spanish (Güney, 2005a). The last two volumes “Ragionamenti di tipologia” were on the interpretation and design of ‘special building’ that was drafted at the time of his death. After Caniggia’s death, his rich intellectual studies were integrated and distributed by Gian Maffei, his apprentice and closest assistant. As a successor of Caniggia’ tradition, Maffei’s books on Florentine and Roman houses, referred undoubtedly to the methodological approach and contents of Caniggia@s last writings (Güney, 2007).

3.3.2. Conclusion and Outcomes:

Following the discussion of the Muratorian approach, his main focus was on the dynamic of urban form formalisation at the moment of its origin, which is highly significant to provincial culture in order to ensure typological continuity. His main shaping elements were based on the structural territory of human achievements through the built form and the need for social correspondence to a unit of measure related to human scale in the proportion of spaces (Cataldi, Maffei, and Vaccaro 2002).

Caniggia expressed his concept of interconnected components in the re-production process of typology as elementary matrices with complex origins that are mainly based on history and typology. Caniggia’s interpretation model is based on the re-production of towns through formalisation transformation processes. The model introduced by Cannigia is based considerably on conversions, in other words, on the formalisation process of the successive contexts of urban phenomena in time. That is why his approach emphasised the observation of the existing relationships between history and typology. Also, in his model he placed a particular emphasis on “organism” at every level with structure scale of human settlements, from the building to the neighbourhood and finally the territory through the city (Caniggia and Maffei, 2001).

Despite the fact that both Murtori and Caniggia's interpretations of typology were mainly related to buildings, the scholars often included the urban scale in their models, which is evident in some of Caniggia's definition of building types: "an urban fabric is the concept of the coexistence of several buildings existing in the minds of builders before the act of buildings, at the level of spontaneous consciousness, as a civil result of the experience of putting together several buildings and summing up all interesting aspects, including aggregation"(Caniggia and Maffei, 2001, p. 119) (see Figure 3.2)

Figure 3.2: Model of the Phases of the Formalisation Transformation Processes in Rome's Urban Fabric. *Source:* Caniggia and Maffei (2001)

All in all, the Typology philosophy in this research could be defined as a recovering method of the codification of the built production through typological approach, which constitutes the structural basis to the previously perceived historical laws of the production of urban space. In general the Typology approach characteristics and features could be perceived by the following: Scaling the urban structure; Components, such as basic buildings and special buildings; Historical typological transformation; Cultural and social contexts; Scaling and relations between organism components, building, neighbourhood, territory and the city.

3.4. The British Morphology School

From the British School perspective, the study of urban form is often referred to as urban morphology, characterised by a number of different approaches. Urban morphology analyses the position of urban landscape and town development with concerns to its geographic discipline derivation. The main body of this section will illustrate the features and the analytical methods and tools that urban morphology theory can deliver through exploring its key eras and its scholars' conceptualised ideas and contributions, with a particular focus on the work of the pioneer scholar Conzen whose work is referred to as The Conzenian tradition.

3.4.1. German Origin

The start of urban morphology is traced back to German origin in the geographic discipline in 1880s, where the first professional geographers conducted research studies in the area of human geography. The thread of those studies was mainly concentrated on two questions of where urban places are located and the causes of their locations. One of the pioneers of this first generation was Friedrich Ratzel whose influence in his methodology of writing was on locations and causes relation at that period 'The geographical location of large cities' (Hofmeister, 2004). Ratzel's main concern was to reach an understanding of the causes of founding urban spaces on their particular location and more vitally, to know the motives for growth provided by those locations; on this basis, Ratzel introduced the concept of 'Quality of spaces' term (Hofmeister, 2004).

The second wave of urban morphology investigation was considered by many to be traced back to two publications of the Germany geographer, Otto Schulter, in 1899, that focused on the layout of towns. He introduced the concept of 'morphology of the cultural landscape' and 'object shaping the earth's surface'. The works of Schulter were particularly vital in influencing the recent Conzenian British urban morphology school, which will be the focus of the following paragraphs. In the same vein, Walter Geilser (1924) in his book 'The German town: a contribution to morphology of the cultural landscape' gave first suggestions to the importance of studying the urban

form of urban location rather than the traditional descriptive approach that dominated at that time. Another German contribution was made by Fritz (1894) reflected in extensive use of town plans for analysing the urban form, presented in his essays 'German towns' and 'the town plan, its development and geographical relevance'. At this period in Germany the town plan became a fundamental characteristic tool of scholars' studies and this facilitated the analysis of street patterns by paying special attention to the qualitative physical characteristics of those patterns, such as length, width, and direction of streets (Hofmeister, 2004). Therefore, the significance of the general town plan and street patterns will be further examined in the chosen Typo-Morphological analytical elements of this thesis.

3.4.2. The Conzenian Tradition

Conzen who is a British scholar of German origin was influenced by Schulter and his ideas on town planning. The main aspect of Conzen's work is his transformation of the concept of morphology to the English speaking world, enabling wider contribution from all over the world in which English is considered to be the first language of science (Whitehand, 2004). More importantly, Conzen was famously known for his critical scaling of urban landscapes, as he was considered to be the first to introduce a three scaling division of the urban form. The first division is the town plan or ground plan where analytical comparisons of the site, streets, plots and block plans of the buildings take place. The second division is the three dimensional form of building fabric. Finally the third division is the land and building use (Conzen, 1969).

In terms of theories and ideas, Conzen is known for developing the most important concepts in urban morphology in the second half of twentieth century. His concepts were driven by exploring what is behind the scene in urban town form, which was mainly influenced by the physical and socio- cultural and economic process. The burgage cycle and the fringe belt concepts constituted exploration methods of the town plan. Historically the burgages emerged during the medieval borough, and basically consisted of a house on a long narrow plot of land with the slim side facing the street. This strip of plots contains void and solid areas where the front or back

spaces were originally used as gardens or additional areas for out-buildings, shops, craft shops, stables, or even supplementary cottages. They were used for a variety of purposes, and helped in to improve business, providing a useful thoroughfare at the same time (Whitehand, 2007).

Whitehand (2007, p. 3) reflected on Conzen's view of the burgage cycle by defining it as: "The cycle, consisting of the progressive filling-in with buildings of the back land of burgages and terminating in the clearing of buildings and a period of 'urban fallow' prior to the commencement of a redevelopment cycle, is a particular variant of a more general phenomenon of building repletion where plots are subject to increasing pressure, often associated with changed functional requirements, in a growing urban area". The concept of burgages sequence and of plots attracted Conzen's attention, and subsequently the attention of other followers of his school of morphology. The focus of his attention was on the dimensions of these plots which can be subject to physical analysis, providing an important means of understanding the production process of the histories of plot boundaries (Lafrenz, 1988).

Conzen was able to restructure the development of plot patterns by concentrating on the formation process of plots and their series of historical layers. For example, using the Conzen method to analyse dimensions of plot widths in the British village of Ludlow, Slater (1990) was able to identify predictabilities and to mediate the original intentions of the medieval surveyor when the village was planned, and to assume the original plot widths and how they were subsequently subdivided into lots. From the analytical study of the burgages cycle, Conzen's approach was based on three morphological elements within the ground plan, the streets, plots and the block plans of the buildings. This method was adopted widely by many researchers for its practicality and applicability as a means of exploring and re-production of the urban form (Whitehand *et al*., 2009). Therefore, based on the significance that Conzen attached to the streets, plots, and lots as key analytical methods, this study will review and adopt them as appropriate analytical elements as will be mentioned later in Chapter 4 (Whitehand *et al*, 2009).

The fringe belt, the second concept which Conzen focused on, is concerned with exploring the relation between irregularity of plot dimensions and the city's growth at its boundaries. In his investigation of this relationship, he argued that there is a link between building sequence, land values, and improvement adoption. His argument conceptualised the formation of fringe belt to be related with slumps in house building when land prices were low, while the formation of high density housing seems to be predominate during periods of house building boom. Whitehand (2001, p. 105) reflected on the vibrant phenomena of the fringe belt concept and his attempt to link it with future speculations of the city growth form "These dynamics in combination with geographical obstacles to the uninterrupted outward growth of the built- up area, gave rise to an urban area in which residential growth zones alternated with fringe belts". The fringe belt notion established a new view of perceiving the urban landscape as a dynamic feature that changes according to different time periods, and is linked to distinct stages of economic and social changes, a perception which prevailed in Conzen's papers (Whitehand *et al*., 2009).

3.4.3. Conclusion and Outcomes

These concepts, the burgage cycle and the fringe belt, have related the theory of urban morphology with the significance of human action through certain stages and linked it with the physical context (Pinho and Oliveira, 2009). In addition, based on these concepts, many scholars, such as the originators of Urban Morphology Research Group UMRG in Birmingham, Whitehand and Larkham (1992), have emphasised the importance of studying the town's general ground plans for the re-production development of future forms with continuing physical and socio-cultural features being passed down to future generations of town development over the time period (Pinho and Oliveira, 2009). In general, the Morphology approach characteristics and features could be perceived by the following: Study the general plan for historical continuity in re-production; Study the general plan to explore the human action through stages within its social and physical context; Presenting a straightforward use of its morphological elements on three scales in analytical studies: the streets, and plots within the general plan, the block plans within the buildings, and the land and building use.

3.5. Typo-Morphological School

Until the mid-20th century the two schools, the Italian Typological School and the British Morphological School, developed their own theories separately. Their prominent founders Muratori and Conzen respectively established their concepts and approaches independently in different places. However, their theories and field of focus are similar and overlap to a great extent. Both philosophies have been seen by many scholars as corresponding to one other, as the two schools were considered to be applied synthetically to the advantage of urban design and planning studies, and to provide practical approaches to urban design and planning in wider context (Moudon, 1994). In addition, a third school, The Typo-Morphology School stemmed from both the Italian Typological School and the British Morphology School in the mid-20th century. One of the Typo-Morphological schools is the French School of Versailles which was founded by Philippe Panerai, Jean Castex, and Jean-Charles DePaule. This School is usually referred to as the French school of urban morphology (Panerai *et al.*, 2004). Typo-Morphology is often associated with scholars such as Moudon, Kropf, and Panerai. Moudon (1997) introduced Typo-Morphology as an emergent interdisciplinary urban research field in which she merged the existing British, Italian and French schools (Pinho and Oliveira, 2005).

The Typo-Morphology school has sparked the interest of each school of scholars to use each other's theories and approaches. This is similar to the Neo-rationalist Typology school development in which the influence of 1970s Krier's work has been pivotal in igniting a renewed awareness in the physical typological design and planning in the area of morphology. It also closely resembles the elaboration of the school of Morphology in which Larkham (2005) introduced a disciplinary approach that was supported by typological evidence.

Typical British morphology research focuses on discovering how cities are built and why, in order to establish an urban design theory. Typical Italian typology research focuses on the way cities and urban form should be constructed, in order to develop a city making concept. Finally, French Typo-Morphology research studies try to

explore the magnitudes of previous experiences of city making, specifically the urban development, with specific focus on the 19th and the 20th centuries.

Typo-Morphology's approach is distinguished from the spatial morphological one by its real world 'object' orientation (Moudon, 1992). This approach focuses mainly on the classification or 'typology' of open spaces and building types. Because building types characterise the basic structural elements of the city form, Moudon argued that types also allow the understanding of the socio-economic interactions activities within the city, and this approach of including the individual architectural types also permits methodical practical detailed analysis of change over time to take place (Moudon, 1986).

Typo-Morphological studies focus on both the physical spatial structure and social dimension of urban form. Moudon's views on Typo-Morphological studies and approaches were described when he stated: "Typo-Morphological studies reveal the physical and spatial structure of cities. They are typological and morphological because they describe urban form (morphology) based on comprehensive classifications of buildings and open spaces by type (typology). Typo-Morphology is the study of urban form derived from studies of typical spaces and structures" (Moudon, 1994, p. 289). Moudon's views have constituted a conceptualisation of the relationship between the physical and social aspect of space. She emphasised the prominence of the individual building types of urban spaces and the surrounding context to be studied together, for example, studying the relation between public building types and their related adjacent urban open space. Thus, buildings and their adjacent open spaces are seen as complimentary interconnecting elements of space which represent the 'urban fabric' that is made and used by their users (Moudon, 1994).

The Typo-Morphological approach reflects the engraved history in the urban form as it incorporates the social and cultural aspirations of the city where human actions take place. Typo-morphologists are interested in typologies of the dynamic relationships between the built form and urban space with a non-rigid outlook to

urban fabric in its time context. Hence, the time dimension is important for understanding the evolution of the physical space, and both are considered to be primary aspects of the General Ground Plan Analysis of the city growth (Vivek, 1990).

Typo-Morphological examination permits the conduct of analytical study of the architectural building and urban elements, such as walls, courtyards, local streets, street network, plots and blocks, in a more detailed way. Coupling the Typo-Morphology analytical approach with specific case studies will enable us to investigate the association between their physical form and their socio-cultural notions. Local streets for example are the areas of budding contact between next-door neighbours. The Typo-Morphological analysis will allow the investigation of the physical form of such areas of social exchange which encourage the natural interaction between people on local streets, and at the same time, do not interfere with the privacy of adjacent houses. This increases liveability and causes trust and social coherence between neighbours (Sola-Morales, 2004). As mentioned in Chapter 2, the primary focus of the socio-cultural norms in Libyan society is the energetic social interaction within a range of privacy levels. Therefore, the Typo-Morphological approach in this thesis will be customised in order to serve and reflect the above notion. In other words, the Typo-Morphological elements that will be illustrated in Chapter 4 are determined from the above discussion to optimise the balance between coherent social life and privacy in Benghazi neighbourhood.

The French School's studies of the urban form focus on the extensions and transformations of city growth, and favour the multi-disciplinary framework in discussing methods and philosophy of urban theories. Moudon (1994) reflects on the French Typo-Morphological views on the issue of urban form continuity: 'The French researchers do not associate issues of continuity or discontinuity in the built landscape with past and future. Since both states have existed in the past, both are likely to be possible in the future". Hence, the Ecole d'Architecture de Versailles believes that the present is not a total split from the past, and the past provides several models for the future. Their distinction from the Muratori Italian School is

seen mainly in their claim that city building types should be studied along with the history of design theories, and in a way that is not only operational, as Muratori claimed, but critical as well (Moudon, 1994). The French school has fragmented the critical history of design theories into two dimensions: first, the history of design theories through ideas, and second, the history of design theories as practised, thus it covers in depth both the conception and practical consequences for design theories (Moudon, 1994).

At the Ecole d'Architecture de Versailles studies conducted by Jean Castex , Philipee Panerai, and the anthropologist Jean-Charles Depaule ranged from distinct buildings to the whole city, which are considered to be one of the best Typo-Morphological works in France (Darin, 1998). Their approaches examine several periods of Versailles through different urban forms and housing types. Their analytical approach included a special focus on the urban block, which draws some deep views on the dynamic nature of the urban block throughout the course of history. The study shows how the urban block progressively goes through changes during different periods of time until it becomes dramatically transformed. Also, they established that their town was developed, not as whole, but as assortments of urban fragments. In addition, they linked design theories, time evolution, and block and plot changes, by underlining the novelty of the change that happened to their city, which was originally designed on the theory of 'Garden city of Enlightenment' and progressively became a 'Standard city', where the large plots occupied initially by separated mansions were converted through time to apartment blocks (Darin, 1998).

3.5.1. Conclusion and Outcomes

The three schools share a main essential dimension that is favoured in this research study: time, form, and scale where the urban form is under constant change and evolution history and subject to social and cultural forces and constraints (Moudon, 1994). Thus, Typo-Morphological analysis must be linked to its time measurement, and scale and socio-cultural notions. The built and open spaces constitute the urban form as they both define the urban fabric's use and function according to socio-cultural needs. This urban form is physically distinguished by several structural

scales and elements, for example the scale from dwelling plots to the city as whole, and the blocks and neighbourhoods in between (Komossa, 2009). This thesis advocates Typo-Morphological fundamentals to be developed and promoted from the marriage between architecture, history, and socio-cultural which operate through urban organizational and time scaling, and critically analyse them according to the socio-cultural dimension and norms.

In this thesis, stemming from the previous discussions, the Typo-Morphology approach characteristics and features could be perceived by the following; Relation between building types and related urban spaces on a scale; Sensitivity to history; Provide an outlook that a city is dynamic at any given point; Operational and critical study of building types; Dynamic of block and plot changes according to history and design theories; Generative type; Descriptive; Time scale.

3.6. Configurations of Streets Systems: Space Syntax and Multi Centrality Assessment, MCA.

The configuration of the street system of the city's physical form in urban morphology plays a significant role in understanding the relationship between different spaces or places of social interaction. It supports the concept that human activities and the community's social lives have a profound impact on the urban structure or spatial layout and vice versa (Jiang and Claramunt, 2002). Since the early 80s space syntax was introduced as a methodology of spatial analysis based on visible integration which focuses on the network of streets and movement. Space syntax has recently been subject to a wider understanding of spatial configuration and relation to the approaches of social norms and cognition (Porta, and Latora, 2008). In the area of urban morphology, two configuration systems with GIS-related approaches were recently developed: Ajax Space Syntax and Multi Centrality Assessment (MCA). In these two approaches movement is correlated to the morphological properties of the street network. The difference is that Ajax space syntax is based on cognitive axial maps, while MCA adopts the topological representations. Ajax Space Syntax was originally founded in the late 1970s to early

1980s by Bill Hillier, Julienne Hanson and colleagues at The Bartlett, University College London as a simulation graphical tool to help architects understand the likely social impacts of their designs. The second approach, MCA, was developed by the Human Space Lab at Politecnico of Milan and is more concerned with the sociological studies on centrality in networks, stemming much of its theoretical ground from the centrality concept. The centrality concept was developed by structural sociologists since the early 50s as a way to administer multi-dimensional challenges developed by human, economic, and institutional organisations. The concept of centrality was based on how each individual or organisation is interconnected to one other individual or organisation, according to their structural reference system, through quantitative measurements (Wasserman and Faust, 1994).

The MCA methodology bases its quantitative measurement on dividing the network structure into nodes and edges. In this regard it cultivates three main measures: the first one is called *centrality* degree C^d and counts how many edges each node has. The second, *closeness* centrality C^c, counts how close each node is to all the others. The third, *betweenness* centrality C^b, measures to what extent each node is traversed by shortest routes that link each couple of nodes (Porta and Latora, 2008).

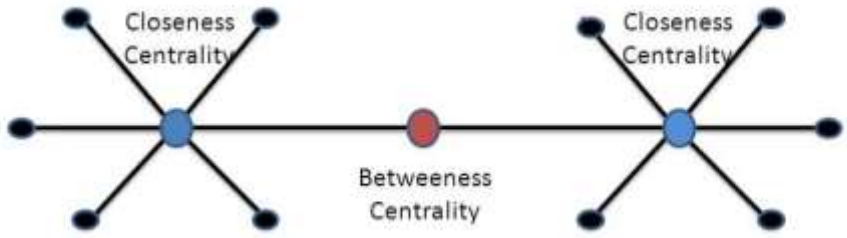


Figure 3.3: Nodes Relations in MCA Analysis. *Source:* Porta and Latora (2008)

The study of network analysis using the centrality concept has been recently developing in Glasgow by the Urban Design Study Unit (UDSU) at the University of Strathclyde, led by Professor Sergio Porta. The UDSU Centrality approach adopts the Multi Centrality Assessment method which relies on the understanding that a city is a Spatial Network consisting of geo-referenced nodes (intersections) and edges

(streets) linking them, in which they apply the measurement of the three mentioned centrality indices, C^d, C^c, and C^b. In this thesis MCA will be used as an investigative tool to assess and interpret the social impact of different case study networks and their relationship with the surrounding urban fabric. MCA-based GIS can help to unveil the multifaceted socio-cultural dynamics linked to urban form and neighbourhoods, which could assist in designing lively and better quality places, based on a strategic location of spaces. The tool is chosen for its potential to reveal the relationship within a given physical system (layout), and for its graphical, easy to understand, approach (Porta *et al.*, 2009), in addition to its obtainability within the author's research environment. Moreover, MCA can/will be used to assess the best strategic locations for interaction spaces that better suit the socio-cultural norms and interaction activity in the given case studies. For example, locations of public buildings, like the Mosque, on the street network of neighbourhoods, are crucial to interpretation for shaping a successful amalgamation between the socio-cultural and Typo-Morphological elements.

Chapter 4:
Setting the Methodology for the Urban for Analysis of the Arabic City and the Case of Benghazi

Chapter 4: Setting the Methodology for the Urban Form Analysis of the Arabic City and the Case of Benghazi

In this thesis, the Typo-Morphological analysis of the urban form is divided into six elements. This chapter will enable the research to be better managed and regulated in depth. In addition, this division is necessary for the applicability of testing these elements against the socio-cultural criteria. These elements are: the general neighbourhood plan; streets and street-networks; urban blocks and social blocks; urban public open spaces; public buildings; and houses' walls and open spaces. The elements were chosen because they are on the foremost focus of the Western Typo-Morphological and Islamic urban literature, as explained in detail earlier in Chapters2 and 3.

4.1. The Study's Conceptual and Practical Contributions to the Typo-Morphological Elements

The original contribution of this thesis lies primarily in the methodological framework which links morphological analysis with socio-cultural interpretations. Specific concepts and methods have been scrutinised and selected from literature and explored with regards to possible socio-cultural implications in the Libyan context. Those methods are organised in a consistent framework of six elements of urban form to be applicable to Benghazi.

This study contributes to most of the elements. The thesis author has made four original contributions: the social block element; walls' permeability tool under the houses' walls and open spaces element; open public space configuration tool under urban public open spaces element; degree of privacy under houses' walls and open spaces element. In addition, the author has further developed some other tools, such as a diversity index under the urban block element; Ped-shed tool under the public building element; recognising external open space under houses' walls and open spaces element. Moreover, the author has made some advancement in the street (route) types tool under the streets and street network element.

4.2. The Six Elements at Scale

Scaling the Typo-Morphological elements is a crucial aspect of this thesis in order to carry out the analytical framework. The three schools, the Italian typology, the British Morphology, and the Typo-Morphology, emphasized the significance of scaling in their studies, as illustrated in the aforementioned/previous discussion of the three schools literature. The literature of the Italian School focused on scaling and relation between organism components, building, neighbourhood, territory, and the city. The literature of the British School presented three scales: the first is the town plan or ground plan where analytical contrasts of the site, streets, plots and block plans of the buildings take place; the second is the form of building fabric, and the third is the land and building use. The Typo-Morphology school defined urban form physically by several structural scales and elements, for example the scale from dwelling plots to the city as whole, and the blocks and neighbourhoods in between. It placed emphasis on/stressed the importance of relations between building types and related urban spaces on a scale.

The general plan scale, block scale, and building scale of urban forms are the main focus for the purpose of this research study. Thus, the six urban elements (i.e. the general neighbourhood plan, streets and streets-networks, urban blocks and social blocks, urban public open spaces, public buildings, and houses, and walls and open spaces) are measured in terms of three broad scales of spatial resolution: general plan, block and building (see Figure 4.1). Methods that analyse the neighbourhood general plan, and streets and streets networks are considered to operate at a general plan scale. Methods that analyse physical urban block, social blocks, and open spaces are considered to operate at a blocks scale. Methods that analyse public buildings, and houses walls and open spaces are considered to function at a building scale. All the six urban elements with the different scales offer a continuous scale for the Typo-Morphological analysis of Libyan neighbourhood urban forms in Benghazi.

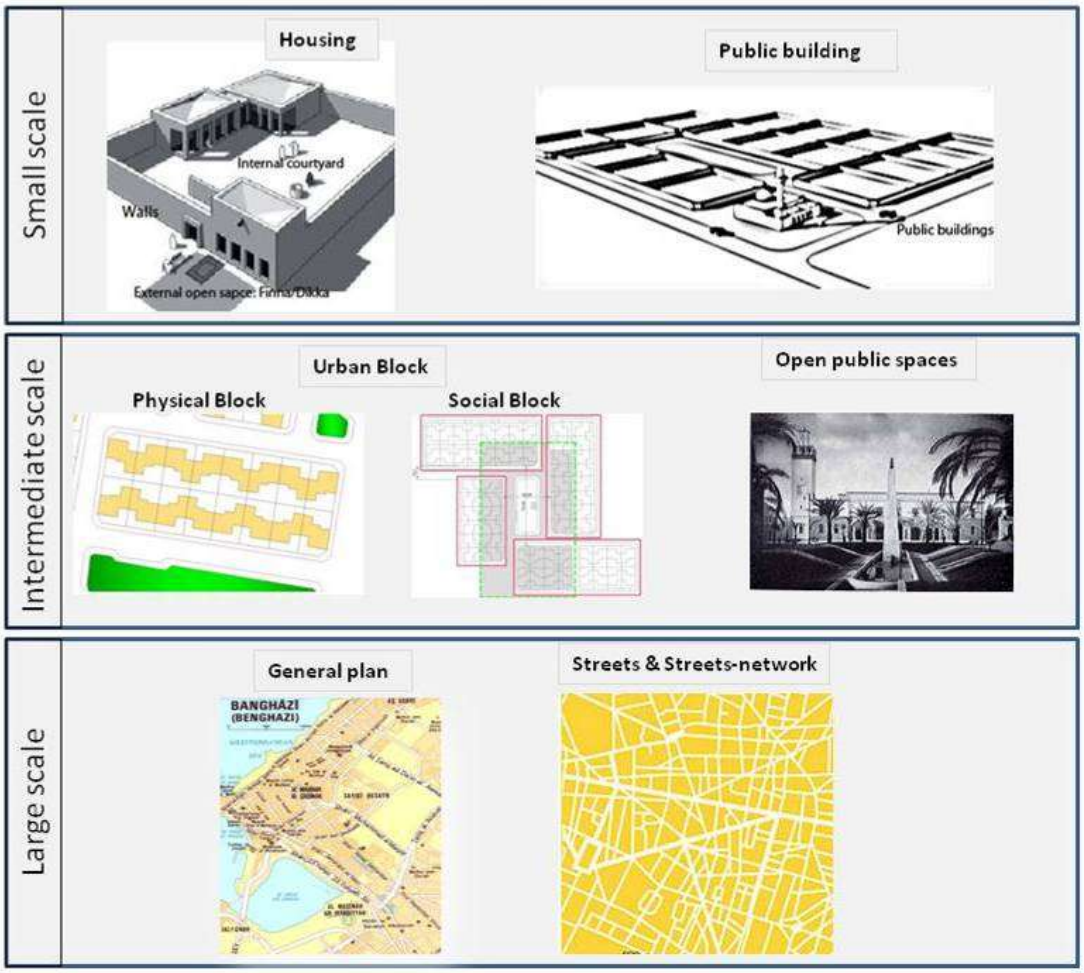


Figure 4.1: The Proposed Six Typo-Morphological Elements. *Source:* by author.

4.3. The Study of Six Elements in Literature and How They are Used in this Thesis

This section introduces and deliberates why and how the six elements are chosen and studied in this thesis. The literature review of the three schools drives the chosen elements which are considered to represent key aspects in implementing the analytical framework of the urban form. Also, the social and cultural norms are vital in order to understand the unique tangible and intangible characteristics of every element, thus the elements are shaped and customised according to the socio-cultural norms embodied in Libya. The proposed elements will be developed and studied according to their response to the social and cultural needs in order to reach an

objective evaluation of the urban form in serving those needs, as will be illustrated in each element in the following paragraphs.

4.3.1. General Plans

As reviewed in Chapter 3, the three schools: Italian Typological School, the British Morphological school, and the French Typo-Morphological School stressed that analysing the general plans is the most crucial step in the studies of urban fabric. For instance, although the Italian scholars Caniggia and Maffei's work in 1979 and 1984 focused primarily on building types, they based their studies on general plans, as city plans are the physical expression of human life (Caniggia and Maffei 2001). In addition, the Conzenian tradition stressed that the technique of analysing typical town plans for morphological studies is the most important one (Conzen, 1969; 1981; 1988). Also, The French schools respected the same concept of considering the city plan as a key stage in analysing urban forms.

In Islamic town planning, general plans are the first to be described because general plans emphasise the cultural and social component of the Muslim communities (Allawi, 1988). The general plan describes the arrangement of the traditional urban fabric elements that were fashioned to meet the requirements and needs of social and cultural aspects, especially the foremost two elements: the grand mosque and the market street. In addition, an Islamic general plan will show axes oriented to Mecca (Muslim praying direction), axes to areas to block the hot dusty winds, and city walls (Allawi, 1988). The study of general plans will stipulate an examination and understanding of these characteristics and their social and cultural dimension. Such characteristics will identify a plan type for a certain Libyan neighbourhood, which can be used in developing urban design guidance for neighbourhoods in Benghazi.

Although the literature on Islamic planning in general is rich, the literature on Benghazi as an Islamic town during the Ottoman era is rare and poorly described. This is mainly because Benghazi was considered a small and poor town in the Ottoman era. Even throughout the Italian occupation period, urban studies about Benghazi are not available, at least in English, apart from master plan maps which

are of limited use. In the modern era, more urban studies have become available; however, they are not comprehensive and mostly lack a theoretical framework. Thus, the author will mainly draw literature from general Islamic town planning, the available sources specific to Benghazi, and the Western European Typo-Morphology.

The general plan consists of two-dimensional maps which illustrate the basic structure of it such as borderlines, physical features and characters, the void and solid fabric, besides the configuration of various urban functions. An overview of the difference between the neighbourhoods' forms can be gained by associating the general plan of each neighbourhood at different periods. This will reveal the basic features each neighbourhood has at the general plan scale. This will give insight into the examination of each element against the socio-cultural norms.

4.3.2. Streets and Street Networks

Streets are vital element in providing areas with accessibilty, mobility and all general movement required to sustain the relationship between peopl and- city. Streets are the links between individual dwelling plots and their daily functions, and the livelihood of physical space which is scattered all over the city. Social and cultural life is considered to be part of peoples' activities, which are likely to be carried out through their movement on the street networks of their cities.

Vehicular routes and streets' pavments for pedestrians are bound together within the category of circulation but are not identical. Each acts and serves differently, but they share the common purpose of providing movement to the proper working of cities. A city pavement on its own is considered to be an abstraction. It only has meaning when twinned with the building and other uses on its borders. Jacobs (1961) emphasised the importance of the social meaning of streets besides/over and above the purpose of carrying wheeled traffic in the middle, considering streets and their pavements as the main public places of a city, and its most important organ. There is an increased desire among urban designers and planning authorties to design streets as places. Mainly they suggest accommodating and restoring the demands of

movment and social space within the same physical space. Carmona *et al*., (2010, p. 102) stated that "Urban design should rediscover the social role of the streets as a connector that stitches together and sometimes penetrates the disparate downtown realms". This emphasises/demonstrates the importance of the link between the diversity and choices of streets that reflects the social complexity of the traditional city. Sustainable urban form requires patterns of development that accommodate and integrate the individual's and community's needs for various movement systems, while providing social interaction and exchange.

The Italian Typologist Rossi (1984) categorised the urban fabric of a city into three principal functions: housing, fixed activties, and circulation, which refer to three main urban elements: houses, public buildings, and streets. These elements shape the city form over time. In morphology literature and research studies, street networks are an important element of urban development. These dominate a crucial part of urban elements as an urban public space among morpholgical researchers (Conzen, 1968). Moreover, Conzen adopted a method called *town-plan anlysis*, that implemented an empirical focus on streets and streets networks. This method was used to introduce three fundamental elements: streets, plots, and buildings, which all work together to shape the urban form. These elements were considered crucial in order to begin a morphological analysis (Conzen, 1968) and they reflect the social role played by streets and street networks via the level of movement and frequency of use.

The social role played by streets and street networks was studied by morphologist scholars such as Hillier and Lida(2005) who illustrated the link between movement and street network, demonstrated in/as diagrammed in/as illustrated in Figure 4.2, where he indicated a hypothetical network with different types of streets such as main street, a cross street, side streets, and a back street. He presumed that all streets o be equally loaded with dwellings, and that peoples' movement and circulation are based on the concept of shortest or simplest (fewest turns) routes He presumed that the highest level of movement would pass through the horizontal main street rather than other streets, and that more movements ould go through the central area of the

main street rather than the other peripheral parts. This conclusion follows from the structure of the network that reflects the geometrical type of the complex and people psychology.

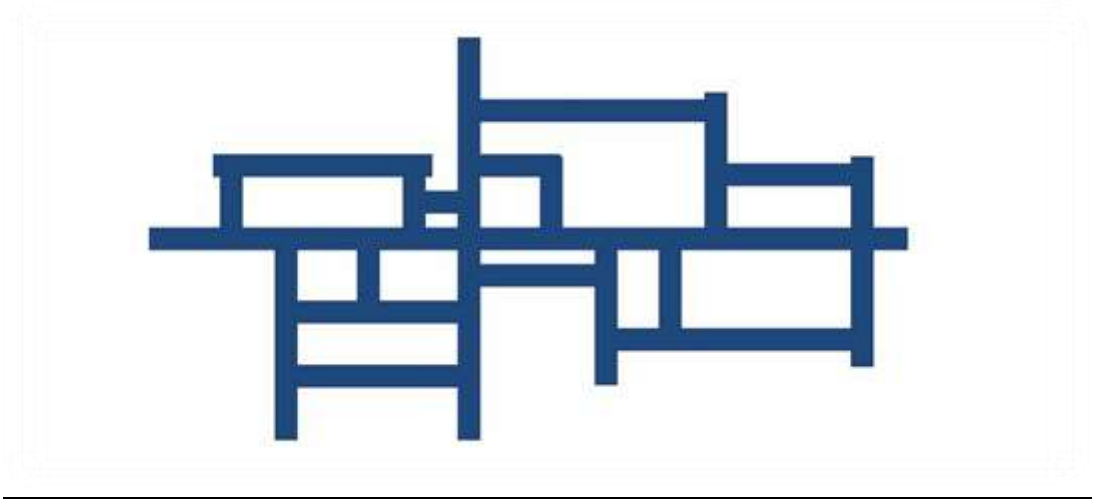


Figure 4.2: Network Effects and Psychological Effects: a Theory of Urban Movement
Source: Hillier and Lida (2005)

Harvey (1989**)** has argued that there is an intimate and balanced connection between residential areas and socio-cultural catchment spots. The success of this connection is based on balancing the different social requirements and needs of each functional zone, such as privacy for residential areas, and liveability for the market street. In addition, Harvey considers this balance to give an understanding of the nature of the urban experience (Harvey, 1989**).**

Throughout urban history, market streets have facilitated most of the social interactions that happen within the neighbourhood, and provided a channel for social exchanges and links with the wider community of the city as a whole. The locations of the neighbourhood centre or the market street on the street network are a fundamental element of the physical and social structure of urban areas. Market streets are generally laid out in relatively different location in terms of their relation to residential blocks and the street network (Harvey, 1989).

On one hand, in Benghazi's old Ottoman quarter, local residential street interactions have been significantly reduced, which works perfectly with human need for privacy and quietness. On the other hand the need for an easy-to-reach shopping area and other community facilities, which is very important for community sustainably, was relatively embedded in the Ottoman neighbourhood of Benghazi.

Wilson (2000) introduced a rich review of this field, which shows how the traditional literature of spatial and urban geography could be brought together into an "Interaction- location paradigm" on the basis of a range of concepts and methods that are produced from mathematical physics, but without reference to the emerging network science. The socio-physical relationship between areas of local community interactions and areas of privacy are a crucial concern in every neighbourhood community. Sustainable neighbourhoods do not only enhance and promote more humane local social interactions, but should also protect the local residential privacy. In residential quarters, it is important to set a balance between areas of interactions and more private and sanctuary areas in neighbourhoods. The socio-physics concept will be explained in later paragraphs (Hillier and Lida, 2005).

As demonstrated in Chapter 2, one of the crucial relations is the relation of the individual with the market street or the daily shopping facilities, or in other words, how the locations of most of these services are situated within the neighbourhood mix. Vital outcomes will be developed by understanding the links between these locations and their shapes and sizes, and importantly their consequences on land use in shaping the functional dynamics of each of the historical and modern cases in Benghazi.

By studying the two historical quarters of Benghazi centre, observations show that during the course of time, the Ottoman/ Arab section shows little change in land use, while the Italian section has shown little resilience to land use change in its residential small blocks. The middle area of Italian quarter was originally designed to be mainly residential, but it seems that the permeability and connectivity elements of its network structure have caused changes in the land use of some its plots to become

commercial. An additional element is the distribution of bigger parcels of land for administrative blocks on the periphery of the whole quarter. These surrounding large administrative blocks have created movements throughout the residential core area. Thus changes in land use have accrued over time, to accommodate shops and economic benefits from these dynamic movements.

In this thesis, two approaches will be adopted for analysing the street network and streets. The first will focus on the street network to understand the interlinking relation between the residential areas and places of socio-cultural significance such as the market street, through their locations on the street network and evaluating how they serve socio-cultural needs by balancing the local quiet residential streets and the vibrant market street. This approach will adopt the GIS-based Multi Centrality Assessment technique. The second approach is to classify streets by their socio-cultural use, and adopts the Kropf classification of streets which is based on the uses of streets and their links to other major socio-cultural facilities located on the street network (Kropf, 2008). Both approaches will be explained and their usage justified in later paragraphs.

4.3.2.1. First Approach- Integration Network Anlysis

This section will draw some evidence on how cultural differences could be reflected in the configuration of streets and consequently affect the their movment network. In his theory of Natural Movement, Hillier (1989) identified the natural movement in a grid of street networks as the proportion of urban pedestrian movement that is determined by the grid configuration itself. He added that urban grids are cultural products because they are created through the people's own movement, and through different shape types of street network. These differences are mainly composed of various levels of interfaces between different categories of social relations, such as the difference between the relation that takes place in the main market street and the relation that takes place in the local side streets. On one hand, the market street has more public interface and lacks any privacy due to its inherently public nature. On the other hand, the local side streets are frequented consistently by the same group of locals and maintain a semi-private feature.

Hillier and Vaughan (2007) provided a syntactic analysis of the historical core of Nicosia city in Cyprus (Fıgure 4.3) that reveals important spatial and social information. The north east quarter is the historic Ottoman area, while the south east is the historic Greek area. The textures of the grid marked in the two areas have quite different geometries and emergent topologies. Compared to the Ottoman area, the Greek one has longer lines, more lines passing through each other, and a different pattern of angle of incidence. Hillier and Vaughan (2007) applied space syntax integration analysis to the network of Old Nicosia which confirmed differences between the two areas. Hillier and Vaughan (2007) concluded that the Greek area has much more local and global integration, and has more synergy between scales of the local and global aspects of spatial form than the Ottoman area. Since this comparison reflects a typical range of differences that are found between network systems in Europe and those in the Islamic world, it is reasonable to regard these variation as evidance for socio-cultural differences in the geometry type of street networks Hillierand Vaughan (2007).

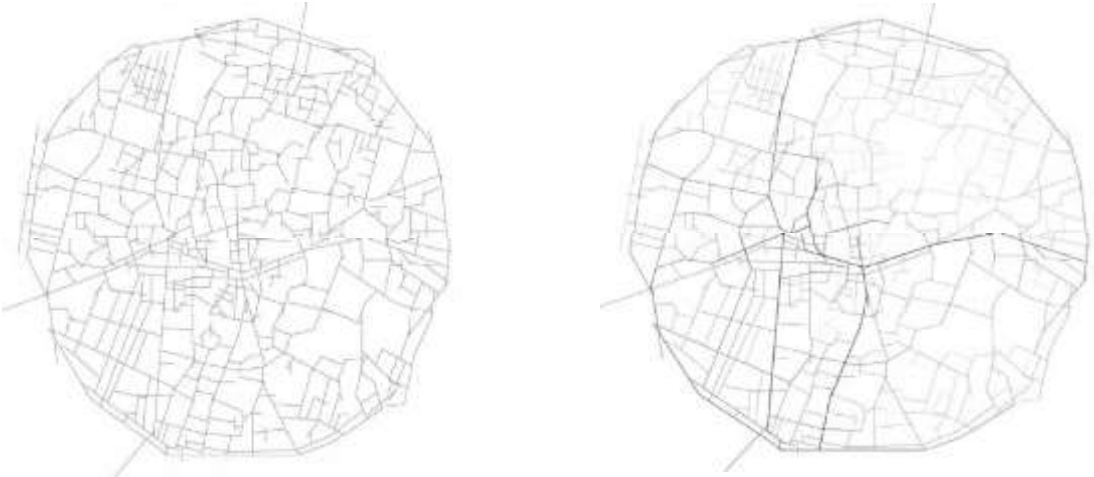


Figure 4.3: Old Nicosia Street Network Old Nicosia Integration Network Analysis *Sources:* Hillier and Vaughan (2007)

Benghazi city's old quarters within the old core of the city centre are formed by both the Ottoman (Islamic) section and the Italian Colonial (European) section. The comparision of the centre streets and street networks are expected to be similar to the comparison made in The Old Nicosia case. In Benghazi, the Italian section was formed as an extension to the Ottoman section, especially the geometrical line of the main market street. However, some differences in street network integration might be found, which indicate the variation between the socio-cultural relation and effect of each old quarter. Network analysis and its socio-cultural dimension will be studied and illustrated in Chapter 6 to reflect upon such differences.

4.3.2.2. Second Approach- Street (Routes) Types

The second approach in this section of studying streets is to identify streets (routes) in terms of their socio-cultural use, by focusing on their relation to catchment areas, such as the Market, the Mosque and other community facilities. The importance of this approach is that people's movement is rooted in the principal that people need a range of socio-cultural facilities to fulfill their daily needs and ensure their socio-cultural and economic inclusion, both internally in their neighbourhood and externally to benefit from the city and it socio-economic facilities (Kropf, 2008).

Karl Kropf, 2008, in his article on putting forward a low–tech methodology for analyzing streets, had classified routes by their relation to the centre either for cities or for neighbourhoods. This method of approach is not based on high tech methods relying on software's, which in his opinion has limits and constraints plus its financial costs. In his approach he is suggesting a low cost, practical way to understand the relationships between street (route) types on a neighbourhood scale, Kropf sees the type of route as classified in the first three points below:

- Strategic or Thoroughfare: routes with catchment centres at the both ends.
- Semi-strategic or loop: routes with a centre at one end and a route at the other.

- Secondary strategic or cul-de-sac: A route with any type of higher strategic routes at both ends.
- Sub-secondary strategic: routes with no catchment area or strategic street at any end.

This classification is designed to give a rank for each neighbourhood street with regard to their inclusion with socio-cultural need. The highest proportion of streets well-linked to catchment areas is considered be the best in serving communities' needs.

To sum up, the analytical process in studying streets and street networks is mainly based on two approaches: one that deals with street networks and how to preserve the balance between the privacy of residential areas and the liveability of its street market. The second approach will classify street types through their connection to socio-cultural facilities such as the Mosque and the Market Street or Centre. Those two analytical approaches seek to enhance real understanding of the human socio-spatial in the three presented case studies of the Benghazi urban form.

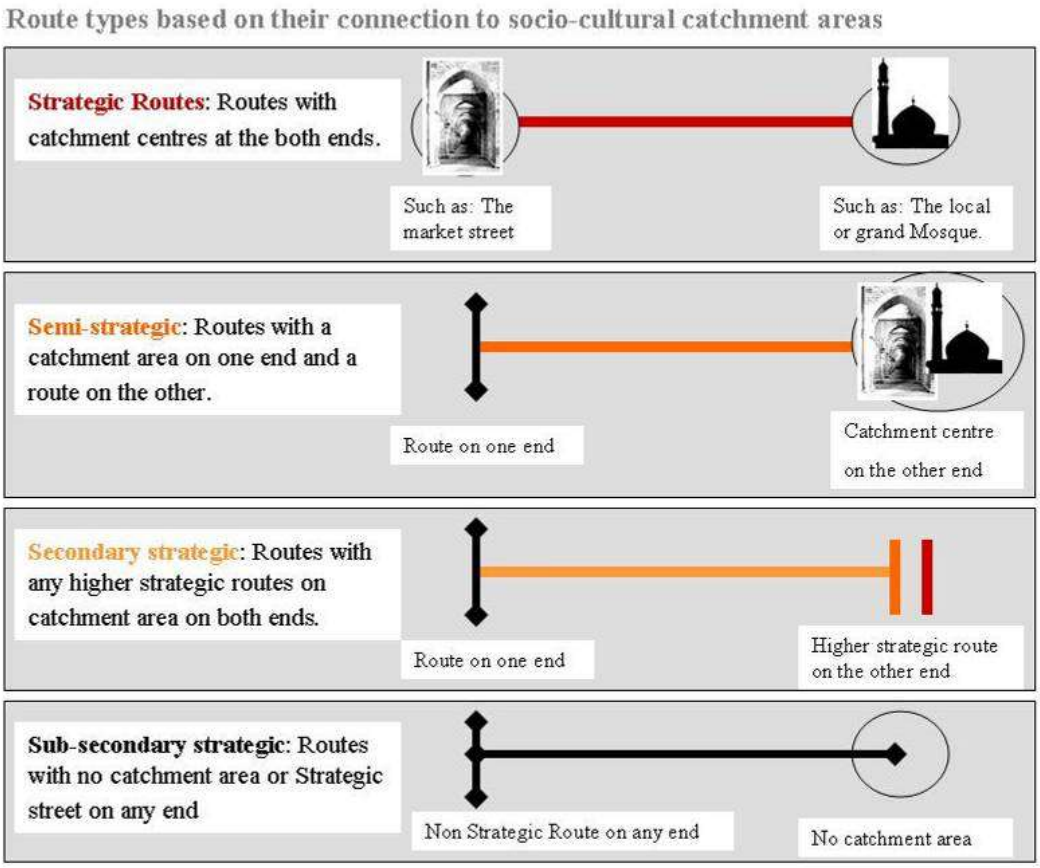


Figure 4.4: Route Types. *Sources:* By author.

4.3.3. Urban Blocks and Social Blocks

4.3.3.1. Urban Blocks

Cities and towns, planned or unplanned, are generally synthesized from relatively simple patterns of streets and blocks. The neighbourhood block is considered to be a decisive and vital element of both the physical structure and social interaction of urban areas.

Differences in the arrangement of block patterns and the plots inside them create very different environments. Block arrangements with the differences of amalgamation of street and plot patterns are commonly referred to as urban fabric (Caniggia and Maffei, 2001). In other words, block structure is important in determining the pattern of movement within the parameter of subsequent improvement and in shaping a neighbourhood character. Street arrangements that are

shaped by the amalgamation of blocks arrangements are usually the most resilient part of the urban fabric. Thus, they form an essential urban spatial organisation of a typical city, town, and neighbourhood, which is vital for the liveability of these places.

Panerai (2004, p. 162) defined the block stating, "The block is not an architectural form, but a group of independent building plots. It has a proper meaning only when it is in a dialectical relationship with the road network". Hence, Kropf (2006, p. 12) stressed that "the block is the result of connecting streets. The block only comes into arise when streets are connected and well defined by buildings".

The conventional simple physical block is shaped by the prearrangement of plots within its boundaries, and streets surrounding its perimeter (Figure 4.5). Based on the Conzenian School of morphology, Whitehand (2001) emphasised the link between the physical dimensions of block and plot diversity and their changes in accordance to social changes. The socio-cultural norms appear to be attributed to the physical shapes and sizes and the arrangements of the block and plots diversity. This is caused by the effect of social relationships between neighbours Whitehand (2001).

In the case of Benghazi, socio-cultural norms have attributed to the change of size and shape of the block/plot, such as the requirement to accommodate the second generation of the extended family or downsizing plots by the Islamic (Shari'a) inheritance law. Other physical changes have also been made in accordance with the socio-cultural needs. For example, in Benghazi, throughout the modern era, many of the front gardens of the houses in the modern neighbourhoods were retransformed to other uses in a way that imitates the Ottoman old core which had no front gardens. That implies that the front gardens in the modern housing were built as a pure mimic of the global modern design with no consideration of the local needs. Identifying the pattern of these physical changes on block/plots scale will be the crucial focus of this research in order to understand the related socio-cultural effect. The analytical examination of the block/plot will be studied in accordance to their sizes, shapes

(form), compactness, and plots' diversity, to understand the principles of the production of urban design guidelines in Benghazi.

Figure 4.5: Physical Block. *Source:* by the author.

4.3.3.2. Social Block

The capacity of streets and spaces between neighbours to have an impression on people's lives remains evident and enthusing, receiving much recent attention in social science literature (Ahlbrandt and Cunningham, 1979; Boyte, 1980; Goetze, 1979; Schoenberg and Rosenbaum, 1980; Warren and Warren, 1977).

Scholars, such as Jacobs (1961), have accentuated the crucial significance of streets and pavements between blocks in organising the residential social environment. Jacobs mentions how the physical dimension of a street might echo its social environment. In her example she noted the alienation of social feeling between the same street neighbours of East Harlem in New York, where she examined the width of the street in between its blocks (Jacobs, 1961). In the field of sociology and

behaviour, Taylor (1997) emphasised/pointed out how streets between blocks are competent as a physical setting for social communications. Taylor noted the significance of the physical arrangements that shape streets between adjacent blocks, where he says: "the surrounding physical milieu supports and contains people social lives" (Taylor, 1997, p. 120). Jan Gehl (1980, 1987) in his famous book 'Life between buildings: using public space' has plaaced importance on the social life that takes place between urban blocks, where he attempts to give an objective understanding of those places hosting social activities. Also, William H. Whyte, in his book "The Social Life Of Small Urban Spaces", describes the close link between the alternation of spaces and social activities and documents how frequently quite simple physical arrangements can remarkably improve social interaction. (Whyte, 1980)

The form and shape of urban blocks arrangements are important for social interaction as they should establish a balance between providing an adequate area for suitable circulation and for social space (Carmona *et al.*, 2010). Different block arrangements can have a profound effect on the social life in the streets between each block and another, where the physical layouts of block forms will result in various levels of social interaction in the neighbourhood street (Unger and Wandersman, 1982).

Functionalism dominated planning ideology during the 20th century and was regarded critically for not including the psychological and social aspect of designing local streets or public spaces. Functionalism was undoubtedly known for its physical and materially-oriented planning ideology. This planning orientation has an absence of interest in the reality that the streets and spaces in-between are an important element in hosting social interactions and are directly associated to people's movement and social life. In functionalism, a block of buildings are usually studied separately from the surrounding roads and analysed as an unconditional physical object within their perimeter (Gehl, 1987). Therefore, studying void spaces and street frontages between blocks together will be more effective in understanding social life interaction between these blocks.

In response to these statements, the thesis author has originated the “Social Block “concept and application (Figure 4.6) as an urban Typo-Morphological element, which the author believes is a more socially acceptable way of defining void spaces and their surrounding blocks. The frontage part of the blocks facing the street and the street itself are considered together to be fundamental to the social process of the neighbourhood street. People who live in blocks on the opposite sides of a street will have a more recognizable social relationship with each other compared to the relation with the people who live in the rear of the same block. The proposed social block focuses solely on neighbours as a potential subgroup of neighbourhood social activities. The role of the social block as a defined place in today’s urban areas may encourage the social ties between neighbours.

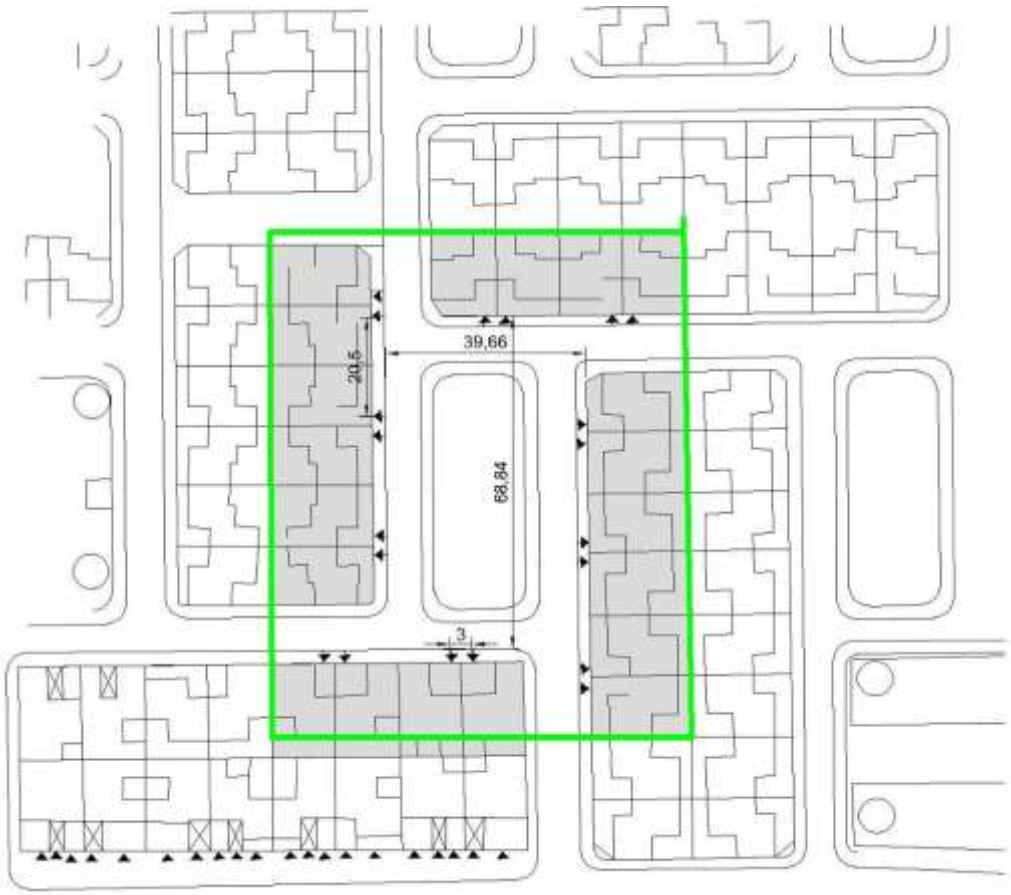


Figure 4.6: Social Block: the Middle Gray Square Area. *Source:* by the author.

The definition of the suggested social block is a rectangular area which consists of all those plots' frontages that share the same void space, in which this void area is described socially by neighbours as their semi-private territorial area for social interaction, and people who live in its adjacent plots identify themselves as street neighbours. The optimum design of this social block should be oriented to enhance the gathering areas in its void space through the good arrangements of surrounding block patterns and the plots' frontages, in order to increase meeting possibility within sensible dimensions. The principal void space of the suggested social block and its inner frontages and door openings are the objective focus of the analysis process.

The periphery perimeter of the social block is not considered to be important for the study analysis apart from helping to create a type categorising of different social block shapes. The void area of the social block should not exceed that reasonable length beyond which any social interaction between opposite neighbours would be considered to be disconnected. This condition is judged subjectively, as it is not easy to ascertain a certain empirical distance to define it. Also, this void area of the social block should not be occupied by high-speed traffic movement which would make it dangerous and thus unmanageable to maintain social gatherings between opposite neighbours. Finally, the void area might be made of streets, gardens or open spaces, but should allow any form of social gathering on its space.

The study analysis of the social block will adopt some empirical criteria that Gehl (1987) used in his approach to understanding life between buildings and looking for ways to enhance neighbours' social bonding. Gehl's criteria introduced a metric scale based on hearing and sight senses. Both hearing and sight are generally considered to be the most important functions for maintaining human contacts. Gehl divided his scale into ranges that started from the Personal distance to the Social distance to the Public distance of human relationships. These ranges were based on the distance of how far human contact can be maintained and how strong or weak this contact is with regards to hearing and sight senses. For the hearing range, up to 1.30 meters distance is considered to be a Personal distance which allows very close conversation to take place, and from 1.30 to 3.75 meters is a Social distance where it

is still possible to hear but not possible to engage in actual conversation. Beyond 3.75 meters is considered to be a Public distance where the ability to hear others is greatly reduced, and it is still conceivable to hear someone shout loudly but with difficulty in understanding.

As for the sight range, Gehl considered the distance of 1 to 3 meters to be strong for social bonding, as at that distance other senses like hearing will begin to supplement the interaction. The range of up to 30 meters is considered to be medium where the visual impressions, like people cheering each other can still be effectively meaningful. Beyond the 30 meters and up to 100 meters is considered to be weak as it only permits people to perceive others as individuals with little social contact or ability to recognise others (Gehl, 1987). The Social block investigation of this thesis will adopt these ranges and put them on one scale, where the distance of up to 3 meters will be consider as Personal distance and from 3 to 7 meters as Social distance, and from 7 to 30 meters to be considered as Public distance, the distance between 30 to 100 meters will be considered as very weak, beyond the 100 meters distance will not be considered as having any significant weight and will not be considered as a part of the proposed Social block. In addition to the above 4 scales, an additional scale will be added to these proposed ranges. The categorisation is based upon cultural reasons highlighted in chapter 2, such as the differences in gender uses of market place such as shop frontages as social areas, where in Libyan culture, women rarely use these areas for socialising; however they are more often used by the elderly and men. The analysis will differentiate between these areas of pure social activities that take place between neighbours and those areas attached to commercial shops and their frontages.

All in all, the void spaces between neighbouring blocks constitute an area of social bonding between opposite plots. The investigation process will be based on objective understanding of the physical features of those areas of social interaction. The analysis will first emphasize and locate those places of possible social gathering areas within the void space of the Social block. Highlighting these areas will be subjective but sensible and obvious for any reader. The possible areas of

congregation should be more meaningful in maintaining close distance contact between dwellers of the same social block by using the suggested scale ranging from Personal, social, and public to weak distance.

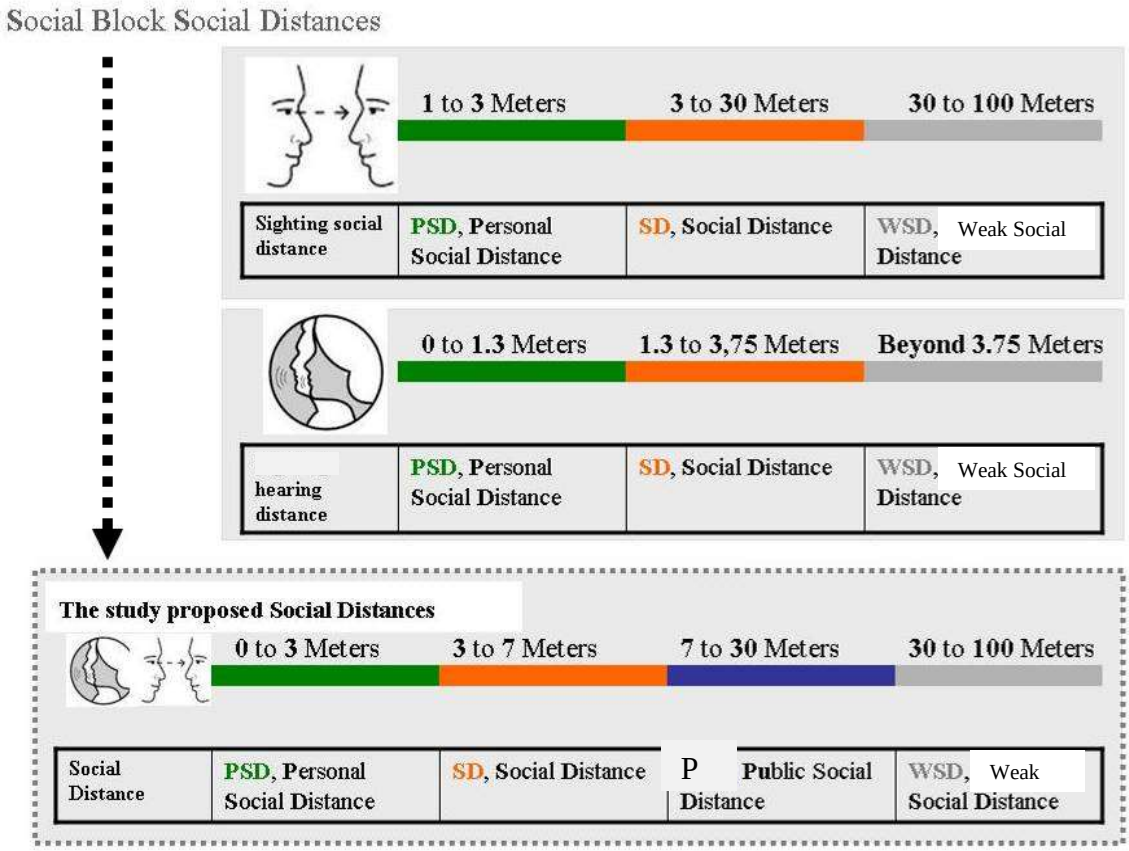


Figure 4.7: Gehl (1987) Sighting and Hearing Distances at the two top tables. The bottom table shows the proposed Social Distances used in the study. *Source:* By the author.

This thesis will focus on understanding different Social block arrangements in the case studies and calculate their response to the allocation of social spaces within a neighbourhood. The Social block approach is adopted for being suitable in giving an objective visualisation for urban design analysis and for developing suggested principles for guidelines, in which the approach tries to objectively reflect upon the social aspect through identifying their prospective physical spaces of social exchange.

4.3.4. Public Open Spaces

Public spaces have been an indispensable Typo-Morphological element in the study of the urban form. Urban open spaces can be understood in a variety of ways depending on views of defining and illustrating them. These views seem to be closely related to political, social, cultural or environmental representations, such as the public realm gathering places or green areas. From a Typo-Morphological point of view, urban open spaces are usually defined as the empty or void plots which host public socio-cultural activates, separating the built capacities and surfaces (Teller, 2003). The void shape of public space would clearly be featured by a duality relation with the solid elements that surround it, such as buildings, shop frontages, vegetation, fences, and partitions (Teller, 2003). Public open spaces are fundamental for socialising, they are closely related to socio-cultural life. Thus, public space has social context as society has spatial components (Carmona *et al.*, 2010). From a social point of view, Chombart de Lauwe (1966) defined public open spaces as nodes of congregation which are linked to the network which encompasses daily and local movement (Chombart de Lauwe, 1966). The aim of studying public open spaces in this thesis is to understand the spatial framework in which the public social life of districts takes place, as conditioned by social and cultural factors through people's movement and the adjacent uses of the public spaces.

Public spaces are a key element of all modern cities and operate as a major node for social, political, religious, and economic happenings. The character and utility of any public space are identified by its place in the structure of the urban fabric and to its location to residential areas, and adjacent community socio-cultural facilities. More importantly, the function of public space is associated with movement and the adaptive reuse of adjacent sites and buildings. Public plots are essential to association in a city and have become nodal for both intra- and inter-urban transit. Hillier (1996) in his book 'Space Is The Machine', strengthened the case for the importance of movement circulation to the function of public accessible spaces, when he justified its importance with two reasons: firstly, space is a void rather than a solid which means that its physical nature is not clear, and hence, cannot be expected and treated in the same way as other entities like buildings; secondly, related spaces cannot be

visualised from one point. Thus in order to experience the whole space, movement from one to another is required (Hillier, 1996).

It is worthwhile to remark on the roots of the historical building of public open spaces in both the western and Islamic literature. During the modern era public spaces in western literature are seen as a reaction to the industrial era. Public spaces are usually traced back to the "Garden City" movement and mostly embodied in municipal parks. The creation of public urban parks is rooted in the Victorian era, and thought to be attributed to two Victorian phenomena: The development of industrial towns and the passion for reform as a result of this rapid growth. By the early 1820s, it had become apparent that high densities of development coupled with overcrowding, lack of hygiene, inadequacy of light and ventilation, and lack of proper water facilities were at the root of the industrial city's social and environmental problems. In 1828 John Arthur Roebuck, a member of Parliament, outlined a programme of "town planning" in which he advocated tree-lined boulevards and open spaces in towns, as well as common lands outside towns. His appeal for open spaces carried enough strength to form a parliamentary committee, to study public walks. The final recommendations led to great discussion on the issue of the relationship between general health in densely populated towns and the psychological and recreational value of public open spaces (Bachelor, 1969).

In Islamic literature public open spaces are more linked with the need to accommodate social, cultural and economic activities through function and passage of movement. Porter (1980) in his study 'Architecture in Islam: the search for form' highlighted and emphasised the Islamic character of public spaces by attributing its accomplishment to mixed usage, a variety of functions or functionality, and circulation of spaces. One of the significant characteristics of public spaces in Islamic literature is that it managed to preserve the privacy of the adjacent residential areas, which requires separation, and differentiation of areas and passages. Also, he added that axial vision and access/access points could be controlled by the physical shape of the public spaces. In addition, Whyte (1980) stressed the relation between the social and physical dimension in his book 'The Social Life of Small Urban

Spaces', when he described the close connection between qualities of city space and city activities and recognised that simple physical adjustments can improve the use of city space significantly. Therefore, this study will focus on the definition of open public spaces based on movement circulation, physical shapes and entrances, and adjacent buildings in order to investigate their effect on the social and cultural dimension to develop urban design guidance for deprived neighbourhoods in Benghazi.

Public open spaces have had a distinct and constant strand in the literature of urban design during the past decades, focusing on the use of open space and its necessary existence for fulfilling basic human socio-cultural needs. Well-known urban design scholars documented the different behaviours and various activities that occur in public spaces, such as Jane Jacobs (1961), 'Death and Life of Great American Cities' and William H. Whyte (1980), 'The Social Life of Small Urban Spaces', in the USA and in Europe, Jan Gehl's study (1987), 'Life Between Buildings'. This literature, among others, have enriched the concept that a human being can only live among and in relation to others and these relations create the social and cultural life that consequently leads to the creation of public open places, such as streets, plazas, parks and public squares etc. that become 'artefacts of the social world' (Low, 1997). As such, next to being a design object, public space is also a socio-cultural and anthropological ensemble, which is embedded in the history of the morphology of the urban form. Madanipour (2003) defines public open space as the void space where we are in co-presence with the other individuals of communities and where we share experiences that create a link with past and future generations:

"Public space is the institutional and material common world, the in between space that facilitates co-presence and regulates interpersonal relationships. By being present in the same place with others, shared experience of the world becomes possible and a link is made with previous generations who experienced (or future generations who might experience) the same physical reality" (Madanipour, 2003, p. 206). Furthermore, public spaces create the stage where public cultural life is seen without the barriers of walls. Zukin (1995, p. 259) sees open spaces as the "primary

sites of public culture", while Carr *et al.* (1992) defines them as: "…the common ground where people carry out the functional and ritual activities that bind a community, whether in the normal routines of daily life or in periodic festivities." (Carr *et al*., 1992; p. xi).

It is clear from the socio-cultural literature of public open spaces that public space should be socially inclusive. As mention previously, conceptualising the various relationships between open spaces and the urban form is to understand the nature of socio-cultural activities that take place in the public realm. Gehl (1987) suggests that there is a different relationship between the types of social activity conducted in public open space and the quality of that space. He classifies activities as:

- Necessary activities: which are crucial to everyday living, such as going to work or daily shopping or taking children to school. These activities have to be conducted despite the quality of public space.

- Optional activities: which are not necessary but desirable such as walking and reading in a park. These activities rely upon good quality environments, and are reduced significantly in poor quality environments.

- Social activities: which involve social interactions between people in public spaces, such as chatting in the street, meeting friends and playing football. They take place more often in good quality environments, due to the higher degree of optional activities taking place; however they are not totally reduced in poor environments due to the presence of people conducting necessary activities.

To create successful open spaces that cradle Optional and Social activities it is crucial to support good open space. Although the physical and socio-cultural contexts vary from location to location, with each public space having its unique character and identity, there is a general agreement that for a variety of Optional and Social activities (Gehl, 1987) to occur, two key fundamentals should exist in the

physical design of quality public place: good opportunities for enhancing the land use surrounding the space and good opportunities for walking, or in other words occupying the movement routes:

"Public spaces offering many qualities and few disadvantages inspire a broad spectrum of urban activities. Attractive walking routes and places to stop along the way encourage foot traffic which in turn promotes social and recreational activities, because people walking along become inspired to linger and enjoy the urban scene" (Gehl and Gemzoe, 2000, p. 14).

The relationship between public open spaces and movement is fundamentally linked with the connectivity network of the urban form and the way in which open spaces are occupied by people's movement has a significant effect on the quality, liveability and usability of the space. An open space "good quality environment" depends on its accessibility from a catchment centre, consistent with its size and function.

4.3.4.1. Method of Analysing Public Open Spaces: Multi-Attribute Ranking

The method used in this thesis of analysing public open spaces is based on techniques of multi-attribute ranking. The method of the ranking system is developed by assigning numerical scores to each case study of public open spaces. Scores are assigned by (a) creating numerical figures for the attributes, often by placing them into categories, (b) introducing numerical weights for each category, and (c) applying equations to calculate the multi-attribute values of each studied public square (open space). Ranking is then accomplished simply by sorting the case studies' Open spaces by their scores.

The ranking method is good but lacks several critically important elements. The method scoring approach is based on weighting values for each element, which are based on the observation of author and his or her opinion, as there are no weighting values for the importance of each element and their ranking in the literature. However this ranking is believed to offer better physical and empirical understanding

of good open space characteristics in the urban form. The analytical approach is based on the following:

Firstly, the link between open spaces and the movement through its link to the street network are classified in four ranks. The rank ranges from 0 to 4. The highest rank is given to public squares with two high movement streets that penetrate the middle of the space, and to 4 high movement streets that border the space, while 2 points are given if it is adjacent to one edge of the square, and 0 score for no relation (see Figure 4.8).

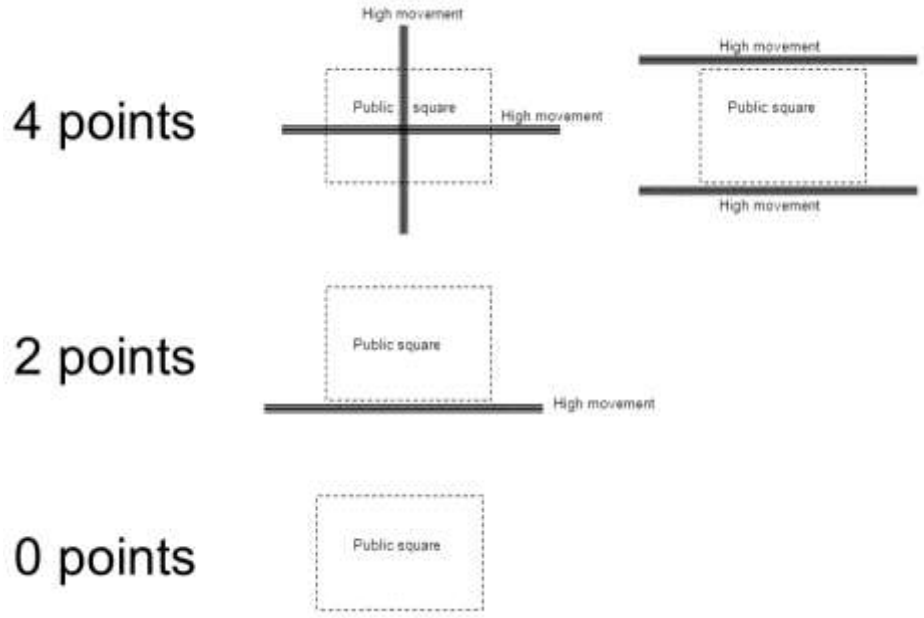
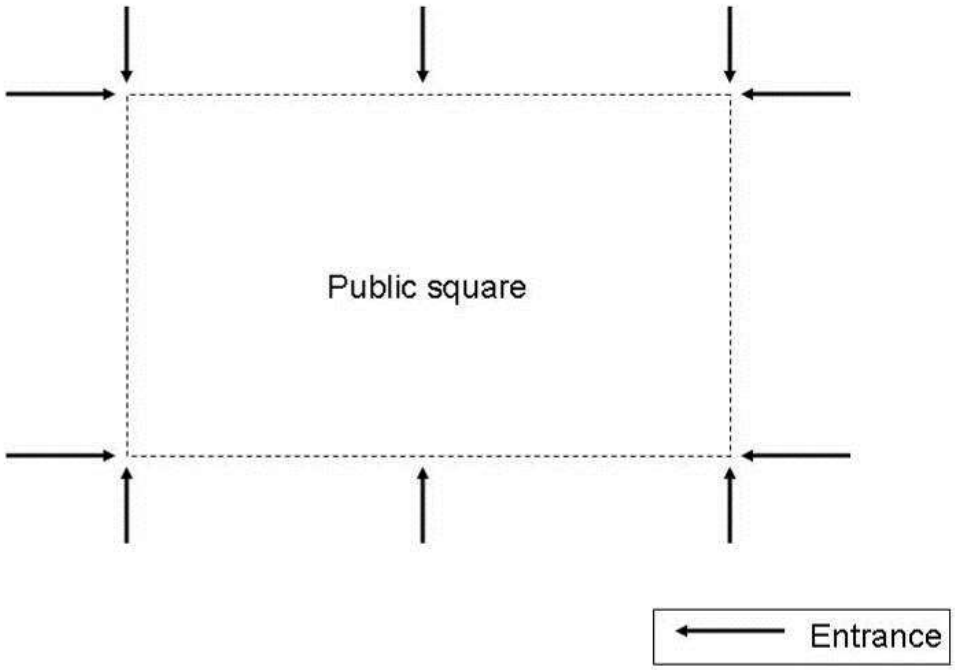


Figure 4.8: Scores for Different Movement (Thoroughfares/ streets) Locations on Public Squares. *Source:* by the author.

Secondly, the accessibility through entrances between the adjacent street network (movement) and the open space is valued. This is marked by counting the number of entrances between them. Each entrance weighs 0.1 point and the highest numbers of entrances do not exceed 1 point. Open edges count similarly to 3 entrances that weigh 0.3 points in total. For example, having a square with two open edges will be weighted by 0.6 points, while having a square that is surrounded by 8 entrances will count 0.8 points (see Figure, 4.9).

Figure 4.9: Entrance Scoring. *Source:* By the author



Thirdly, the active frontage surrounding the open space, will be categorised into 5 functions (activities): the first 3 of them will be counted positively (+), commercial buildings (cafés and restaurants); religious buildings (such as a mosque); administrative buildings (such as banks); while housing will not be considered as a positive active frontage due to its negativity regarding the privacy norm and will be counted as (-); and undefined edges or blank walls, such as schools' high walls will be counted as (0).

Fourthly, the percentage of the length of active frontages is calculated against the total perimeter of the studied open space to find out the percentage they constitute of the overall, and the result will be converted to a decimal number. For example, if a square has a total perimeter of 100 metres that include an active shop frontage of 75 metres, this means the percentage of active frontage is 75% and 0.75 when converted to decimal number. If in another example, the square has a perimeter of a 100 metres, and the frontages are as follows; 75 metres of shops; 20 metres of residential frontages and 5 metres of blank walls, the calculation will be as follows for the active frontages: 75+ (-20) + (0) =55 metres, and the percentage of the active frontages is: (55*100)/100 = 55% and 0.55 when converted to a decimal number.

Fifthly: The Diversity index (Morello and Ratti, 2009) :Which indicates diversity function of the urban public spaces according to their active frontage lengths

$$D = 1 - \frac{\sum_{i=1}^{S} n_i(n_i - 1)}{N(N-1)},$$

Where D represent the Diversity Index of public spaces; active-frontage, S (species) is the number of classes (i.e. Shops, Cafes, Mosques, Administration buildings, Blank Walls, and Houses), n is the active frontage length in each class of a species, N is the total number of classes' lengths.

Finally the total of the three main shapers of our analysis (Movement, Access, active frontages and the diversity index) is calculated to determine the quality of each studied public square. The highest total score is seen to be the best quality environment of successful public open spaces.

In this thesis, open public space as a Typo-Moropholgical element will be adopted by focusing on the interaction between public space and the society. The approach of this study is firstly/primarily to consider public open spaces as social gathering nodes

and explore their relation with the movement created by the street network, and secondly to understand the relation with the land use of the adjacent buildings and entrances.

4.3.5. Public Buildings

Public buildings provide different kinds of services and facilities that are essential for sustaining communities' services, in addition of providing a variety of optional activities that dwellers use in their neighbourhoods (Carmona *et al.*, 2010). Planning ideas including the introduction of public facilities or public buildings did not develop in isolation from the domain of social philosophy, but they are developed from the gradual accumulation of ideas about the daily social and cultural life (Batchelor, 1969).

The historical roots of the development of public buildings are somewhat different between the Western literature of the modern era and the Islamic. The Islamic public building emerged from religious beliefs of financing public buildings that contribute to the well-being of communities while the Western public building mostly developed as a philosophical idea in response to the industrial era and lack of community facilities through adopting public buildings as an essential part of the urban fabric. Municipal building during the Western modern era traced back to the Utopian City and the Garden City movements. Howard, a philosophical socialist pioneer in the Utopian City movement, published in 1898 a proposal for the establishment of garden cities in his books, 'Tomorrow: A Peaceful Path to Real Reform', that was reprinted as 'Garden Cities of Tomorrow' in 1902 in which he placed emphasis on the importance of public buildings for communities' well-being. Public buildings, such as the town hall, museum, art gallery, hospital, library, theatre, and concert hall, were mentioned as an essential part of the Utopian City and the Garden City (Batchelor, 1969). In addition, the Italian typology school considered public buildings as important elements in their architectural studies as discussed in Chapter 3. In the Italian section of Benghazi, public buildings were introduced providing services such as banks, libraries, theatres, and hospitals. The physical

character and the location of the Italian public buildings are different from those of the Ottoman (Islamic) public buildings as will be analysed in the following chapters.

In Islamic literature public buildings are usually rooted to the Waqaf system that was defined in chapter 2. In a typical Islamic city the Islamic Waqaf charitable fund system represents a great percentage of the societal wealth. Historically, the Waqaf fund was used for a wide range of public buildings for public interests such as mosques, public restrooms, hospitals, libraries, schools and universities. The concept of Islamic Waqaf is an important element in the relation between the individual or the community with God through the development of non-governmental sectors that serve the public benefit, and socio-cultural and economic aspects. Most of these public buildings are oriented to serve the community as a whole and specifically the poor. The relationship between the Waqaf, architecture and urbanism is traditional and fruitful in Islamic cities and plays a key role in achieving a good urban environment and providing socio- cultural facilities in a very high level of efficiency as reviewed in Chapter 2.

EL-Basyoni (2011) argues that the role of Waqaf has been crucial to the process of revitalization in the field of Islamic architecture through its direct involvement in various aspects of life that is most embodied in public buildings. El Basyoni (2011, p. 136) emphasised the importance of architectural intervention in the role of Waqaf as he stated “Most projects require the intervention of architecture at various stages which demonstrates that a Waqf project cannot perform its purpose without the intervention of architectural studies”. He has developed a table that shows areas of architectural study intervention in relation to different types of Waqaf (see Table 4.1).

Waqf Project	Architectural Needs			
	Furniture/ Decoration	Landscaping	Architecture	Building/ Shelter
Building new mosques/ renovating old ones	√	√	√	√
Building schools	√	√	√	√
Water and Sanitation *Waqf*			√	√
Health *Waqf*	√	√	√	√
Education *Waqf*	√	√	√	√
Income Generation *Waqf*	√		√	√
Qurbani Waqf				√
Emergency & Relief *Waqf*	√			√

Table 4.1: Architectural Requirements in 'Waqaf' Projects. *Source:* El Basyoni (2011)

In order to study public buildings, it is desirable to characterise public buildings according to their services to the local communities. It can be presumed that this means those urban components of the neighbourhood whose primary function is to facilitate the provision of services to local communities. The range of such facilities vary in their services, while some provide services to the locality such as schools and mosques, others provide services to the whole city but bring benefit from creating demand in local neighbourhoods such as banks, administrative offices and other regional services (Teitz, 1968).

The primary public building to provide a socio-cultural service to localities in Muslim communities is the mosque. The daily prayer mosque, (Masjid in Arabic), is an important institution for the Muslim community. It is not only a place of worship, but also a communal social place. This dual purpose space found its genesis in the Prophet's house constructed in Madinah (the city of the Prophet). The mosque continues to hold the same dual purpose in many parts of the world. The mosque is an embodiment of spatial and temporal Islamic laws that came directly from the Quran and the Sunna of the Prophet of Islam. Spatially, the primary laws are the mosque's orientation to the Kabah and the arrangement of the worshippers in parallel rows behind the imam facing the Qibla wall. Scheduled, the ritual five performances are carried out at specific times of the day following the sun's movement. The five prayer-times are spread throughout the day from sunrise to sundown and into the evening. Despite their number of occurrences, the prayer does not take long to

perform except in the Friday congregation. These changeless spatial and temporal laws are unvaried throughout the Islamic world regardless of local cultural and traditional variations (Aazam, 2007).

The mosque's socio-spatial relation patterns are based on the ritual's temporal and social activities that follow every prayer time. During the ritual performance, the space is characterised by a strong diachronic property, structured in time by the ritual's rules which aim to strengthen the individual's relation to their God and the individual's relation others by performing congregation prayers. When the ritual ends the temporal and spatial properties become synchronic. The entire mosque space and its adjacent open space transforms into a generator of social activities through accidental and planned meetings (Aazam, 2005b). Examples of such activities may include a communal reading of the Quran, learning and listening to lectures and other rituals and traditional events such as initial marriage ceremony and breaking the fast in Ramadan, and random social and business meetings encountered in front of the mosque. Thus, many consider the mosque to be the main public building that generates socio-cultural activities in neighbourhoods, with a strong relation to its urban form. For the above mentioned reasons, Mosques in a Muslim neighbourhood play a curial role in the socio-cultural life of local communities that is supported financially by the Awqaf system, (Islamic charitable funded system), the main concern in terms of their spatial location being to situate mosques in an optimal location to enable its socio-cultural services to be delivered in the best way (see Chapter 2).

Schools are also vital public buildings that provide a curial educational service to communities. School locations affect how children get to school, which is affected by the local street routes, traffic, congestion and safe crossings. A school's location, design, and physical condition may well be one of the most important elements of neighbourhood quality, regional growth and change that affect the building environment. Schools located closer to residential houses and buildings reduce the need for school bussing and parental driving, allowing more students to walk or bike to school. Choice of school location can reduce bussing and driving to school and

open up public transport options for college students and adults. Similarly, selecting good locations for schools, coupled with a physical upgrade brings more of the student population back to communities that have lost students. As with other public buildings, schools have a significant impact on the surrounding street layout patterns and route service demands, residential choices, housing development and vice versa. The planning of the school location thus needs to be integrated with the planning of the street layout to be reachable for much of the surrounding built fabric at local level, but does not need to be integrated with the regional fabric of the city as it serves only its localities (McKoy *et al.*, 2008).

This research deals with the analysis of public buildings in terms of how accessible and reachable their locations are to the public users with regard to different street layouts of the urban form. Different definitions of accessibility have been introduced based on contextual meaning. The simplest definition of accessibility of a given location is in terms of how easy it is to reach. This therefore indicates the spatial relation between the locations of a given public building and surrounded built fabric, or the degree of connection between that location and all others surrounding it. Accessibility can be also defined as a measure of which activities or service may be reached from a given location using a particular street layout system. Accessibility can thus indicate the location of a service or a functional building in relation to how reachable they are from the surrounding built fabric with regard to the street layout connecting them (Al-Sahili and Aboul-Ella, 1992).

The location's characteristics need to be identified through urban morphology. In this research two techniques are used. The first one focuses on the location of the mosque on the street network and its centrality, by using MCA (Multi Centrality Assessment), while the second one reveals the percentage of the built fabric which is within reach of public buildings (such as mosques and schools) and thus their relation to dweller walking distance by using the Ped-Shed technique, with modification to suit the purpose of the research. Both techniques are explained in the following paragraphs.

4.3.5.1. Ped-Shed Analysis

Figure 4.10: Diagram of Ped-Shed Analysis. *Source:* By author.

The Ped–Shed technique is a quantitative accessibility measurement based mainly on graphical and descriptive methods. It is a mapping technique that weighs up the population catchment within a five or ten minute walk from a given node of socio-cultural activity. Other definitions of Ped-Shed describe it as providing walkability analysis of important destinations (for example: Mosques, town centres or transport nodes) within neighbourhoods, and how evenly these destinations are distributed and dispersed through a town or city. When planning new developments, it can be used to identify optimum locations for new facilities and indicate where residential density may be increased. Ped-Shed catchment area methodology focuses on defining the coverage of a street network and built fabric within a designated area and determining how accommodating that network or street pattern is for pedestrian movement. The basic calculation of a Ped-Shed analysis is to divide the area of a 400 or 800 metre circle by the area of the polygon that results by travelling a 400 or 800 metre distance from a designated location along the street network (see Figures 4.10, 4.11).

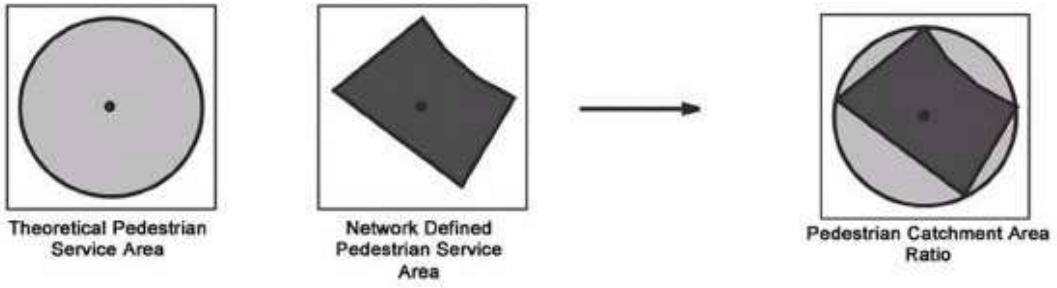


Figure 4.11: Diagram of Ped-Shed Area Ratio Calculation. *Source:* Mineta Transportation Institute

Ped-Shed is undertaken by drawing a fixed-diameter circle which is overlaid on a map with the centre placed on the destination point. Circle radii are usually based on an average person walking 400 metres in five minutes. A second radius of 800 metres indicates a 10 minute walk. The population density within this radius can then be calculated to determine the area of built fabric covered within a certain walking distance out of the total area. Ped-Shed analysis can be further refined by mapping linkages and obstacles that may decrease or increase travel distance or time to give a more accurate population estimate (Congress for New Urbanism, 2001).

4.3.5.2. Distance of Service

Planning standards define the maximum service distance as the distance or time that the user most distant from a facility would have to travel to reach that facility. Determining the appropriate distances to services for the Ped-Shed analysis requires choosing standards that are more related to the Libyan culture, such as the Middle East. Table 4.2 shows the service regions of various services as recommended by Ansari (1983) for Middle Eastern cities. These specifications are based on the culture as well as on the needs of the population in the Middle East (Ansari, 1983).

The Ministry of Urban Affairs in Saudi Arabia Criteria (1980) recommended 300 metres as the maximum walking distance to a mosque, while Ansari (1983), who undertook his study in Iraq, recommended 1,200 metres. A 300 metre distance was adopted in this research, as it seems more reasonable distance than 1,200 metres to travel for prayer several times a day. The second most import public building is the

school, which is considered very valuable for every community and family. Schools need to be central to neighbourhoods or a group of neighbourhoods. For schools the recommended travel distance varies from one standard to another. Most of the specifications (Leibbrand, 1970; Mukfas, 1986; White, 1976) recommend 500-800 metres as a maximum walking distance to the nearest school. This is the equivalent to a 10-20 min walk for the average school child. (In this study only Ped-Shed analysis will be used, as the only concern is about how near the school is to children and safe crossings).

Service	Region of service(maximum walking distance)
Post offices	800 m
Police stations	1,200 m
Mosques	300 m (Criteria 1980)
Parks	300 m
Health centres	800 m
Hospitals	One for city (or circle with 20 km radius) (Criteria 1980).
Elementary schools	500m
Preparatory schools	800m
Secondary schools(high schools)	800m
Libraries	One for a town
Banks	Not available
Public transport	400 m or 5-10 min walk
Fire station	One for a town

Table 4.2: Region of service (maximum walking distance) for Various Services. *Source:* Ansari (1983).

To sum up, in this thesis, with the assistance of the Typo-Morphological approach and with regard to the religious context, the focus will be to find and comprehend the links among or the link between public buildings, Waqaf buildings, and urban form entity. The principal purpose is to maximise the benefits of public buildings in serving communities through understanding and proposing the optimal location within the urban fabric and hence, maintaining both their physical and social urban **integrity.**

4.3.6. Housing

Housing is considered as the fundamental component of the city's urban form. One of the most significant roles of the city is to provide residences for people. Houses reflect their residents' perceptions regarding environmental, cultural, social, visual beauty, and practical requirements. The study of housing from a socio-culutral dimension is important in order to understand these preceptions. As reviewed in previous paragraphes, housing is considered an essential element in Typo-Morphology as typolgists have greatly related their works to houses. For example, Rossi introduced three types of houses: Central court type, gallery type, and separate dwelling type (Bandini, 1981). Also, Caniggia and Maffei (1979) placed an emphasis on houses as the 'basic building' of the urban component in which cultural tradition is important in different types (Caniggia and Maffei,2001).

Houses are the first built environment where strong family social interactions and ties take place. This study will analyse housing from the Typo-Morphological point of view with an emphasis on the link between physical features and the socio-cultural needs Therefore, two main elements that describe/detail/explain this meaning will be investigated in the following paragraphs.

The house is the main building unit of the settlement and constitutes the principal socio-cultural asset of the community; it is generally part of a block common to the same family. One of the most important socio–cultural elements that houses provide to their dwellers is privacy. The idea of privacy is an important element in housing and has been synonymous with house design since the start of civilization. Establishing a clearly defined territory occupied by related family members has always been one of the main natural concerns in the built environment. People had the need to protect themselves from environmental elements and from their enemies as well as to withdraw from the broader group in a private manner. According to Gür (2000) in his publication about culture and the Ottoman Housing Architect: "although most of the privacy control mechanisms are conceptual, archaeologists and architects dealing with these subjects can easily decide whether a space in a house is private or for social use. Because, the understanding and practice of privacy can be

traced from the strong marks in the human-built environment", these marks are cultural echoes of various mechanisms transmitted from one generation to the next (Gür, 2000, p. 76).

In the above context housing represents an important factor. The use and placing of open spaces in houses are important for people to experience their social space and regulate their territory and consequently the degree of desired privacy. The concept of a space capable of providing both sanctuary and privacy has been essential for societies. Houses' private and open spaces have taken many forms and being situated in different types of locations in their layout, always in respect to the socio-cultural needs of the dwellers (Bekleyen and Dalkilic, 2011). This study - as mentioned before in the methodology chapter - will only focus on the privacy element of houses' open spaces and exclude any other factors.

This section studies and compares the typology of the Benghazi case studies' different house forms, the Ottoman, the Italian and the Modern, in terms of the level at which the open spaces preserve the socio-cultural norm of privacy. Therefore, the study will explore the degree of separation boundaries between private open spaces in public streets and houses and their locations. For example the location of the inner courtyard is more private than the front garden for certain factors involving their distance from the adjacent public street. Another example the study will focus on is the permeability character of the separating walls between houses and their adjacent streets, as the permeability of the wall plays a significant role in the privacy of those rooms behind them. The study will also highlight the diversity level of those houses' front edges (front walls), length and dimension, which indicate different parcels of plots situated behind them within the same block. This is considered to have the positive social effect of allowing mixed income dwellers to live in the same block. The (Morello and Ratti, 2009) diversity index is used in the formula as shown below:

$$D = 1 - \frac{\sum_{i=1}^{S} n_i(n_i - 1)}{N(N-1)},$$

.

Where D represent the Diversity Index of Housing Walls, S is the number of classes (i.e. Short length wall, Medium length walls, and Large Walls), n is the length in each class of wall, N is the total number of walls' lengths.

4.3.6.1. House Walls

Walls have a very deep social and cultural presence in Muslim communties, as is reflected in the old Islamic planning sytem. Privacy as preventing harm caused by pentrating sights is one of the most important needs which the built enviroment should maintain in the neighbourhood. No walls means there are neither paths nor alleys because walls do not only provide border and passageways, but also form them in the first place. Street walls shape spaces that informal public and neighbourhood social interactions contained and flourish (O'Meara, 2007).

Walls symbolise the concept of privacy, O'Meara (2007) pointed out that in the logic of the wall, families, and specifically women, belonged within the privacy of the house or, at the very least, the semi-privacy of the neighbourhood. Hence, Islamic building laws coupled with the Arabic culture of shyness give the residents the right to privacy by preventing sight penetration of a neighbour's house, where a wall might be built to block overlooking windows and doors.

People, specifically elderly and women, socialising under the shadow of houses' front walls is a scene/event widely viewed as common practice in Benghazi. Walls in old Arab-Muslim cities have a noticeable presence as shown in the paragraph below (Figures 4.12, 4.13). Moreover, walls broadly define the space of local streets. Islamic Literature suggests that any understanding of the nature and characteristics of these spaces should mainly regard walls as a crucial part of the urban fabric. The Tunisian architect and scholar, (Djerbi 1996, p. 10 as cited by O'Meara, 2007, p. 2) explained that: "The walls of the medina, steer our changes of place, enclose, delimit, and protect our activities, objects, and tools; receive us and make us pass from one location to another. They separate and structure the architectural space, and by way of this they allow us to dwell. They can, therefore, signify the nature of this dwelling".

Figure 4.12: Walls that Shape the Neighbourhood Paths. *Source:* Colors of Libya

Figure 4.13: Libyan Ladies Chatting in the Shadow under the Wall within the Sanctuary of the Neighbourhood. *Source:* Colors of Libya

As discussed in Chapter 2, walls have an important place in the legal and planning system in Islamic building law. Recently, there is a growing awareness of the

historical element of Islamic law that is concerned with the regulation of the Arabian Islamic city's architectural environment, mostly its neighbourhoods, as it forms a large proportion of its urban fabric (O'Meara, 2007).

The socio-cultural notions show the importance of the role of walls as a Typo-Morphological element in understanding the planning of Islamic towns and neighbourhoods by organising the relation between next-door neighbours. This study will consider walls as a Typo-Morphological element that is embedded in the urban Arab-Muslim culture. The resulting interpretation of the study can then be applied to the structure of the urban design guidance of deprived neighbourhoods in Benghazi.

It is a principal and common fact that the concept of a property is that it has a legal boundary in the shape of walls, as a theoretical line within which a person or group of related people has certain rights and privacy to enjoy. The notion of walls as a regulator of privacy is important in Arabic Islamic culture as illustrated in Chapter 2. Physical boundaries maintained by spatial elements such as walls either aid or hinder someone's ability to regulate social communication. So in the case of a walled border-defining space, walls can be described as the physical property indicating the amount of privacy which is communicated through the boundaries of the surroundings. In light of the above, a wall's permeability as a spatial boundary, can act as to separate or bring two or more spaces together (decrease or increase communication). As such, a wall's permeability can be expressed as the level of relations-communication between different spaces which are separated by boundaries (O'Meara, 2007).

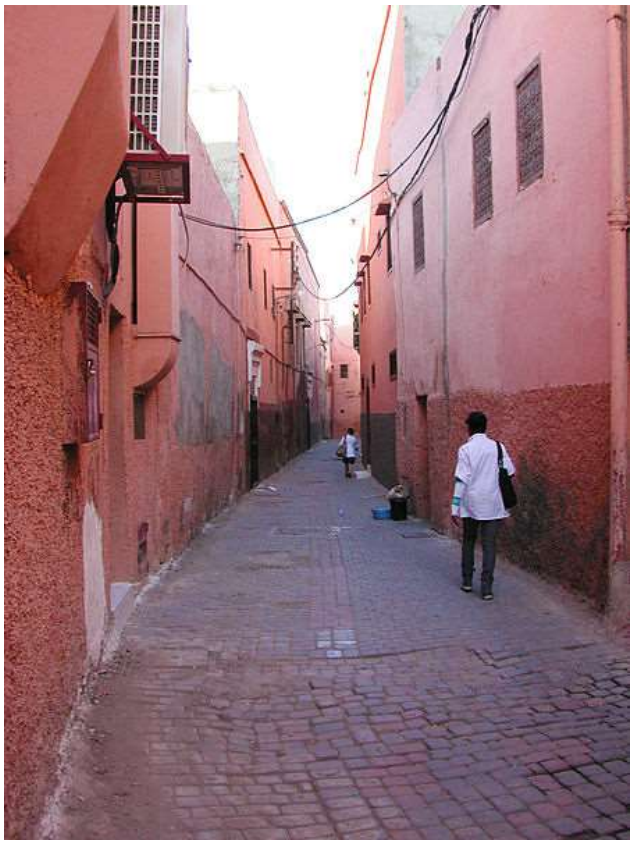


Figure 4.14: Plain Housing Walls in Arabic Streets with little Visual Permeability. *Source:* wikimedia.org

In this study, the permeability of walls will be understood by their openings, such as windows and doors. For windows this will be calculated in terms of their size (area) and height location from the ground. In term of a door's opening, opposing houses' door locations are seen as an important factor in avoiding a straight line of sight between them. Line of sight will be understood by drawing a straight line between opposite doors and calculating the angle degree between the line and the opposite walls, the bigger the degree calculated the less privacy and vice-versa. For example, if we have two doors exactly opposite each other, the angle degree between them will be 90 degree and thus a very low level of privacy. To summarise, three main factors will be used to assess permeability of walls, firstly window height and area, secondly wall length diversity, and thirdly the opposing door angle degree.

The graph below (Figure 4.15) shows an illustration drawing which helps to explain the method of analysis.

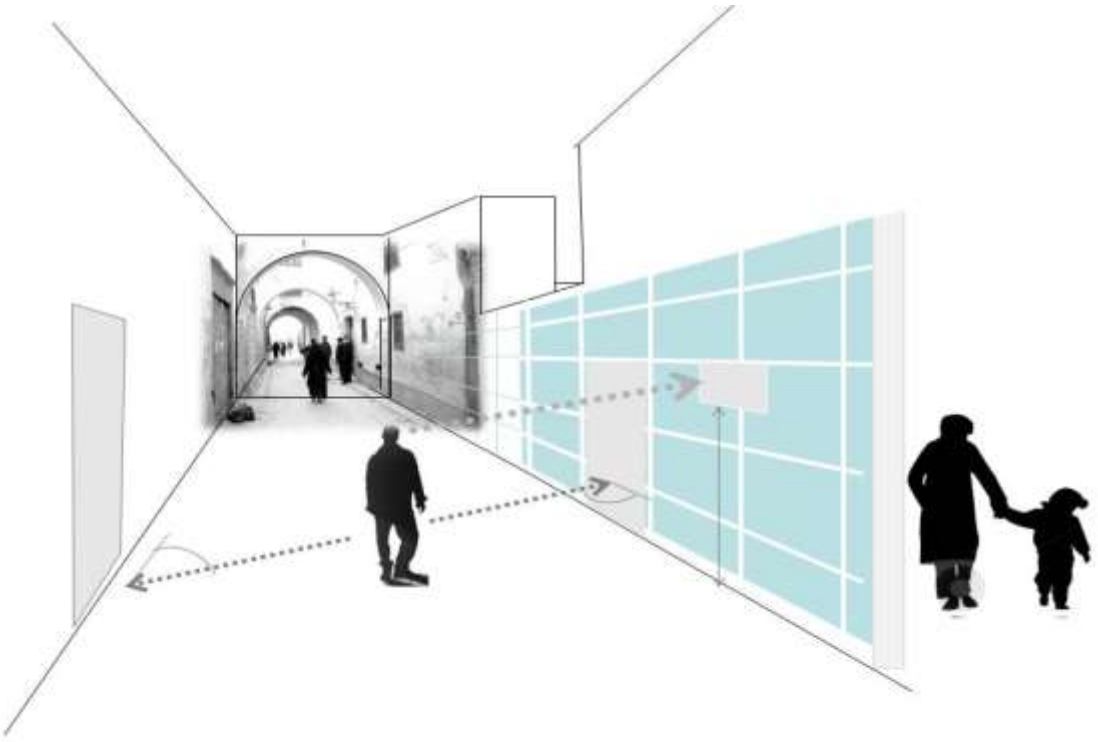


Figure 4.15: Shows an Abstract Illustration of Wall Permeability Analysis in this Thesis. *Source:* By the author.

4.3.6.2. Houses' Open Spaces

In traditional Arabian-Islamic housing, there is a void space that usually contains most of the social housing interactions due to climate, privacy, and hospitality reasons. Thus, Hillier and Hanson (1984, p. 88) identified the relationship between the social interaction and those void spaces within housing buildings: "the social meanings in buildings take place within the spaces of the buildings, and the ordering of spaces in buildings is depending on the ordering of relations between people". In this study, the author will divide the open spaces within the house into two main types: the internal, which reflects the place of private social interaction among the family members themselves, especially women and the external which reflects the place of informal, semi-private social interaction among the house residents and

visitors such as neighbours and close friends , and its mainly used by young men and the elderly. However, social interaction with formal visitors takes place inside the housing building in reception rooms to provide a formal level of hospitality, which will be excluded from the analysis in this study as they are more related to the architectural field and out of scope of the urban design one.

Housing open spaces can therefore be categorized according to the degree of privacy provided by their location and the degree of permeability of the separation wall. This analytical approach aims to provide a more quantitative picture of the architectural arrangement of housing open spaces in terms of their social meaning, and shed light on the physical permeability characteristics of the front walls. This section will first study the Benghazi case studies' housing open spaces which will be divided into two parts: internal spaces such as courtyards, and external spaces such as the old Arab front house sitting area (Dikka in Arabic). Secondly, front walls will be studied in terms of their permeability and length diversity. Methods of studying these aspects will be illustrated in later paragraphs.

4.3.6.2.1. Internal Open Spaces: Courtyard, and Front Garden

Courtyard housing is one of the oldest forms of housing development, in existence for at least 5,000 years, and has taken various forms all around the world. It was initially associated with the Middle East to adopt to climate and culture demands. Hence, the shape, type, and form of courtyard housing depends on these demands. Courtyard houses were part of North African Roman settlements like Libya long time before the arrival of Islam in North Africa (Edwards *et al.*, 2006).

In almost every society, the need for privacy is a significant socio-cultural factor that influences housing design. A wide range of designs have been evolved in various cultures to accommodate people's need for privacy as one of the necessities in housing form. Gottlieb (1965, p. 155) expressed that privacy is an essential need for all humans: "shelter must satisfy the need for a physiological feeling of protection, a feeling that there is something solid around one".

However, in modern housing design, the front garden has been widely adopted by designers and planning authorities in Benghazi. Unlike the courtyard which is a void space in the middle of the house, the front garden is a void space in-front of the house which implies the elimination of the courtyard inside. Therefore, they are mutually exclusive due to space and financial constraints in social housing planning in Benghazi. Thus, the more spreadable front garden has been subject to more regulation compared to the dimensioned courtyards. For example, front gardens are regulated by a three meter buffering law imposed by Libyan planning authorities as an area of private social life in Benghazi social housing. However, the modern front garden has failed dramatically in Libya (Figure 4.16).

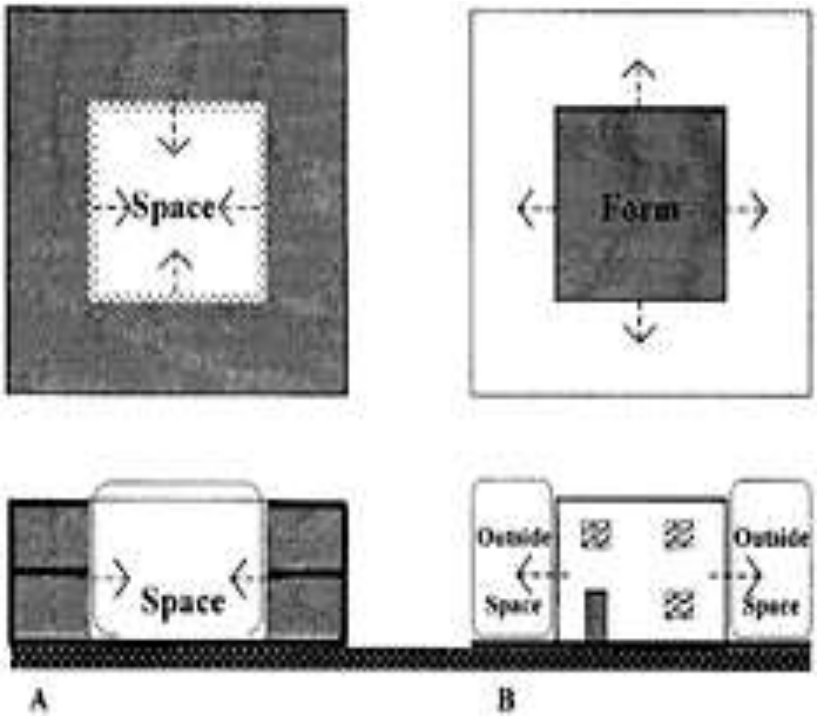


Figure 4.16: The Central Courtayd in Tradtioanl House on A. The Three Meter Buffering in Modern House on B. *Source:* Bahammam (2006).

Although courtyard housing has received less concern in modern housing design, it has continued to be one of the main focus of numerous studies. Courtyard housing has been examined in research studies such as those that deal with environmental sustainability and others that are concerned with adaptivity of courtyard housing to the social policies of local planning authorities (Edwards *et al.*, 2006). However, this

research does not aim to add to the existing numerous studies on the Islamic courtyard. It only focuses on the angle that supports the argument of the failure of modern front garden to serve cultural and social needs.The failure of the front gardens was shown in the way that dwellers transform them to solid buildings for uses other than social interaction such as house expansion and commercial shops (Bahammam, 2006).

In this thesis, the courtyard is considered as a void open space for private social-interaction within the texture of the urban fabric. The focus of this study is the spatial location of both front gardens and courtyards as open spaces on the plot unit and within the block perimeter as a whole, in an attempt to assess its changes in spatial location in modern housing and how people made changes to suit their socio- cultural needs. The classification of interior housing open space types in this research will only be to consider their location and social function, and how the front and back gardens in the modern houses fail to socially replace the traditional courtyard.

The courtyard is the centre of the house and equally the social centre of the family life. It is the most liveable part of the house. Different courtyard types have a variety of different architectural and physical characteristics which can each be analysed by understanding their functional and social meaning. There is no doubt that the element of privacy had an impact on houses' typological courtyard characteristic. Determining the level of courtyard privacy is considered to be a strong parameter when it comes to assessing the significant of socio-cultural elements in housing architecture and spatial arrangement (O'Meara, 2007).

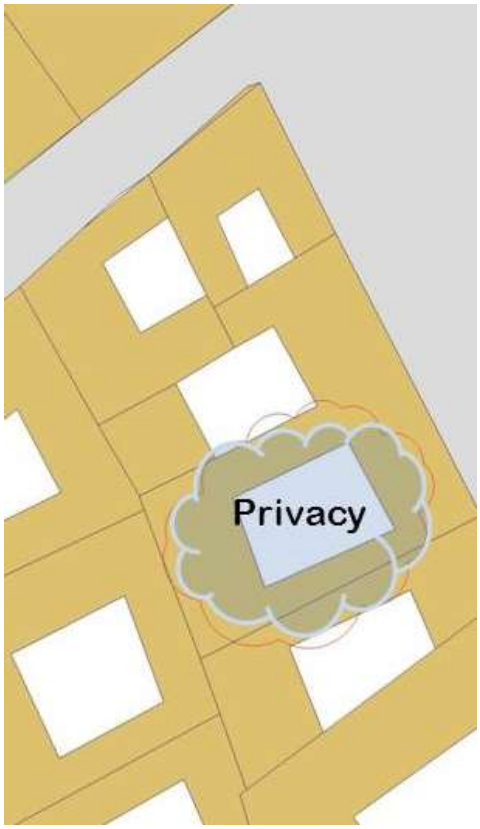


Figure 4.17: Privacy of the Courtyard. *Source:*by the author.

This study proposes two main quantitative factors that determine the level of liveability and privacy in courtyards or houses open spaces. The first one is the size or area of the courtyard where family social activities will be performed, as size plays a crucial factor in allowing enough space to those activities to take place. The second factor is the distance between the courtyard and the public street, as the element of privacy requires a good separation between them to provide a sanctuary to protect space for families to enjoy their group social life. The analysis approach will adopt those two factors and apply them to the three cases studies examined within this research, the Ottoman quarter, the Italian quarter and the Modern neighbourhood. The aim is to find out which of the case studies has the higher rate of courtyard sizes and located at the longest distance from the nearest street.The higher the results, the better the space will serve in terms the privacy norm and in providing enough space for family social life to be carried out in a sanctuary environment.

4.3.6.2.2. External Open Spaces: Dikka

The social habit of sitting at the outside house front is the reason why traditional house design has an external seating area called Finaa. Dikka is a seating area adjacent to the house shadowed by the front wall were people sit and discuss daily aspects of their lives. (Lockerbie, 2005). In Benghazi, the social function of this external area is to serve as a semi-private area for short meetings among male members of the house and their informal visitors where there is no need for formal hospitality services to be provided.

In Benghazi, it is common to see elderly people use this area for long periods of time. This external area (Finna) acts positively in giving the elderly and the disabled the opportunity to enjoy the social life of the neighbourhood. This is because it gives them the option of being both near to their houses and essential care, and in the middle of the street's daily life and neighbourhood affairs. In addition, the presence of elderly people in neighbourhood streets watching children playing in front of them gives a sense of security to the neighbourhood. Mixing elderly people with children has numerous social benefits for both of them, it creates a source of happiness and enhances self esteem for the elderly and disabled, and provides children with security and a better chance to develop their personality through interaction and integration in a safe environment.

The modern housing form in Benghazi did not recognise the need for semi-private open space in front of houses and only treated these areas as a public street for the purpose of movement, failing to regard them as a social interaction focal point. Therefore, house residents have made some modification to the street path in front of their houses to meet their social requirements. Unlike other alterations in the inside open spaces, this one is made in a publicly owned area which is the street pathways. The photographs below (Figures 4.18, 4.19) illustrate the character of informal arrangements of the Finna. The chairs are aligned along the external side of the wall and close to the house main entrance. The photographs are of modern houses, but demonstrate the adaptation of social needs for all hosts to sit with their informal guests in a semi-private area for a short time.

Figure 4.18: A Semi-Private area to socialise with informal visitors. *Source:* catnaps.org

Figure 4.19: The combination of uses of the shadow from the tree, charitable water fountain, and a sitting place that form a social, pleasant gathering point. *Source:* catnaps.org

One essential characteristic of the Arabic traditional street pattern is the ability for people, particularly elderly men and children, to meet in a series of unstructured encounters. Houses' external setting areas (Dikka) are the most informal location for social meetings. Their locations are important in that they appear in both a public and semi-public space where the users can see and be seen by those passing. Dikkas are usually built adjacent to the wall as an element of the external design of the residential wall (Figures 4.20, 4.21).

Figures4.20, 4.21: Elderly People Enjoying Street Social Life Sitting on the Dikka on their houses front wall. *Right image source*: Libyan.org. *Left image source:* catnaps.org

Many houses in the Benghazi Ottoman quarter have these seating areas outside which become part of the informal social life that features in everyday life. Unfortunately both the Italian and the Modern neighbourhoods have an absence of these semi-private sitting spaces in their house walls. The opportunity is missed to accommodate a socio-cultural relation between elderly people and children in the street, through which the first group, the elderly, enjoy street social life and moreover the positive emotional feeling of being around the happiness of children playing, as well as having the advantage of nearby services that their house can provide to them in the fresh open air; and the second group, the children, also benefit from the enjoyment of playing out-doors in a safe and secure street environmentunder the surveillance and protection of the elderly (Figure 4.22).

Figure 4.22: An Artistic Drawing Shows Elderly People Socialising on Dikka, while Children Play around them. *Source:* Libyana.org

4.4. Summary

To summarise, this thesis study is using an approach that takes into consideration types and morphologies of the past, through which it seeks to be of great value for future development and regeneration projects. This approach is thought to produce conceptual tools and make urban design language richer and clearer. This requires a wide vision that does not isolate urban elements as individual objects but rather sees them as a part of the whole physical and socio-cultural context of the city.

This chapter has defined some key terminologies such as morphology, type, typological process and Typo-Morphology. In addition, a clarification of the hierarchy of scales has been illustrated and the rationale behind chosen six elements of the urban forms at each scale have been discussed through the literature in order to reach an analysis that is supported by both theoretical frame work and practical application.

In the next chapters, each urban element of Benghazi neighbourhood case studies is investigated in depth using the Typo-Morphological methods, and is examined against the socio-cultural norms. Morphological neighbourhoods are addressed through general plan analysis by comparing the three neighbourhood case studies to extract the physical alterations based on social and cultural needs. Thus, each element's types and typological process will be demonstrated, and the comparative outcome will be used in developing urban design guidance that is applicable for deprived neighbourhoods in Benghazi.

Chapter 5:
The City of Benghazi: Descriptive Analysis of The Three Case studies

Chapter5: The City of Benghazi: The Descriptive Analysis of the Three Case Studies

This chapter will introduce Benghazi city, its geographical status and the urban evolution of the city throughout history. The thesis contains three case studies: The Ottoman, the Italian and the Modern neighbourhoods, targeting regeneration areas. These will be introduced through illustrating the historical urban evolution of the city and its historical context.

5.1. Geographic Status and Historical Context

From a geographical point of view, the coordinates for Benghazi are 32 degrees N and 20 degrees E. Benghazi is the second largest city in the country and as well as being the capital of Eastern Libya it is also considered to be joint capital in status alongside Tripoli. It continues to hold the Benghazi municipality seat as well as the seat of the Benghazi administrative province. Figure 5.1 illustrates the geographical position of Benghazi in the country. Benghazi holds one of the Mediterranean Sea key harbours on the African coast, situated where the city extends about 4 kilometres along this coast. The harbour had great influence on the livelihood of the inhabitants during the Ottoman rule; hence it has had great influence on the morphology of the urban pattern as will be explained in later paragraphs (Urban Planning Authority in Libya (UPA, 2010).

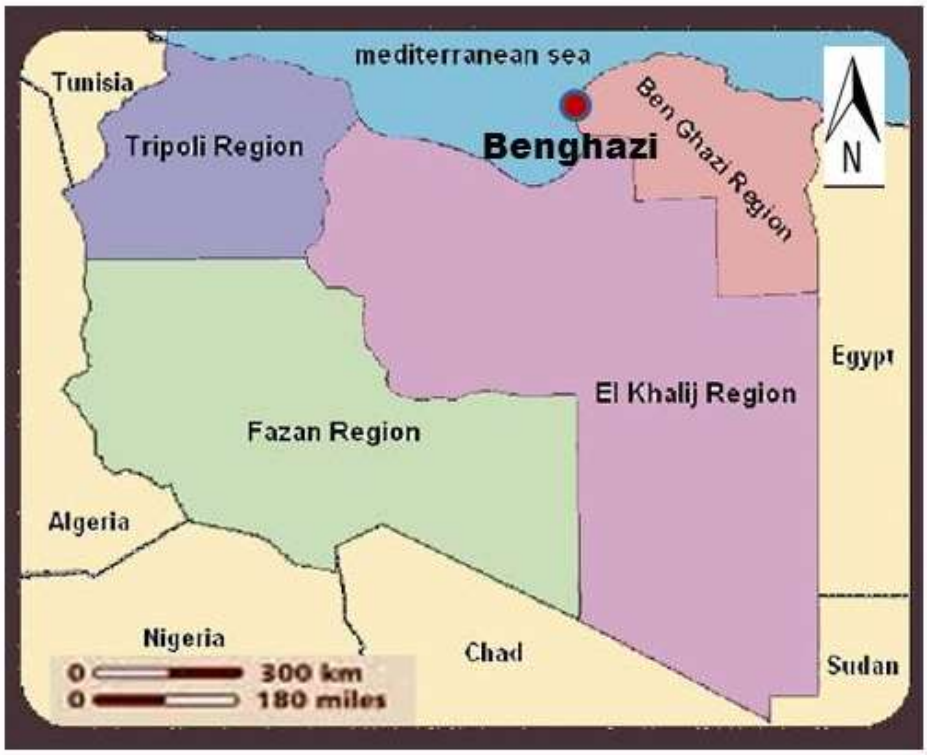


Figure 5.1: The Geographical Position of Benghazi in Libya. *Source:* Urban Planning Authority in Libya

Benghazi has a typical Mediterranean climate due to its location on the southern Mediterranean coast, which provides a favourable climate for many in terms work and living. However, the southern dusty hot winds (Qibli) which blow for a few weeks during the summer are considered the least desirable climatic feature. Qibli is a hot desert wind that hits most of northern Libya during the early months of the summer season (April and May) and which carries huge quantities of sand from the desert thus causing a rise in temperature. The direction of the wind has influenced the orientation of urban pattern of both the Ottoman and Italian sections of Benghazi city centre, as will be explained in later paragraphs which analyse the general plan of both historical quarters. In general the morphology of the city is characterized by a semi-arid large half circular shape, with a flat plain topography and the presence of some salt wetland lakes and marshes, locally called Sabkhas. In both the Ottoman and Italian historical core of Benghazi, the sea is responsible for shaping the north

and north west boundary of the city centre e, while the sea lagoon forms its shape from the south and south west, and from the west it is shaped by the salt wetland lakes Sabkhas. This led to the natural growth of the city during the Italian rule to be restrained to a narrow strip of land between the sea and the salt wetland (Abdulaa, 2007).

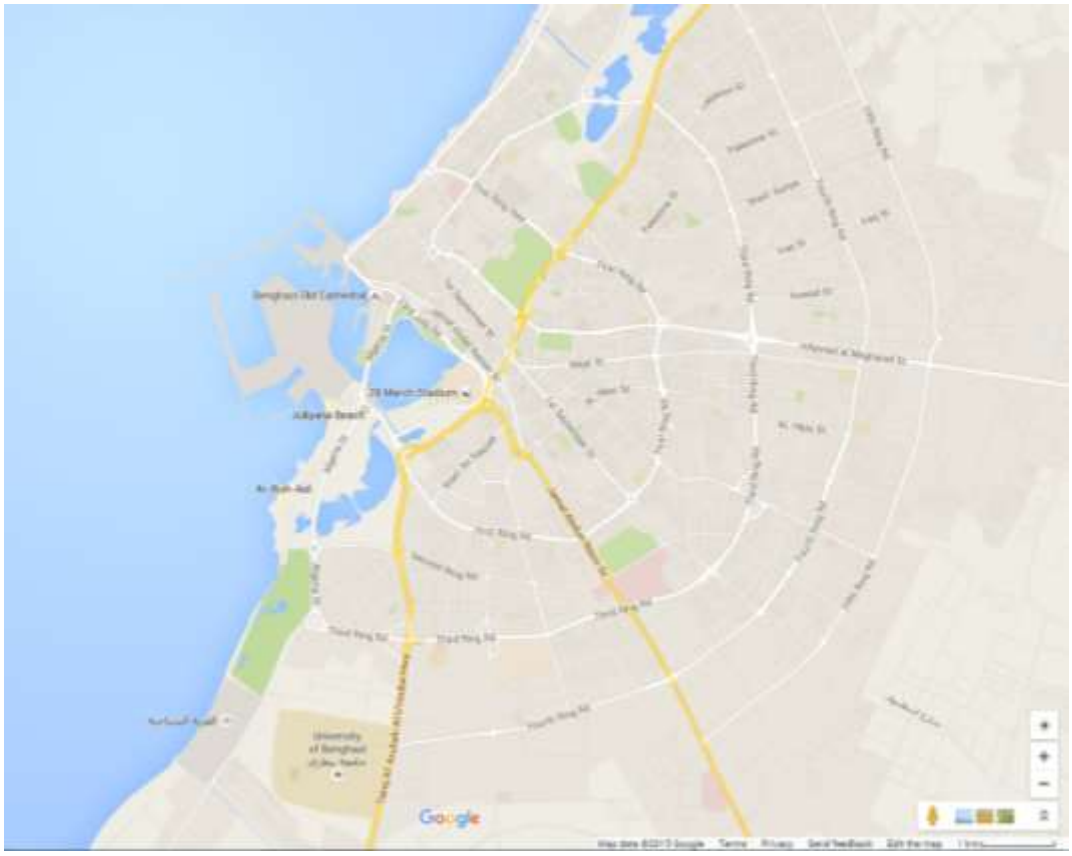


Figure 5.2: Main Circular Roads in Benghazi. *Source:* Google maps

5.2. Introduction of the Three Case Studies

Three case studies will be the main focus of the study analysis. The Ottoman old quarter will be focused on because of its genuine urban form, which reflects the socio-cultural dimension of the Libyan society, but on the other hand cannot be an example to follow as it is out of date in terms of serving the contemporary Libyan society, such as incorporating new facilities like public areas and administration buildings. These new facilities where introduced to Libyan society during the Italian colony and after its independence, and can be found in the Italian city centre quarter. In addition, the second case study, the Italian city centre quarter, provides the thesis with an era during which Benghazi experienced a turning point, adopting automobile routes in the city's urban fabric. The third case study is the modern deprived neighbourhood that reflects most of the huge expansion of the built up areas in Benghazi city. The deprived neighbourhood used is "17thFeb neighbourhood". This neighbourhood gives a good reflection of the changes made by its dwellers in adapting their socio-cultural needs in the built environment. In addition the neighbourhood is used to reflect the criticism of global modern design, which spread all over Benghazi through following global design theories without respecting the local context.

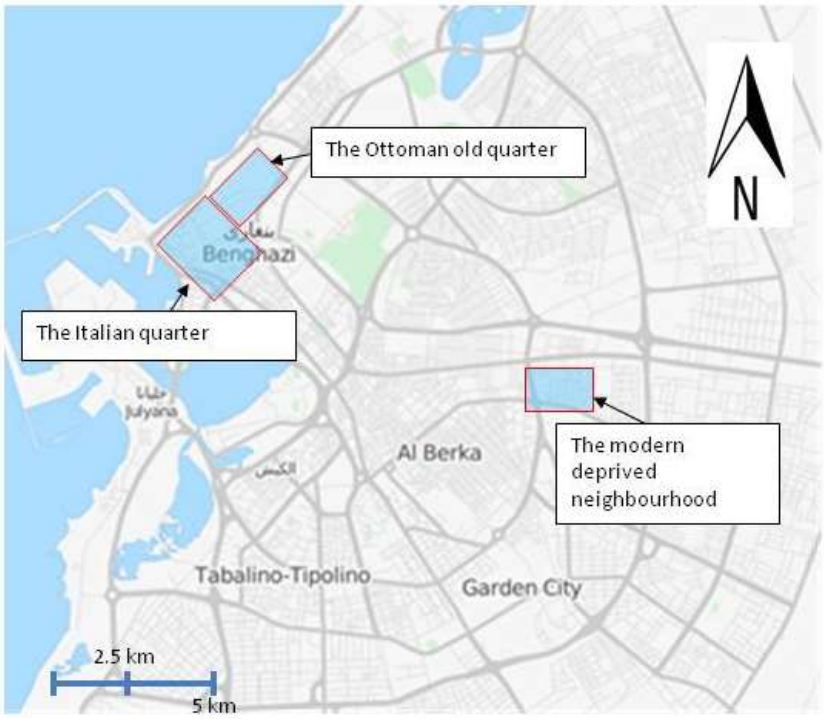


Figure 5.3: The Three Case Studies of the Thesis. *Source:* (worked by the author)

To summarise, the analysis chapters of this study have been carried out to cover three turning point periods which are, in chronological order: The Ottoman, the Italian, and the present contemporary period.

5.3. Brief History of the Evolution of the Urban Development

The origin of Benghazi as the second largest urban settlement in Libya dates back to more than two thousand years. The city was founded in the 6th century B. C. by Greek settlers from Cyrenaica and it was known by the name Eusperides**.** In the second half of the 3rd century BC, the city was transferred to a new site called Berenice where the present Benghazi subsequently evolved, (Goodchild, 1962) (see Figure 5.4) . With the arrival of the Islamic conquest (643-1552), the name Berenice was replaced by the name 'the harbour Benghazi'. The name Benghazi was used for the first time in 1579 (Goodchild, 1962; Bulugma, 1964). Benghazi was selected to be the principal administrative centre during the Ottoman rule of the country (1711-1911) and its position was strengthened when it became a principal military centre during the Italian rule (1911-1940). Under the British Administration (1942-1951), the military position of Benghazi remained until the country gained its independence in 1951. However, Benghazi began to gain more administrative and economic importance after the discovery of oil in the late 1950s, which made the city more attractive to rural migrants who left their own villages seeking well-paid jobs and better living standards (General Popular Committee, 1989a).

The city is divided into many neighbourhoods, some of which were founded during the Ottoman and Italian Colonial rule and many of which have developed as a result of copying modern urban cities. The various neighbourhoods differ in their level of economic prosperity, as well as their cultural, historic and social atmosphere. The city can be roughly divided into the following areas: Central Benghazi (referred to as Al-Blaad by locals): includes the old quarter of Ottoman and Italian sections and the modern expansion after its independence and oil discovery (Abdalla, 2007).

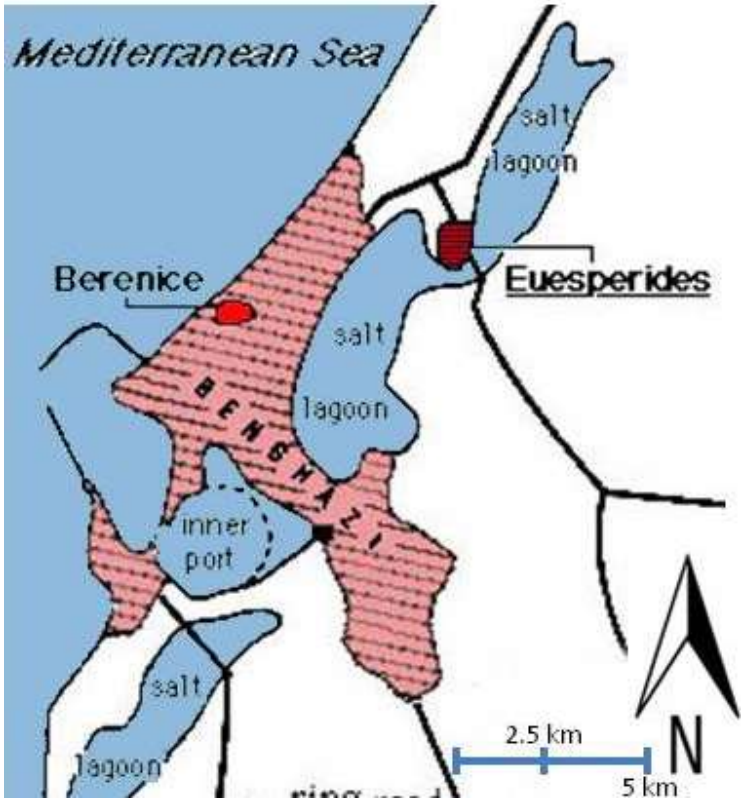


Figure 5.4: Salty Lakes (Sebakha) and Seaside Shape the City Centre Core. *Source:* Museum of Art and Archaeology, University of Oxford

5.3.1. The Ottoman Evolution of Benghazi: 1711- 1911.

During this period, the growth of Benghazi was very slow due to the severely poor economic conditions that the city experienced. However, the structure of Benghazi witnessed a slight expansion and underwent some modifications during the Ottoman era (Goodchild, 1962; Bulugma, 1964). The Ottoman section morphology has a very basic pattern, but still functions well. The Ottoman area is located between the harbour, the salted wet lands, and the sea line. Later paragraphs will shed light on understanding its morphological characteristics and features and its socio-cultural dimensions.

5.3.2. The 1930 Italian Master Plan of Benghazi: (1911-1940)

From the 1911 to the 1930s Benghazi experienced a pause in its development as it was leading the resistance of eastern Libya against the Italian invasion. After the

1930s, the Italians occupied Benghazi and started to construct their settlements, during which time Italian planning features and style of architecture began to dominate most of the new developments in the city, mainly for the benefit of the Italian colonists (Goodchild, 1962). By the late 1930s, four Italian master plans adopting European planning ideas were introduced for Tripoli, Benghazi, Misurata and Derna. These are considered to be the origin of town planning in Libya (Kezeiri, 1984). At that time, Benghazi city mainly consisted of two large distinct quarters; the old Ottoman Arab quarter and the modem European quarter built by the Italians. Italian Master Plan for Benghazi in 1930: area number 1 at the top shows existing Benghazi which is the centre core of the Benghazi Italian section and the neighbourhood which is studied in this thesis (see Figure 5.5).

Figure 5.5: Benghazi Master Plan made by the Italians in 1930.*Source:* Urban Planning Authority in Libya

5.3.3. The Kingdom Era: The Post-Oil Era

As mentioned in Chapter 1, during the Kingdom era, Libya witnessed dramatic urban population growth. The population increased from137,295 inhabitants in 1964 to 266,196 inhabitants in 1973. In addition to having a natural growth rate of 4.4 per cent, the crude birth rates in Benghazi were the highest in the whole country during 1974 (Awotona, 1990). The natural population growth together with rapid

immigration into the city from other countries led to dramatic population growth in the city during the 1960s and early 70s (Urban Planning Authority in Libya (UPA, 2010).

It was evident that Benghazi's development during the Kingdom era brought with it a new stage of dramatic growth. In this respect, this phase was undoubtedly the most important stage of the city's evolution. During these crucial years, Benghazi almost completely changed in size, in layout and in architectural style and urban form. Most of the residential areas built according to the 1966 master plans, mainly followed western global urban patterns. One example of this is the form of clustered neighbourhoods where more open space was provided, and the neighbourhood centres were located in the middle of its urban fabric (Abdalla, 2007). After the 1969 revolution, specifically from the middle of the 1970s, the city's urban development and regeneration was largely hampered by the serious political, administrative and economic problems that the country was suffering from at that time (see Chapter 1).

5.4. Social and Economic Dimensions and Future Prospects: After the 17th February Revolution

Benghazi has the second largest population in Libya with around 650,000 inhabitants spread over a plain area of around 60 km^2 (23.2 $mile^2$). The Benghazi region holds over one quarter of the entire Libyan population and produces over one-fifth of the country's total employment. About 30 per cent of the government-built social housing stock is in Benghazi in an area of approximately 13.92 Km^2 representing about 23.2 per cent of the total urban area (Urban Planning Authority in Libya (UPA, 2010).

Benghazi has a well-known history of being the cradle of uprisings and revolutions in Libya, with the 1969, 2006 and 2011 revolutions starting in Benghazi. Many consider this to be a result of the vibrant intellectual environment that exists within the city. It has the first university to be built in Libya as well as being the birthplace of the first political parties. The city's political environment usually has an influence

on its urban planning policies by directing its policies toward a genuine adoption of the city people's needs and their socio- cultural context.

During the 1969-2011 dictatorship of the military regime, problems emerged due to the political environment that caused instability and corruption. Together with severe shortages of funds in the country and inadequate planning policies in the housing sector, mentioned in chapter 1, this made it hard to fill the shortage required in the housing development. The social impact was seen in the dramatic decline in marriage numbers, and resulted in slowing the population increase in Benghazi, compared to the Kingdom era (1945-1969) discussed in chapter 1. The recent 17thFeb 2011 revolutionary National Transition Council in Benghazi suggested that expenditure on the housing sector should be directed towards implementing mass public housing projects, enabling Libyans to start their families(Colijn, 2010).

Libya, economically, has an excellent position that should allow it to fulfill its planning strategy, as long as corruption is reduced. Libya has Africa's largest oil reserves worth around USD130 million a day at current world oil prices. The Eastern region of Libya supplies more than 60 per cent of oil exports and much of Libya's oil reserves is thought to be in this region (Colijn, 2010). Benghazi, being the capital of the eastern region, represents itself as the oil capital of Libya and hopes to fuel economic revitalization in the east by promoting ambitious economic plans such as developing new industries. Heading these plans will be the urgent requirement of filling the shortage in housing stock and revitalizing the whole city and its deprived areas.

5.5. Neighbourhood Boundaries: Defining the Physical Neighbourhood Boundaries of the Study

In urban design literature, the strategies approach of defining neighbourhoods based on using geography zones or higher geographical aggregations as proxies for neighbourhoods is problematic from the point of studying socio- cultural aspects. The physical boundary of neighbourhood interaction may be particularly important

for children and their safety because of the spatial restrictions on children's patterns of social activities. A different approach to defining neighbourhoods, as proposed by Grannis's recent studies of Los Angeles, San Francisco, Pasadena, CA, and Ithaca, NY, outlines natural components based on the form of street patterns. Using GIS, Grannis determines residential units that he calls "tertiary communities" by defining aggregations of street blocks that are within the reach of local pedestrian movement, meaning that pedestrians can walk through the area without having to cross major barriers, in this case, thoroughfares. Grannis compares local communities defined by residential street patterns to data on the social networks of neighbours, including residents' cognitive maps of their neighbourhoods and areas of social interaction. Grannis concludes that individuals interact more with people living within their local communities than with people who live nearby but across major thoroughfares. (Grannis 1998, 2001)

The Morphology of local pedestrian streets is based directly on patterns of social interaction that involve children and families. Parents are generally concerned with distinguishing territory outside of which their children should not wander unaccompanied by an adult, to ensure that their children stay in areas that are safe for play and favourable to adult surveillance. To the level that these spaces of children's daily activities usually do not cross major thoroughfares, defining community areas may provide a base for finding neighbourhood boundaries based on the children's social group and social interactions.

In the Benghazi Ottoman quarter and also to some extent in the Italian, automobile streets were limited. Thus, most of the neighbourhoods were connected for pedestrians and this has reflected positively on the social cohesion of the whole quarters. However, in new Benghazi, segregation of neighbourhoods resulted from the automobile-oriented planning system that led to hierarchical street patterns and the development of high speed thoroughfares between neighbourhoods.

Mosques, markets and transportation points or stations in Muslim communities provide localities with their daily needs and act as a social catchment points in

neighbourhoods. These catchment points tend to be located along established routes or crossing points.

As a distinctive feature of their facilities, most traditional Libyan neighbourhoods had a mosque and adjacent street market, which provided a socio-cultural focal point for the community. Thus the local communities' markets were easily accommodated within the neighbourhood boundary. These markets usually included both retail and service functions, such as food shops, bakery, butcher, and repair shops.

The conclusion from the above arguments is to define a socio-cultural and economic meaning to be used as the basis for defining the physical frame of neighbourhoods in this study. Thus, **"**neighbourhood" in this study can be defined as a group of dwellings located together as a cluster and sharing streets linked to a main market space or street, and as a cluster whose inhabitants share a local daily mosque. And for the social, safety and security concerns of the well-being of local children, the physical boundary of the neighbourhood should not include high speed thoroughfares.

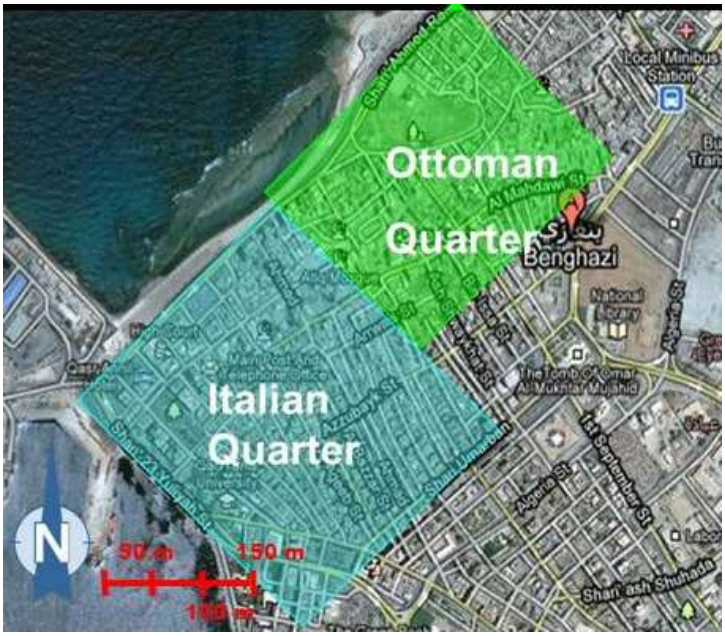


Figure 5.6: The Physical Boundaries of Ottoman Quarter and Italian Quarter. *Source:* By Author

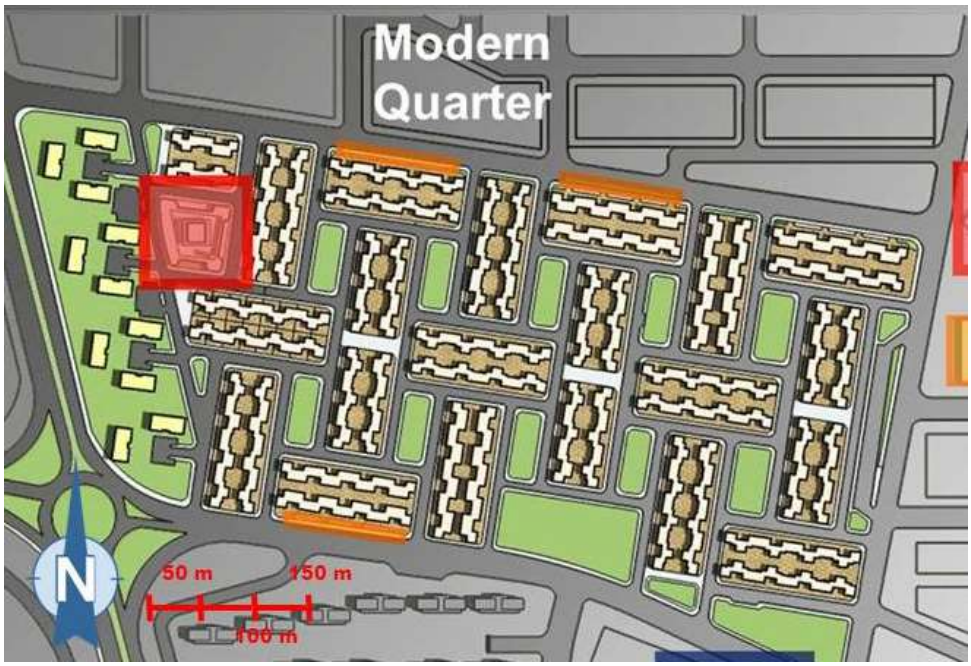


Figure 5.7: The Physical Boundaries of the Modern Deprived Quarter. *Source:* By Author

The Analysis: Exploring the Link between Socio-Cultural Values and Urban Form in Benghazi

Chapter 6:

Large Scale Elements: General Plan, and Streets and Street Networks

Chapter 6: Large Scale Elements: General Plan, and Streets and Street Networks

6.1. The Analysis of the Three Cases in Benghazi

In this Chapter, the Typo-Morphological analysis of Benghazi case studies will focus on assessing each element of the Typo-Morphological analysis against the socio-cultural norm, in order to understand how responsive they are to the social and cultural dimensions of the Libyan society. The analysis will attempt to reveal and discover the different physical arrangements of the urban elements and their role in enhancing the social life of the neighbourhood. Physical analysis tools will be introduced for each element. Those tools are introduced to help in quantifying the social dimension in a physical shape and empirical numbers if possible. For example, areas of social gathering points shaped by different block arrangements will be drawn and quantified, and examined in terms of their level of interaction, and which ones serve better. The analysis will be oriented in order to result in visual, and quantitative urban design guidance within built up deprived areas. In addition, results will give suggested urban planning policies that are designed to give a planned frame work for the produced guidance.

The urban form analysis of Benghazi studies will be conducted using the six urban Typo-Morphological elements introduced in chapter 4. At a large scale, the general neighbourhood plans, streets and streets-networks are analysed; at an intermediate scale, urban physical blocks, social blocks and urban public open spaces are analysed; while at the small scale, public buildings, house courtyards and walls are analysed. All of the above will be studied and assessed against the three main socio-cultural norms, which were categorised in Chapter 2: the individual with their next door neighbour, the individual with their street neighbours, and finally the individual with their neighbourhood.

6.2. First Element: The General Plan of Benghazi

Libya has undergone considerable and rapid social, economic and political changes during the 20th century, which have had a great impact on shaping its urban general plan. The discussion of this section will be centred on understanding the general plans for each of the three case studies. The general plan is examined through two dimensions: the first is the morphological which includes two aspects, the neighbourhood site, neighbourhood configuration, and their transformation. The second dimension is testing those two aspects in the light of socio-cultural context (See Chapter 2), that focuses on the relation between the individual and their neighbourhood and surrounding environment. The socio-cultural context is mainly concerned with testing neighbourhoods in accordance to their relation to the site's environmental and natural aspects, the location of the mosque and its orientation towards Mecca, the location of the main facilities and functions like the market street, and finally, the availability of adequate open spaces and recreational areas.

In morphology, the city or neighbourhood site is considered to be the starting point of the analysis, where it reveals its geographical location and the rationale behind this choice (Chen, 2009).The city or neighbourhood configuration refers to neighbourhood areas, boundaries, axes and functional distribution. The three case studies chosen are clearly related to the three main historical periods of the urban form of Benghazi, the Ottoman, the Italian and the contemporary modern period.

6.2.1. Neighbourhood Site

6.2.1.1. The First Case Study: The Ottoman Quarter

The first case study in this research is the old Ottoman neighbourhood quarter, which was the whole of the old Benghazi city during the Ottoman period until the Italian colonisation period, prior to which Benghazi had several names. During the Greek period the city was initially known Eusperides or Euesperides (around 525 BC), as it was associated with the mythological Hesperides Garden, referring to the fertile lands around Benghazi and also to the whole fertile lands of the Green Mountain of Cyrenaica. After Eusperides was abandoned around 347 BC a new settlement was started nearby which became Berenice (one of the five cities of the Pentapolis)

around 249 BC. These names appear to have been used until around the 13th century, when the name was changed to its current form, Benghazi. After the arrival of Islam, in the 13th century, the small settlements took a strategic place in the economy of the region as an important player in the trade that was increasing between Europe and Cyrenaica, with extended trading roots to the south hinterland as a trading gate to Africa. At the time the Marsa (Harbour) of Benghazi played a vital role in the city's economy. Hence, the city harbour was an important element in its livelihood (Abdalla, 2007). In addition, the city had a northeastern route that linked it with other cities of Cyrenaica in the eastern Green Mountain. While the west side or the harbour route ran towards the west, to Ejdabiah city, about 150 km. Ejdabiah is considered to be a key town in the trade route to the Southeastern Sahara oasis of Libya, which forms the traditional route to Sudan, Techad, and Africa in general (Abdalla, 2007).

Figure 6.1: An Old Image of Benghazi harbour. *Source:* Tours libya.com.

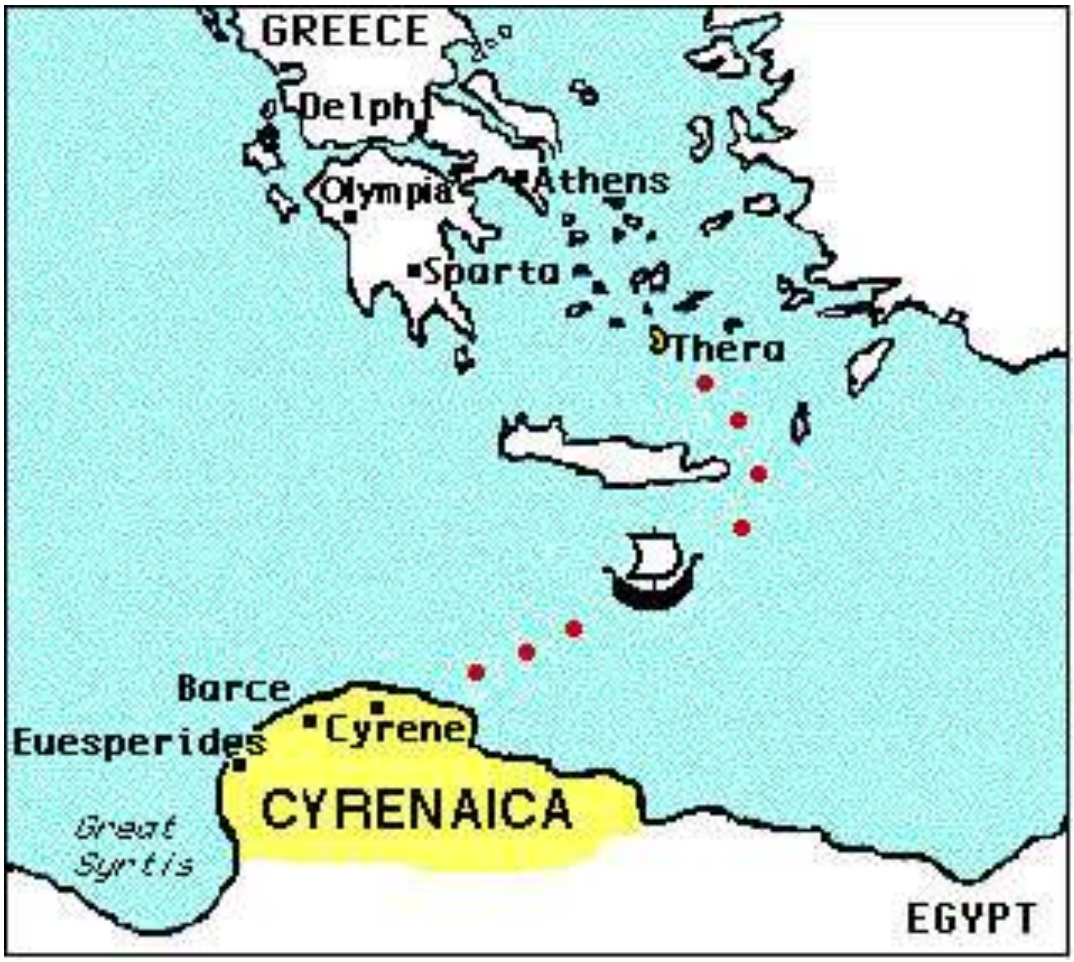


Figure 6.2: Trading Routes in Benghazi between Cyrenaica, Europe and Southern Sahara Oasis. *Source:* Museum of Art and Archaeology, University of Oxford

Other topographical elements have shaped the Ottoman neighbourhood of Benghazi, for example the sea line towards the north and north west, and salty wet lands towards the south and south east. Old Benghazi's geographical constraints force it to take the form of a strip along the sea running from East to West. The southern and western salted wetlands provided Benghazi with a natural filter that mitigated the sandy wind, which blew from the south (Sandy wind called Qibli in Arabic) (See Figure 6.2).

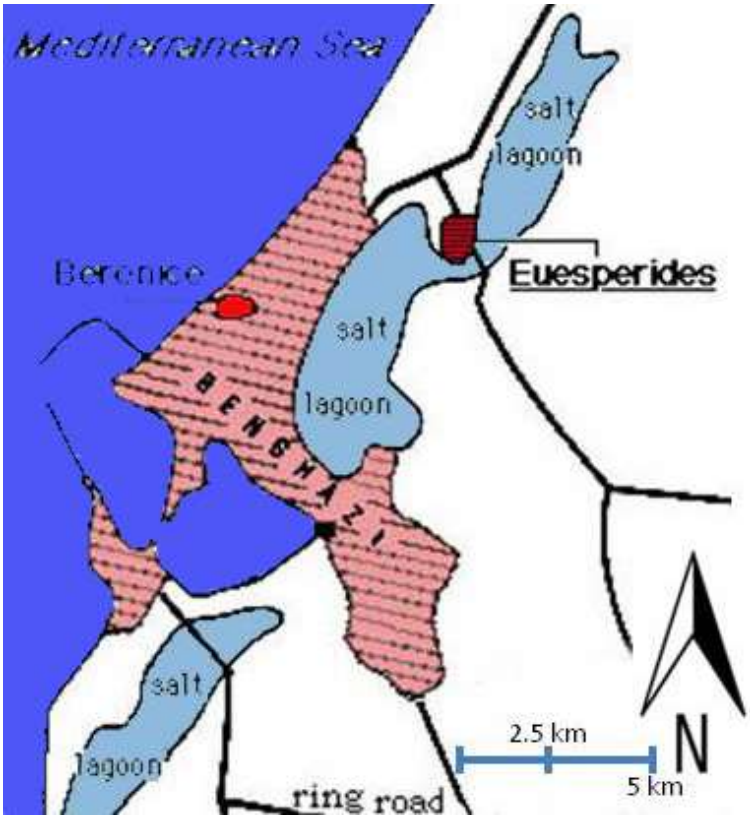


Figure 6.3: Salty Wet Lands (Sabkha) that Surrounded Old Benghazi. *Source:* Museum of Art and Archaeology, University of Oxford

Figure 6.4: Libyan Scouts Cleaning Wet Land (Sabkha) at the South of Benghazi. *Source:* Ramsar Convention on Wetlands

Figure 6.5: Natural Life in Benghazi Wet Lands. *Source:* Ramsar Convention on Wetlands

The teachings of Islam regarding that which relates a person to his/her God were observed by most Muslims. However, the relationship between people is partially related to their individual rights, and this is explained in Islamic building law, especially regarding rights related to the State's interest, for instance in cases of dealing with natural and environmental aspects. The Islamic building law has distinguished two types of resources: surface minerals and hidden minerals. Surface minerals are the ones that can be acquired with little effort such as salt from salty lakes, while hidden minerals are those that need a great deal of effort to obtain such as gold or oil (Salasal, 1998).

The Islamic building law had a great influence in minimizing the private acquisition of mineral land in order to maximize its use by as many individuals as possible to take advantage of those surface minerals, like salt. The Islamic legal system has developed laws to ensure that lands containing minerals cannot be owned by any party or individual, even by the government (Elshestawy, 2004).In the case of Benghazi, the salty lakes surrounded the city were one of the livelihood resources for the city's poor where the Islamic building law granted them access to utilize the land, and this played a vital role as an environmental barrier as previously discussed (See Chapter2). According to the principle of Islamic Awqaf laws (Charitable Islamic law) discussed in Chapter 2, vital environmental areas are considered to be included in the aims of the Awqaf system as they provide services to the poor and preserves those areas for its purpose.

From the above discussion, it can be clearly understood that the Old Ottoman quarter or the Old city of Benghazi was based on the rationale of trading, geographical and environmental logic, which was backed and strengthened by the Islamic building law. Unfortunately these rationale which influenced its rectangular form stretching along the seaside, have not been used as a basis for any of the following growth in Benghazi. The Italian expansion has to certain extent respected these rationales in its developing plans where the direction of expansion followed the western harbour route, but it did not realize the vital role of the wetlands towards the southern area as an environmental barrier to the sandy winds.

6.2.1.2. The Second Case Study: The Italian Quarter

As mentioned previously, during the Italian colonial period a new phase of expansion was witnessed in the Benghazi city. The Italian administrative government issued a master plan for this expansion and adopted a European Architectural style and planning ideas. The expansion was mainly to host the new settlers coming from Italy (Kezeiri, 1984). Also, Benghazi began to be the administrative and colonial military centre for eastern Libya, after the fall of the eastern resistance, which lasted almost 20 years after the western part of Libya was captured by the Italian forces. The city harbour was crucial for the Italian colonial forces to secure supplies from Italy and connect with Tripoli by sea (Abdalla, 2007).

The Italian master plans focused on the administrational and military role of Benghazi as the capital for Cyrenaica. Therefore, it followed the same orientation of the Ottoman section by keeping the eastern and western routes, which influenced the city's general plan. The map adds another orientation which was to the south. This orientation was due to the limited land available on the western side, as the land was largely taken up by the harbour lagoon located to the west. Also, the size of the expansion made the city claim the salty wetlands in the south and continue to expand beyond them.

In conclusion, the above analysis shows that the Italian neighbourhood is seen as a positive expansion for the site of Benghazi, where it follows the same rational of the

old Ottoman neighbourhood. The negative side of this growth is that the expansion came at the expense of losing some of the wetlands surrounding the city to the south. Especially because the salty wetlands serviced the city with natural environmental protection from the sandy wind, and provided a natural habitat for an abundance of wildlife, especially birds migrating from Europe to Africa and vice versa.

6.2.1.3. The Modern Neighbourhoods

The expansion which took place during the kingdom period was driven by the newly emerging wealth produced by the oil discovery in Libya. The oil discovery had shifted the Libyan economy from a traditional one that was based on trade, farming, and agricultural to an industrial oil one. The independence and the oil wealth allowed Libya to start to facilitate other functions in cities, such as universities, hospitals and industrial building zones, in an attempt to put Libya on the map of advanced countries. Although, the country had wealth and good vision, it was suffering from a great shortage of skills required to build a proper base for this future vision. As discussed in Chapter 1, Libya at that time had invested a good amount of its income in education to overcome this shortage; however it required time and a bigger population. In Benghazi, the population growth rate reached 97.5% during the 30 years following Libya's independence, which was reflected dramatically on urban growth. The need to expand Libyan cities was urgent, and was undertaken quickly, through contracting with foreign planning companies (Abdalla, 2007).

The city's expansion during the early post-oil discovery era was mainly characterized by two patterns of growth. In the areas surrounding the city centre e, the growth had a vertical character due to the increased demand for more housing, offices and shops. The other pattern of expansion mainly concentrated on a horizontal nature and was comprised of low rise residential housing areas. In terms of the planning features of its urban form, it was obvious that they followed the global modern functional zoning style. However, since both expansions were imposed from the outside and were not based on local architecture and urban patterns, they failed to respond to the socio-cultural needs of local residents (Bulugma, 1964).

This study will illustrate an overview of Benghazi's general plan, which will focus on its deprived neighbourhood as a case study. Based on the 1966 master plan (see Figure 6.6), the city took the shape of a radio-concentric pattern with various ring roads and major radials. This master plan highlighted the importance of the city in responding to the increased demand for facilities and services, and particularly housing (Whiting Associates International, Final Report, 1966).

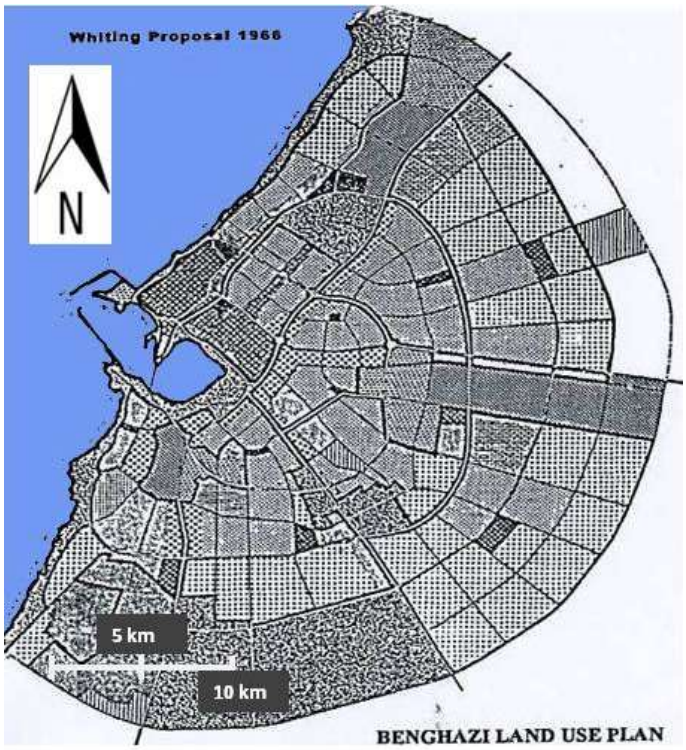


Figure6.6: Benghazi Master Plan of 1966. *Source:* Benghazi master plan**,** Whiting Associates International, Final Report.

Table 6.1: Land Use Distribution in Benghazi according to 1966 master plan.

Land use	**Area (hectares)**	**% of total**
Residential areas	569.70	52.1
Commercial areas	5.50	0.5
Public buildings	50.50	4.6
Transport and Communication	94.60	8.7
Industrial areas	74.70	6.9
Social services	223.70	20.4
Green areas and Cemeteries	53.60	4.9
Recreational areas	20.90	1.9
Total development land	1.092.70	100

Source: Benghazi master plan, Whiting Associates International, Final Report.

As can be seen from Table 6.1, the residential areas cover more than half (52.1 per cent) of the developed land in the city in 1966. In the late 1960s, it was obvious that the city's expansion had diverged from the earlier periods of growth in terms of orientation (Whiting Associates International, 1966).

Benghazi city's general plan became radial in form. The majority of Benghazi, almost 90%, had been built after the 50's. Unfortunately what remains from the long historical periods, the Ottoman Arab quarter and the Italian colonial quarter, together occupy almost 10% of the entire more recent city (Whiting Associates International, 1966).

The overall shape of the city forms Benghazi's continuous urban area which is almost half a circle (see Figure 6.7). The half circle form has a radius of 6 Km with about 80 % of the continuous urban area fitting inside the perimeter of the circle. The radial circular form is traditionally one of the basic models of an ideal city form in 1950s urban planning style. The radial form is supposed to allow the most efficient transportation network while still leaving green space between the built areas. Benghazi's radial or ring shaped urban form gives the city's inhabitants accessibility

to go from one place to another in any direction. More emphasis is placed on having **access** to downtown areas, as mostly it is only the radial distance which is counted. The central core (El-Belad) produces the basic goods and services of transportation. The peripheral rings contain housing zones and connected residential services (Benghazi master plan, Whiting Associates International, Final Report, 1966).

The majority of the 10 social housing estates of the deprived neighbourhoods are situated at almost 4 km from the centre of the circle, while the other 3 deprived areas are situated at the outskirts of Benghazi at a radius of 8 km (see Figure 6.7).

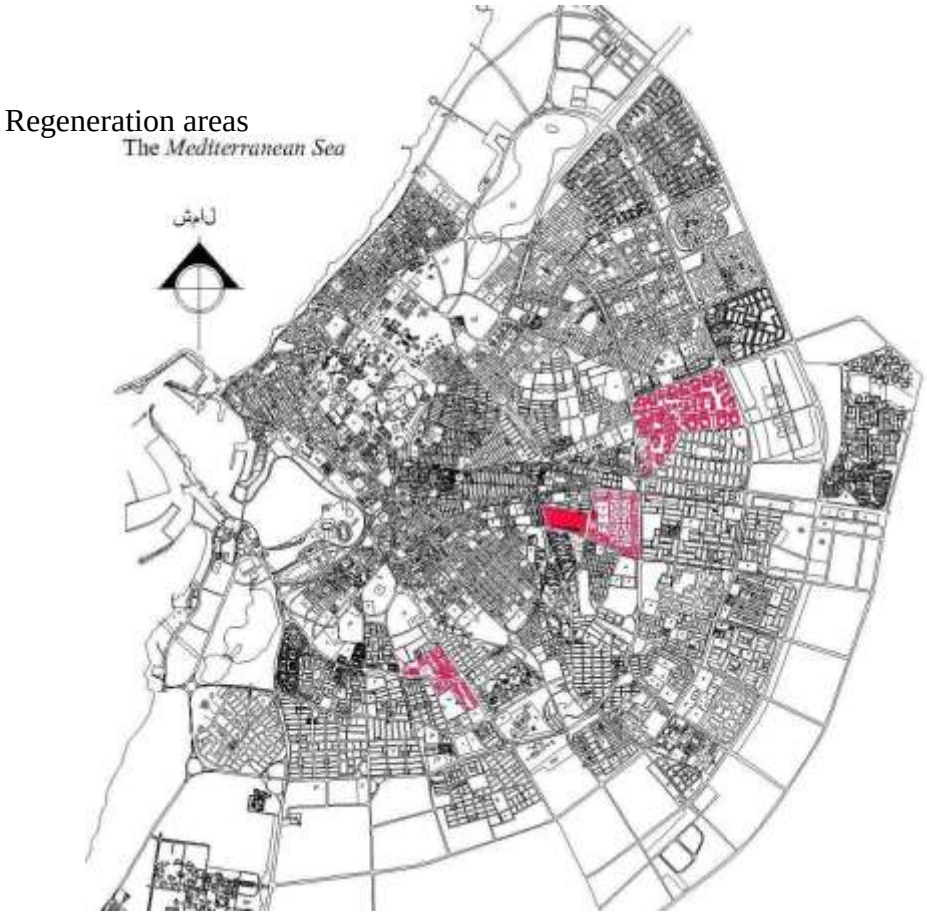


Figure 6.7: Targeted Deprived Areas (in red) in Benghazi City. *Source:* UPA

6.2.1.3.1 The Third Case Study: The 17th February Deprived Area

The expansion of Benghazi occurred not merely by adding a neighbourhood or two to its previous form, such as in the case of the Italian expansion. The expansion took place at a great scale and the original city grew by almost 90%, including the addition of many parcels of land consisting of neighbourhoods connected by major collector roads (Whiting Associates International, 1966). The major collector roads enabled residents to be linked to their workplaces, educational and other services which were scattered all over the city. Thus, the analysis of the neighbourhood case study will treat the main collector roads as a major element to influence the general site plan, similarly to the main roads that shaped the old Ottoman and Italian quarter.

The 17th Feb neighbourhood was developed based on modern European global urban planning methods, which focused on fitting the neighbourhood within a residential zone and facilitating most of its daily services within this boundary. The overall shape of these neighbourhoods is rectangular and their variety of shapes come from the whole design of Benghazi, meaning they have to fit within the main road collectors and the major axial and ring roads of the city (Abdalla, 2007). In the case of 17thFeb neighbourhood it was located between the second Ring Road from the west and third Ring Road from the east, Al Wihdah Al Arabya Street at the north and Al Hejaz street at the south.

The second adjacent ring road is generally developed to have commercial shops at both sides, with service streets running parallel to the main road in order not to interrupt the traffic flow. Hajaz Street was designed to be the main collector road, by which the neighbourhood is connected to the whole city. The Ottoman and the Italian neighbourhoods are connected by means of a major road running in the middle of the neighbourhood fabric, but the 17thFeb modern neighbourhood is connected by the road on its southern boundary. Hence, the majority of its residential stock is located on only one side of its vital collector road.

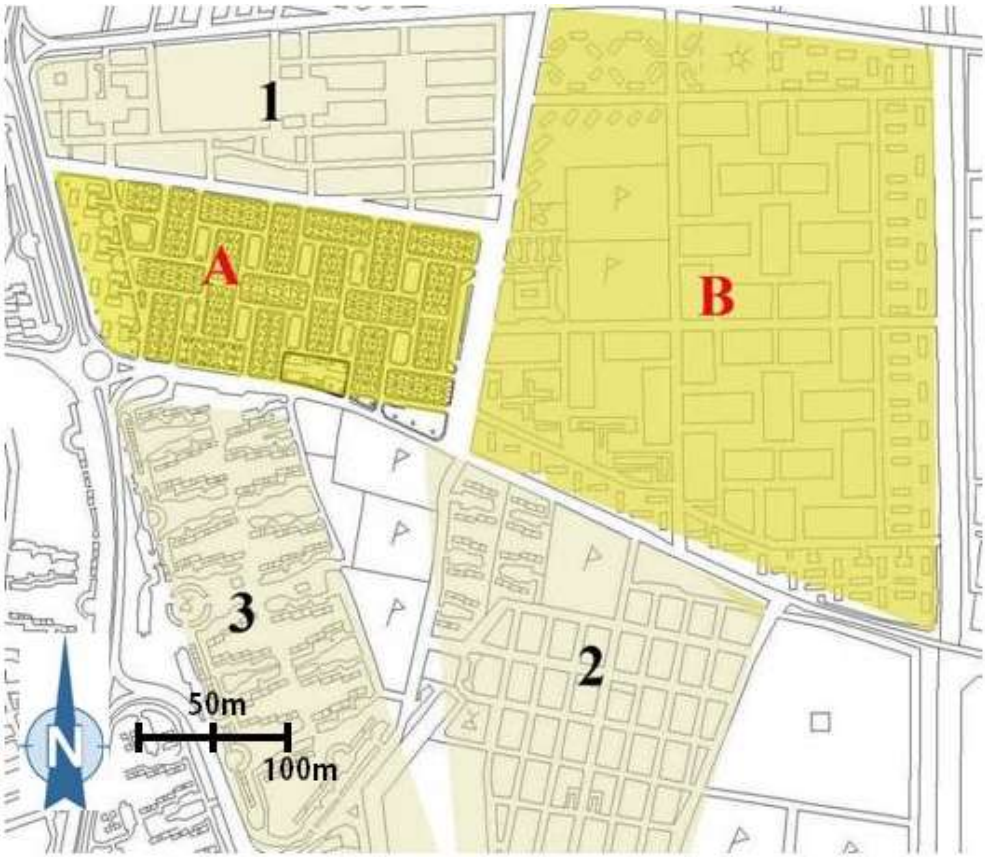


Figure 6.8: 17th February Deprived Neighbourhood in A. *Source:* by the Author.

6.2.1.4. Conclusion

The first two case studies were studied in order to draw out the specific features of their successful urban fabric, such as following the rationale of topography and commercial opportunity embodied in their connection with the harbour and principal access to the east and northern regions. These connections almost went straight through the middle of the quarters and were surrounded symmetrically by the residential areas. The third case study (i.e. the deprived one) was connected mainly by a major collector road running from one of its boundaries. In addition, there was an absence of any consideration of environmental elements, which in the case of the Ottoman quarter helped in mitigating the undesirable sandy wind. The first two cases, especially the Ottoman one, are more appropriate for dwellers, as the general site plan was more suitable for people's needs, allowing them to be connected to

their main economical livelihood by means of a collector road located at the middle of the urban fabric. Furthermore, the positive environmental impact of being adjacent to the seaside and protected by wetland lakes from the south was missing in the modern deprived neighbourhoods.

6.2.2. City Configuration

6.2.2.1. The First Case Study: The Ottoman Quarter

The first case study was basically a harbour city that relied on trading between Cyrenaica, Europe, and the Sahara oasis to the south. Old Ottoman Benghazi did not have a surrounding defence wall similar to many cities at that period, such as in Tripoli. The trading livelihood of its dwellers was a dominant element in its configuration. In addition, old Benghazi, as a Muslim city, had traditional religious buildings, such as the Grand Mosque, located as a monumental building at one end of the Market street to the west, while small Mosques were situated along the Market street, following the same pattern of the streets and blocks.

Awqaf buildings and sites had a great presence in the Ottoman section, as one of the major principles in Awqaf is that it should first go to the local needy of the city, and usually Islamic cities will contain high proportion of such facilities, funded by the rich of the city. Elshetawy (2004), in his view of Islamic cities and their relation to the poor through charitable facilities (Awqaf), mentions that when those facilities are populated in a certain area, job seekers and the poor will be drawn to those areas to sustain life. Hence, this will draw the poor to sites of the rich who can sustain facilities, in addition of course, to living near sites that have minerals and life support resources. Thus, neighbourhood configuration of Islamic cities compared to modern neighbourhoods would reflect the value of the local resources and not the bureaucracy of the planning authority. In such a scenario, neighbourhoods will be religiously motivated to attract working people or job seekers. Thus, the poor, and the unemployed would be attracted to sites that are backed by Awqaf facilities. This mechanism in such cases would mitigate the difference between the rich and the poor, positively reducing the inequality which the new modern Benghazi

neighbourhood is producing through the zoning planning system, basing the hierarchy of residential areas on individual income. In the Benghazi Ottoman section, Awqaf is mostly located along the vital rich market street, such as Mosques, or on the periphery of the city in order to help new comers to settle and extend the city.

The Ottoman neighbourhood basically consists of a residential area that is penetrated through the middle by a market street. The dominant street is the market thoroughfare, considered to be the vital artery of neighbourhood life. The neighbourhood appears to have been rather elementary with few facilities, such as public space and open spaces which were less common. The Ottoman section demonstrates the rectangle morphology of its grid pattern resulting principally from rectangular blocks and the street grid system. The pattern of the Ottoman section is parallel to the seaside, with a slight orientation toward the direction of Mecca. However, it should also be noted that the direction of Mecca compared to the street pattern is slightly different, due to some topographical restraints such as the section adjacent to the old hill with the ruins of the Old Berenice city (see Figure 6.9). The street grid system contains several streets vertically oriented to the seaside to allow the desired pleasant sea wind to penetrate the city.

Figure 6.9: A View of What Remained of Old Berenice, including a Greek Wall and Roman Houses. *Source:* Google map.

6.2.2.2. The Second Case Study: The Italian Quarter

Similarly to the Ottoman section, the Italian section implemented the grid system, and adopted the same orientation, keeping several streets vertical to the seaside. The market street and the city form in general, extended along the side to the seaside. This had located the Market Street and main facilities on the periphery of the residential area, but kept the residential area well connected to the market street from 3 sides (Figure 6.10). The Italian market street was usually populated with shops on only one side, and the other side was usually occupied by public buildings like banks and theatres, compared to the Ottoman section where the market street is fully occupied by shops on both sides.

Figure 6.10: Benghazi Cathedral along the Waterfront in the Italian Quarter. *Source:* wikipedia.org

The Italian section is rich in terms of the availability and variety of open and public space. The public spaces were mostly situated adjacent to the seaside and form its waterfront sky line. The main church has been situated on the seaside near to the harbour in order to be the first building to be seen when approaching from the sea.

Availability of mosques was almost absent in the neighbourhood form, due to the majority of its dwellers being Christian. After independence, Libyans dwelled in the neighbourhood and built mosques in vacant areas and old demolished buildings. Thus, the Libyan inhabitants attempted to respond to their socio-cultural needs, which are embodied in the importance of mosques as a central hub of the Muslim community.

In summary, the Italian section has been viewed positively in providing the city fabric with open and public spaces, but some negative aspects are encountered in the socio-cultural dimension that was absent from its fabric, for example Mosques and Awqaf (charitable funded facilities), which provide Libyan neighbourhood communities with a profound vibrant socio-cultural life.

6.2.2.3. The Third Case Study: The Modern Neighbourhood: The 17th February Deprived Area

The analysis of modern neighbourhood configuration will focus solely on the case study of 17th February and exclude the other city neighbourhoods and the city as a whole due to the limitations caused by the large extension of Benghazi city.

The development of the modern neighbourhood was based on functional global zoning planning theories, where residential areas are usually distanced from major economic and educational or functional zones. The zoning theories accommodate daily shopping and educational services within the neighbourhood boundary within walking distance. Modifications in neighbourhood configurations are one of the most visible aspects of the 20th century evolution of neighbourhood planning (Filion and Hammond, 2003). Benghazi neighbourhoods were mostly laid out on a grid pattern with medium size blocks (see Figure 6.7). The orientation of the street pattern did not respect either environmental concerns, such as allowing sea wind to penetrate, nor the direction of Mecca. The street pattern's orientation was developed mainly to fit within the whole city's radial design shape and its main ring and arterial roads.

These neighbourhoods, as with the one examined in the case study, possess a profoundly hierarchical road system with neighbourhood residential local streets, and main collector roads often set on the boundaries of neighbourhoods, (Figures 6.7 and 6.8). Location and layout of facilities within the neighbourhood is seen as a key factor that affects the daily life of residents. For instance, accessibility to facilities such as schools, shops and mosques is very important for residents, and particularly for children, women and the elderly. In the 17thFeb case study, the functional centre is located in the middle between the neighbourhood and its eastern adjacent neighbourhood. The centre, which mainly contains shops and the neighbourhood mosque, has failed and resulted in the closing of the shopping centre. Despite its location, which was designed to service the two adjacent neighbourhoods, the centre's failure is viewed as evidence of poor design based on putting the centre in the middle and away from main city street collectors. Contrary to the intended design, shops were developed by people on the south boundary of the neighbourhood on the main collector road, which links the neighbourhood with the city as a whole (See figure 6.8).

6.2.2.4. Conclusion

The city configuration of the Ottoman quarter is unique in regard to its adoption of the Awqaf system through the presence of Awqaf facilities. This has profound social effect in helping the poor areas of the city and supports the micro economy of the neighbourhoods. Another finding regarding the Ottoman section is that the presence of Awqaf facilities is usually found on the boundary of the city where it seems to help to sustain and direct the expansion of the city. Also, a large proportion of Awqaf facilities found at the main market street are embodied in different functions such as the Mosque, small shops attached to Mosque boundary, and other facilities that help the community in general and the poor specifically. While Awqaf facilities are absent in the Italian section, the presence of public buildings and public open spaces are well established. Public buildings and public open spaces have contributed positively to the social life in Benghazi's centre and are seen by many as major motivators to the success of the Italian section. In the Italian quarter, public buildings and public open spaces are mostly located on the periphery of the city along its market street. In

the modern case study, the 17th Feb neighbourhood was designed on the theoretical base of functional zoning that was mainly concerned with fitting neighbourhoods within the whole city design shape, between the radial and arterial roads. In the 17th February neighbourhood, Awqaf facilities were limited to one single service that was embodied in the Mosque and located in the centre of the area without any connection to main collector or thoroughfare roads. Public buildings like schools are located on the adjacent thoroughfare roads, but with large walls that separate them from interaction with their adjacent roads.

6.2.3. First Element (General Plan) Conclusion

In conclusion, the analysis of the general plan and city configuration of the three cases shows the rational concepts on which those neighbourhoods were built. The physical features of the Ottoman quarter layout are in keeping with the main reason for the foundation of Benghazi, which was the trade between eastern Cyrenaica and the southern Sahara region, linked with east Africa and connected with the Mediterranean cities through the harbour. Trading routes and environmental reasons were generally the main factors to influence the urban form of the old Ottoman quarter. The general plan of the Ottoman section has strong links with the natural environment as the seaside and the wetlands played a crucial part in shaping its layout. Awqaf facilities have also played a principal role in sustaining services for the poor and helping in supporting the city's growth with the required facilities.

The Italian neighbourhood has a similar orientation and environmental features to the Ottoman neighbourhood, but with some negative aspects that can be identified, such as ignoring the crucial environmental rule of the wetland areas and the complete absence of any Awqaf facilities. Meanwhile the Italian section has provided Benghazi city centre with an abundance of public buildings and open spaces (mainly piazzas) that were excellent for the social and economic life of the city. The Italian quarter always contains rectangular administrative public buildings blocks on its boundaries and adjacent to the market street. Both the Ottoman and Italian quarters have maintained the continuous linear shape of the market street that linked the harbour with other major facilities around the city, such as the food market for

instance. The market street in both neighbourhoods is generally located on the thoroughfare roads and surrounded by shops and community facilities such as Mosques, banks, administrative public buildings and open public spaces.
In the modern 17thFeb neighbourhood, the general plan was mainly based on fitting its blocks within the whole city design, causing it to lose the environmental orientation of its street pattern, usually followed in both the Ottoman and Italian sections, which allowed the desired sea wind to enter and blocked the sandy southern wind. Another negative aspect was identified in the location of the street market, which was replaced by a market centre in the centre of the neighbourhood and away from adjacent thoroughfare roads, gradually resulting in the failure and closure of the centre.

For the most part, the characteristics of the general plan of the both of the old quarters of Benghazi followed the natural environment of their sites and optimised the advantages that these environmental factors could provide to the city by adopting street patterns that run parallel to the seaside. In addition, there was a strong relation with trading and economic routes embodied in optimising the best location of the street market and related to the city's link with its livelihood which was mainly through the harbour and southwestern routes. Future proposals or urban design guidelines concerned with new developments or regeneration projects should draw benefit from these findings derived from the general plan analysis.

6.3. Second Element: Streets and Street Networks

Streets and how they are interlinked are based on topological, logical, socio-cultural and structural properties, which are dealt with in the field of urban morphology (Harvey, 1989**)**. Street network analysis methods adopt a variety of approaches and applications such as street management, transportation planning, business and service planning which each has its own orientated approach for analysing street networks. The recent availability of studies on street networks that focus on social interactions gives a new understanding to the structure of the socio–spatial dimension of neighbourhoods (The European Physical journal, 2004). The central principle of the

street network in this thesis is to perceive it as the product of socio-cultural relations which are reflected on its socio-spatial form and pertain to the field of human geography.

6.3.1. Social Physics and Network Emergence

This section will illustrate the concept of "Social physics", "Network emergence", and "Network agency", in order to help build an analytical theoretical method to understand streets and streets networks. The recent availability of studies describing social interactions is giving a new understanding to the microscopic structure of the socio–physics dimension of neighbourhoods (Virtual Round table on ten leading questions for network research, 2004). In recent years, social physics has been thought to be the link between both humanistic and scientific poles of urban discourse (Hillier and Lida, 2005). It is suggested in this study that socio-physics can provide us with a deeper theoretical understanding of the urban form of neighbourhoods.

Every analytical method or tool that aims to understand the neighbourhood socio-physics system and its remarkable features of urban morphology must define the urban complex as a bridge between human activities, needs, interests, and the physical layout of its street network and blocks arrangements. According to Hillier, neighbourhoods are large physical objects imitated and driven by human behaviour. The most interesting and difficult step or question is how to understand this link in a quantitative tangible method or tool. The next step or question is to understand the consequences of the physical form on the human form, that is the patterns and dynamics of economic, social, cultural and cognitive life that go on in the neighbourhood (Hillier and Lida, 2005).

The general perception is that architects tend to focus more on the physical layout of the form which usually comes at the expense of the humanistic side, by simplifying the view of the human and social aspects (Hillier and Lida, 2005). Understanding the links between the social and the physical aspects requires a great deal of effort and work. Balancing both sides requires defining and developing an approach to clarify

the link between them. Hillier calls this approach "social-physics", which perceives the physical city as emerging from aggregated human behaviours. The different between socio-physics and phenomenology is that the latter sees the physical city as a reflection of human experience and behaviours (Hillier, 2002), while the former sees itself as the natural science of cities.

Drawing on these arguments, and based on Hillier's definition of socio-physics, this thesis will seek to find a tangible quantitative method that allows human socio-culture to be understood in terms of the physical layout. The purpose of the current study is to understand the socio-cultural physics of deprived neighbourhoods, and this will involve examining the traditional street network of Benghazi, as embodied in the social physics as "Interaction- location paradigm".

6.3.2. Street Network Based GIS: MCA approach

Street network analysis has long been a basic function of the urban form through geographic information systems (GIS).Modelling of an urban network for street network analysis is usually based on a map view in which nodes are regarded as the intersections of linear characters, and edges represented as the connections between pairs of nodes. Common network processes include computer based technology to find the shortest, most central, or straightest path (path finding), to analyse network connectivity (Millerand Shaw, 2001; Waters, 1999).

A GIS-based network can be also analysed to know the average level of integration or segregation of a street network with respect to its structural properties. For example, in old towns, old market streets are usually classified as being the important street of a city in terms of connectivity. As mentioned in Chapter 4, this thesis will adopt Multi Centrality Assessment (MCA) as a graph-theoretic method based on GIS, to model how urban street networks are integrated or segregated using so-called "nodes and edges mapping". The outcome of MCA maps relies heavily on the structural properties of a given street network and the allocation of intersection (nodes) within such an urban form.

6.3.3. First Approach Analysis: Streets Networks (MCA)

The analysis of the first approach will concentre ate on the balance between privacy and liveability as one of the important socio-cultural norms, as people favour local streets to be defined as sanctuaries, and the high street as a liveable place. Inner residential areas in neighbourhoods should be protected, though to the point of being inclusionary, while most of the social, cultural and economic vibrant life should take place in the market street or neighbourhood centre. The structural properties of the street network features are to a great extent responsible for this neighbourhood~street life balance. The study will use MCA to understand the physical characteristics that balance the sanctuary features of the case study housing areas and the liveability of their market centres.

In other words, the analytical study of street network in this thesis is oriented to discover those criteria for creating an acceptable balance between people's movements and the sanctuary of housing areas through the street network. Since people's movement throughout the street network is planned from a specific origin to specific destination and is not just from node to node, the amount of travel through each edge or the visits demanded of each edge cannot be determined by traditional methods. Hillier and Iida (2005) define the nature of human movement with two aspects: first the selection of a destination from an origin; secondly, the selection of the intervening spaces that must be passed through to go from one to the other. The first is about *to-movement*, the second *through-movement*. Thus, movement trips are made up of a couple of origin-destination, or *to*-movement, nodes and a variable number of *through movement* nodes. MCA, Centrality measures are frequently suggested to characterize these type of patterns on the street network (Crucitti *et al*., 2005; Porta *et al.*, 2006; Jiang and Liu 2009). Centrality measures define the relationship between particular structural features of a network. MCA network analysis using Centrality measures have always been utilised to express quantitatively the most relevant physical and static properties of networks.

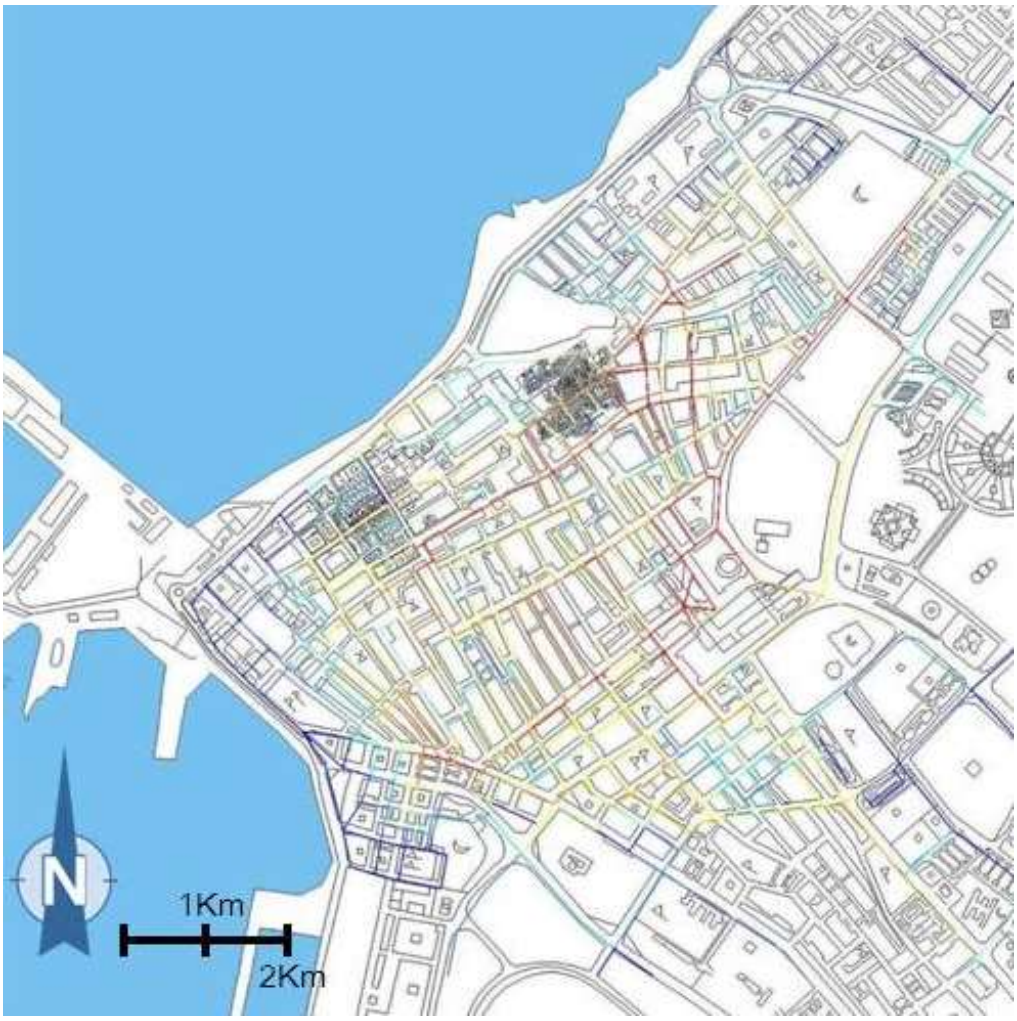


Figure 6.11: An Illustration of MCA Analysis and in the Background a Detailed Map of the Area in Benghazi City Centre. *Source:* By the author

Therefore, in this study, centrality, which considers people's specific origins and destinations, is considered in a synthetic network. According to Wang *et al.*, (2011, p. 292) street centrality is quantified by three indices. "Betweenness centrality measures how often a node is traversed by the shortest paths connecting all pairs of nodes in the network. Closeness centrality measures how close a node is to all the other nodes along the shortest paths of the network. Straightness centrality measures how close the shortest paths from a node to all others resemble virtual straight lines connecting them".

Betweenness is one of the most prominent measures of centrality and explains centrality in terms of the degree to which a node falls on the shortest path between

others (Freeman, 1977). It also characterises people's movements and quantifies the importance of a node or an edge in a movement network. A prior study of an Italian city illustrated that betweenness has a higher correlation with densities of retail and service activities than closeness (Porta *et al*., 2009). This means, the neighbourhood units benefiting from the city network's movement as whole, by allocating functions and activities on the most frequently used routes of betweenness in the neighbourhood fabric to allow exchange of social and economic activity to flourish.

Closeness shows the highest correlation with land use densities, which means that the typical notion of location as being close to all neighbourhood local facilities remains the strongest predictor for land use concentration in the case study. For small and medium sized neighbourhoods like the case studies in this thesis, dwellers and businesses may value the importance of close access to neighbourhood socio-cultural and economic activates, all located within a reasonable distance, and this means excellent correlation between the neighbourhood and its facilities on local scale. This study aims to examine the benefits of closeness by determining how close the main activities are to the local neighbourhood residents, and optimally if these close edges act as centres to both sides of the market street, thus creating unity on the two sides of the street network.

This research will adopt betweenness and closeness measures, due to their success in quantitative interpretation in terms of understanding the relation between city movement (network) and the neighbourhood's local market street and how close they are to the local fabric (residents). In addition, the analysis will seek to interpret the results of the MCA analysis in terms of the social needs of privacy and liability balance as discussed in previous chapters.

6.3.3.1. The Ottoman Quarter

The location of the neighbourhood centre and market street is a fundamental element of the physical and social structure of urban areas. Throughout urban history, market streets have embedded most of the social interactions happening within the

neighbourhood, and acted as a channel for social exchanges with the wider community of the city as a whole.

Market streets are generally laid out in relatively different locations in terms of their relation to residential blocks and the street network. The simple patterns of streets found in the Ottoman quarter has far more depth than it seems at a first glance, in terms of much these streets respond to the socio-cultural dimension. The analytical discussion will be oriented to illustrate the effect of the linear market street on socio-physics, when changed in shape and location and in consequence to changing the land use of residential areas from quiet sanctuary to vibrant economic areas. This linear curved market street is strengthened by large administrative blocks.

In Benghazi, the centre of the Ottoman quarter stretches along the wider side of the whole neighbourhood and parallel to the sea front. This linear centre shape usually has two main walking and movement generators on both ends. In this case, it is the morning fresh food market at the eastern end, and the main (Friday) Grand Mosque and the harbour at the west end, while shops and daily praying mosques and other basic (prior to 20th century) institutional facilities are located along the main line of the market street.

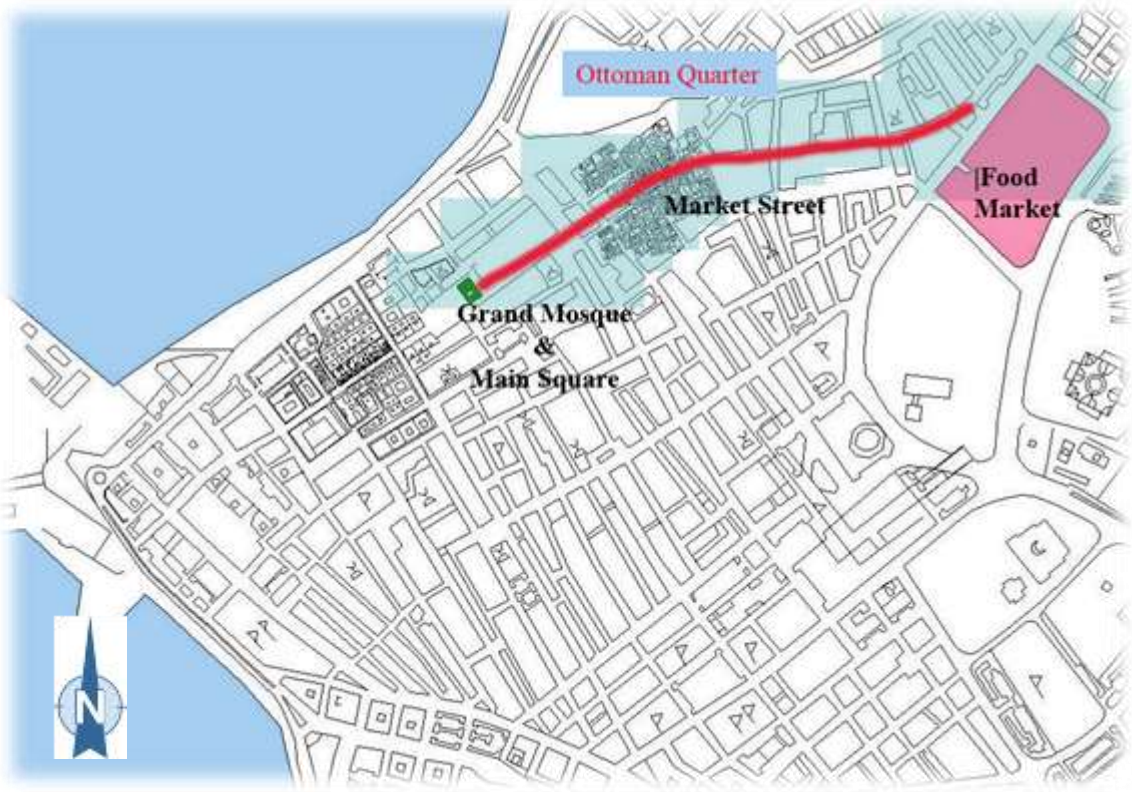


Figure 6.12: The Urban Fabric and Zones in the Ottoman Quarter. *Source:* By the author

A careful analysis of the urban form and its street network might reveal distinctive values towards social relations and mass culture. It would also involve distinctive socio-cultural sets in their urban context (Ley, 1985). In the Ottoman quarter of Benghazi the most significant observation is the social equilibrium between keeping residential areas quiet and providing sanctuary in the neighbourhood, while at the same time increasing prosperity and liveability in the market street. The urban street network seems to give strength to the main market street, with the different functional facilities located and concentrated along its length. Naturally and according to "the network of emergence", economic activities find it hard to spread out of the mainline of the street market, and this can be clearly seen in the case studies.

Figure6.13: Quiet Residential Areas in the Local Streets of the Ottoman Quarter. *Source:* Colors of Libya.

Consequently, the Ottoman quarter has managed throughout the course of time to maintain the functions of its urban form and land use reasonably well until the present. The Ottoman section is more resilient and there is very little evidence of networks of emergence occurring. Thus, this is seen as a positive point with regard to the urban form of the Ottoman quarter, as it stands resilient to changes to land use in its blocks and plots. Therefore, it enhances the balance of keeping a vibrant market street and the quiet sanctuary of the residential area. The simple linear gradient form has embedded the socio-physical requirements of the Libyan socio-cultural norms that were discussed in previous chapters. Many urban elements were involved in the socio-physics of this quarter, but these were mainly met by the simple adaptation of the linear market street with two main mass generators at both ends, and residential areas surrounding and sandwiching the linear market.

By running MCA on the betweenness mode, the graph below shows clear, quantitative, tangible evidence of this socio-physics balance. The market street has the darkest colour tone, while the adjacent residential area has a lighter tone of colour. MCA analysis backs the importance of the Market Street in terms of the street network, as it has the highest betweenness rating among the nodes and edges of the urban pattern. It gives the street hierarchy of the market street more potential correlation between street network patterns.

Moreover, "through movement" to the market street becomes easier and more accessible, because it provides the highest betweenness connectivity between all the routes. This type of network pattern of streets, concentrates the "through movement" on the line of the market street, by providing a single route that accommodates larger amounts of movement, while the adjacent residential streets can be designed for lower neighbourhood and pedestrian/bicycle-friendly speeds, resulting in more socio-physical options for people within their neighbourhood.

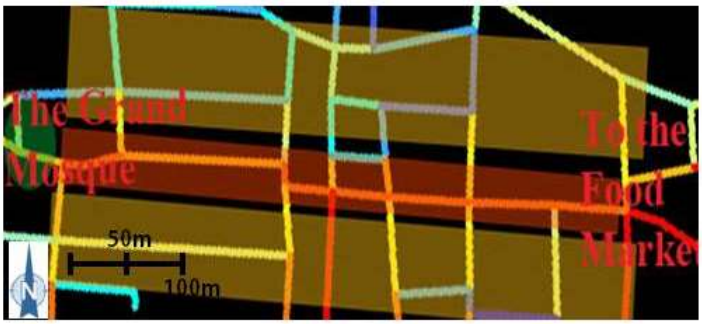


Figure 6.14: Ottoman Quarter, MCA, Betweenness. *Source:* By the Author.

By running MCA on closeness mode, the following graph shows that the colour tones on both sides of the market street are almost the same, meaning each has the same range of closeness, including the market street. In this form of street network, we do not see major dissections in the fluency of movement within the neighbourhood unit.

Other benefits of having greater street closeness rate is the *to movement* which means shorter trips, which save time and money, a wider variety of travel routes to a destination, and more cost-effective infrastructure because residents of a community can get to schools, shopping, and other daily needs without overburdening a major network distribution road intended for through-trips. These benefits give more cohesion to the neighbourhood social life, instead of being split into two parts or more as an effect of the thoroughfare street cutting through.

Figure 6.15: Ottoman Quarter, MCA, 800 Closeness. *Source:* By the Author.

6.3.3.2. The Italian Quarter

The following maps of the Benghazi Italian central area (Figures 6.16 and 6.17), show something of a network of emergence, through which its character has changed in less than 60 years. The first map shows a single linear Market Street with circulation ordination, complete with the Grand Mosque and the administrative buildings along this line, and almost surrounding the residential inner zone from north, west and south.

Figure6.16: MCA Betweenness Map with Other Important Elements such as the Food Market, Transport hub, Hospitals, and Large Administrative Blocks in light gray. *Source:* By the Author.

The main movement generators are distributed along the whole line of the centre, with less emphasis on the main Grand Mosque at both ends. In the Italian quarter, urban socio-spatial characteristics are different from the Ottoman case due to 20th century merging of the new socio-cultural buildings and urban spaces that serve the large community through a variety of economic, educational and recreational needs. These functional areas, were designed to serve and reflect the changes that took place all over the world and not just in Benghazi or Libya. At this time, Benghazi entered the global method of design and left behind much of the local character that was embedded in its urban form. The Italian quarter was seen by local people and the local planning authority as an urban pattern that perfectly served the allocation of

these new functions, but they did not provide in-depth insight of the street network emergence, its consequence and future impacts on land use and subsequent changes to the socio-spatiality of the neighbourhood (Urban Planning Authority in Libya, UPA, 2010). This street network of emergence was caused by many elements and mainly by the arrangement of the linear Market Street and large blocks that generate movement. Thus, after a period of time this layout has caused changes to the land use of its inner part, especially the adjacent small streets on the routes to administrative large blocks at the western side of the Italian quarter.

Figure 6.17: Trend of Emergence in the Italian Network. *Source:* By the Author.

In the Italian Quarter, we will find a trend of emergence spreading in the land use changes. This spreading, when compared with the results of running the MCA on the betweenness mode, shows some explanations, which provide a better understanding of what is actually happening, especially if it is linked to a further block and land use function analysis. The MCA betweenness map (Figure 6.18) shows some high connectivity range on the western side of the Italian section, where smaller blocks are arranged adjacent to the larger administrative blocks. This network of high

connectivity, coupled with the availability of car garages in the adjacent residential blocks, has resulted in the conversion of many car garages to shops along the small streets of the residential area that lead to large administrative blocks (Siksna, 1997). This suggests that the overall land use changes and consequent changes in the socio-spatial relations are caused by the street network connectivity, which along with the surrounding large service blocks, has created "through movement", and subsequently generated more socio-economic locations.

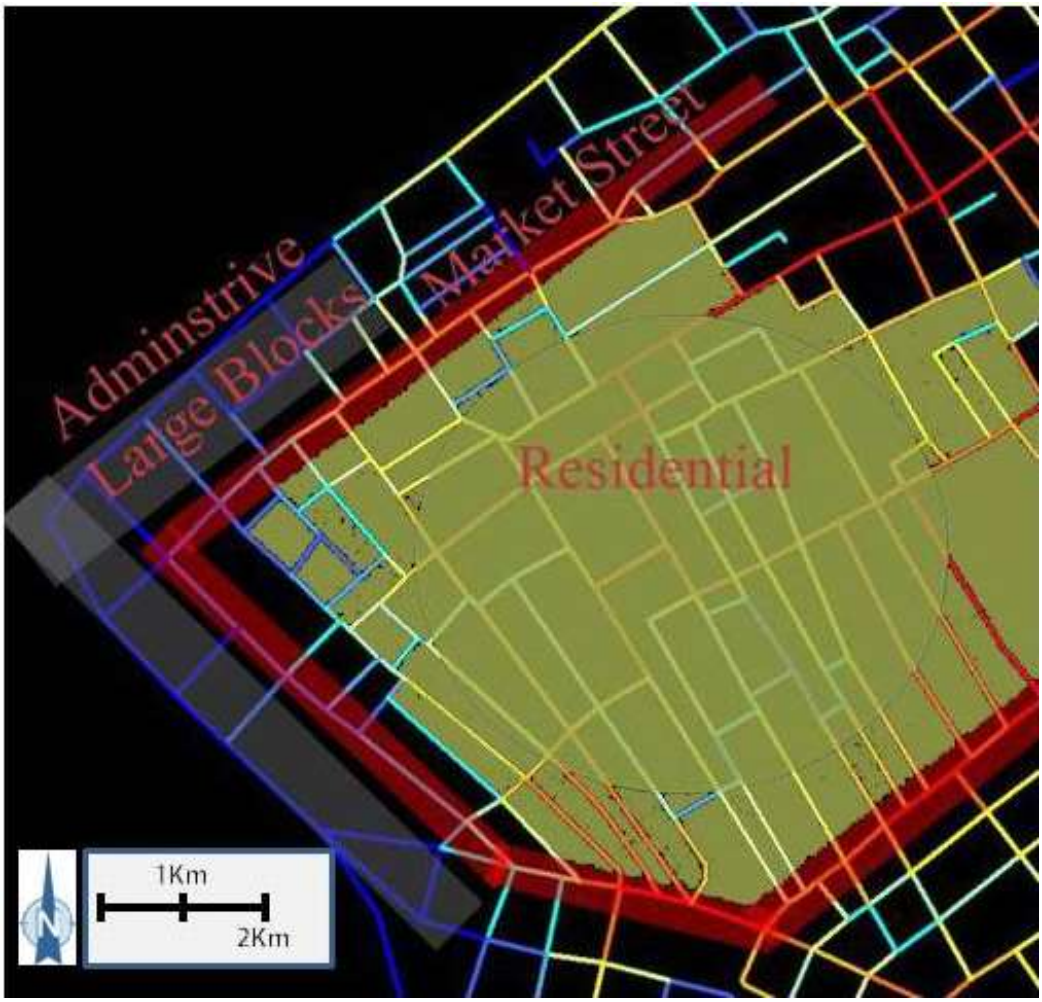


Figure 6.18:Italian Quarter, MCA, Betweenness, and Zones. *Source:* By the Author.

By running MCA on the 800 closeness mode, the results were similar to those of the Ottoman section, where closeness spread between the main market street and its surrounding area, which encourages the "to movement" on its street network.

Although, the Italian urban pattern was designed to allow both car and pedestrian movement, the main market street did not act negatively, and served as a barrier between the two sides of the Market Street, as will be seen in the Modern neighbourhood case in later paragraphs. MCA results give quantitative strength to this finding.

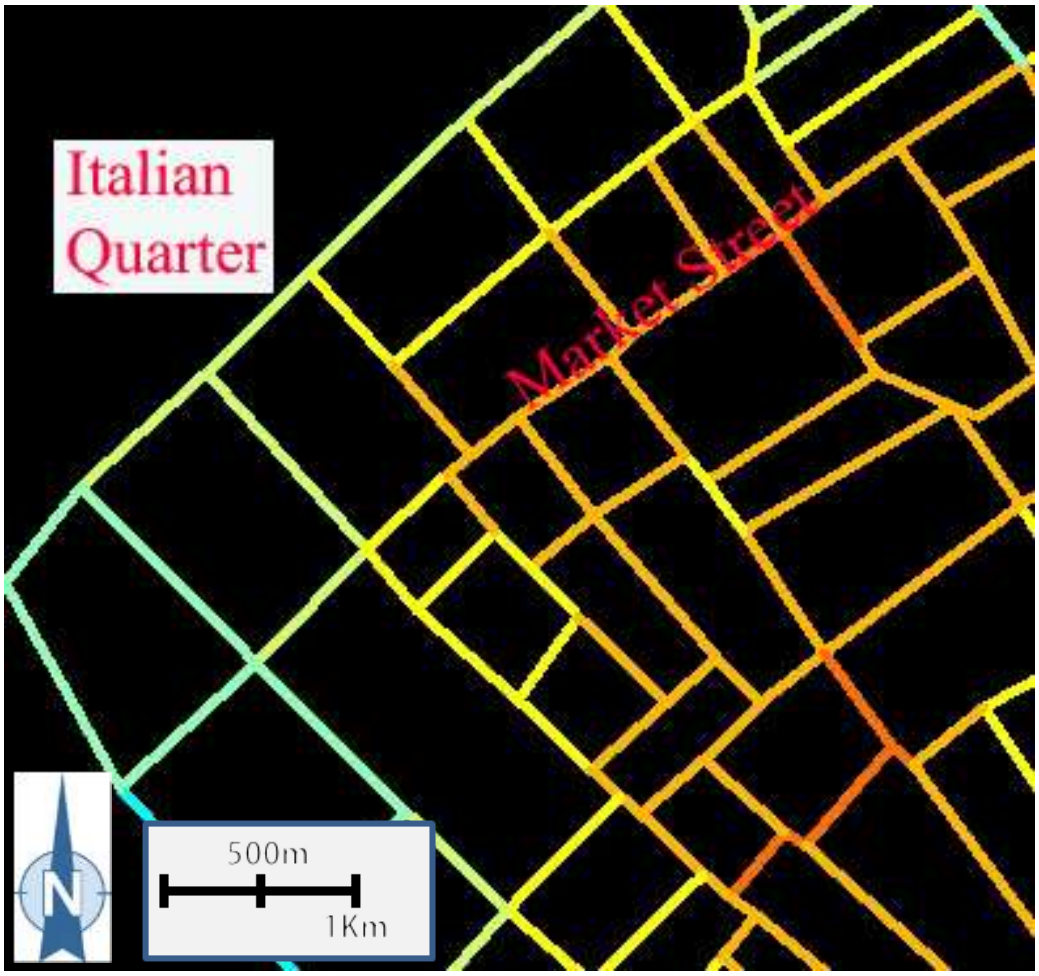


Figure 6.19: Italian Quarter, MCA, Closeness 800. *Source:* By the Author.

6.3.3.3. The Modern Neighbourhoods: The 17th Feb Deprived Area

The Italian urban form is slightly different in the layout of the Street Market and the residential area from the character of the old Ottoman section, which was essentially pedestrian and gradient in terms of its street pattern, and followed a simple layout of a linear Market Street with mass cultural generators on both ends. Both old quarters,

the Ottoman and the Italian, are very different to the new 1960's Benghazi development where a new set of master plans and requirements were established prior to development taking place. Usually modern urban forms follow the 1960's theory of replacing the traditional linear market street by applying the concept of a neighbourhood centre, which is usually located in the centre core of the neighbourhood, see Figure 6.20 below.

Figure 6.20 Locations of Facilities in the Modern Deprived Neighbourhood, where the Mosque is in green colour; shops in red; and Schools in blue. *Source:* By the Author.

By running MCA on the betweenness mode, the graph below shows a clear difference between this case and the previous cases of the old quarters. The thoroughfare shops that were developed by people without the planning authority's knowledge have the darkest colour tone, while the adjacent residential area has a lighter colour tone. The original location of the shopping centre and Mosque were found to have a lower betweenness rating than the mosques and the market street in the Ottoman and the Italian quarter, providing strong evidence of the importance of street network connectivity to the success of neighbourhood facilities such as the

market street (see figure 6.21 and figure 6.22). MCA analysis backs the importance of making the Market Street by its weight in terms of street network, as it has the most betweenness rate among the nodes and edges of the urban pattern. This gives the street hierarchy of the market street more potential *through movement* and correlation between the overall street network patterns.

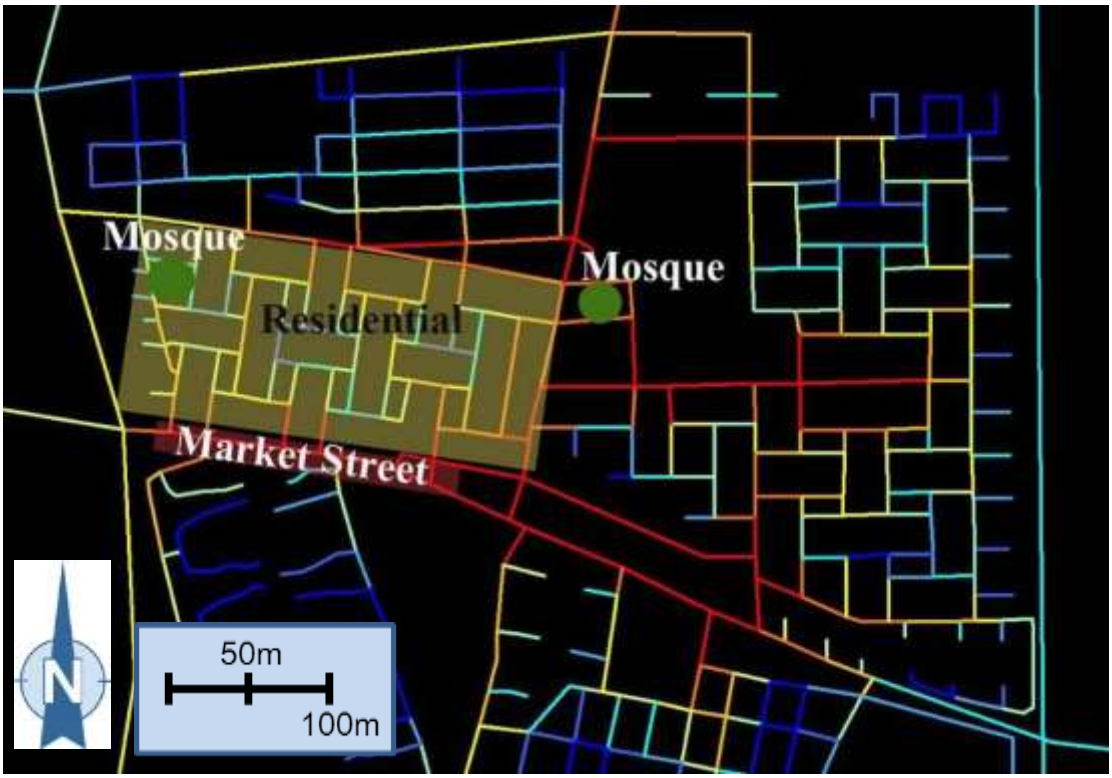


Figure 6.21: Modern Neighbourhood, MCA, Betweenness. *Source:* By the Author.

By running MCA on the 800 closeness mode, the result shows separation of the two parts of the urban network adjacent to the thoroughfare street. Unlike the findings from the Ottoman and Italian quarters where there was a unity between the parts adjacent to the market street "thoroughfare" in the middle, in the case of the modern neighbourhood the two adjacent parts of the market street have hindered the continuity and connectivity of the "to movement" between residents and their service facilities. Although, the Modern urban pattern was designed to allow both car and pedestrian movement, the main thoroughfare street acts negatively, creating a barrier

between the two sides of the Market Street. These MCA results give quantitative strength to this finding.

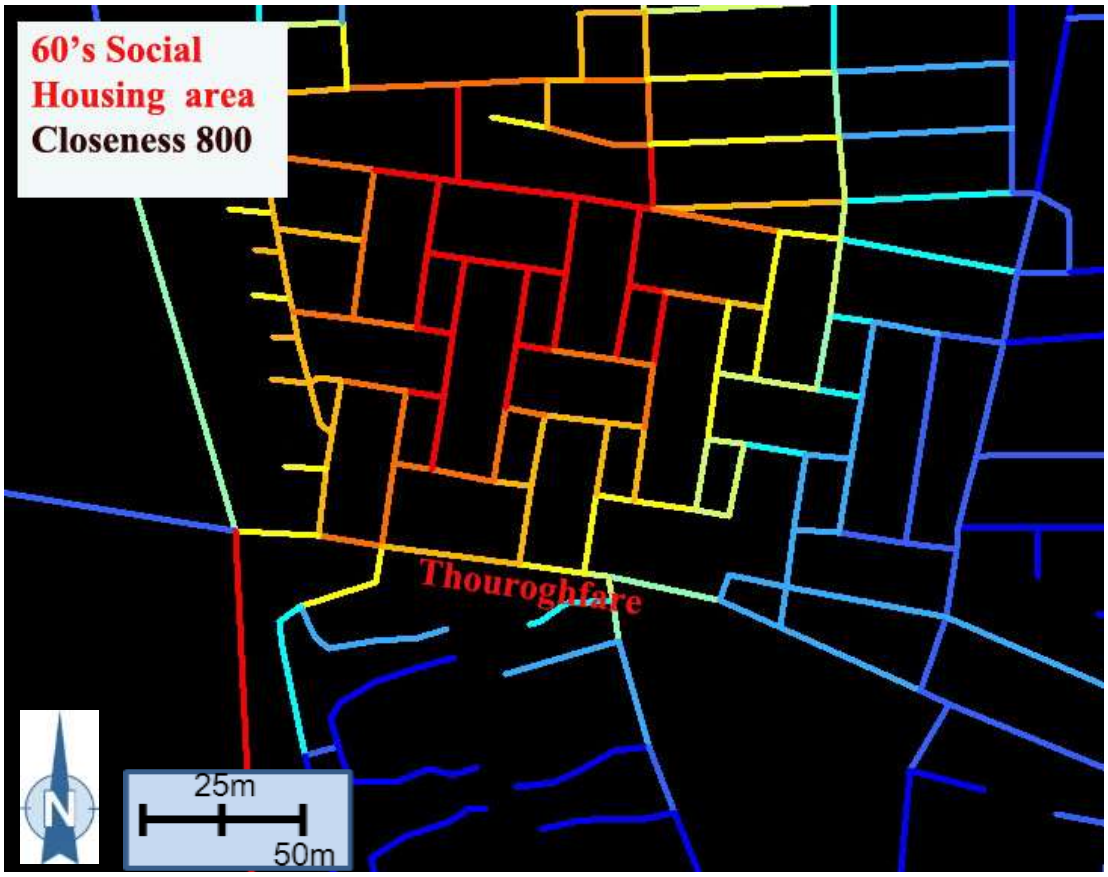


Figure 6.22: Modern Neighbourhood, MCA, Closeness 800.*Source:* By the Author.

6.3.3.4. Conclusions of Street Networks analysis

The findings show a strong visual correlation between liveability and movement in the three Benghazi quarters (The Ottoman, the Italian and the Modern). In the Ottoman and Italian quarters, the MCA betweenness analysis demonstrates less *through movement* patterns at their residential areas, and a high level of *through movement* at the Market Street. While the market streets in both the Ottoman and Italian quarters are located at the highest rate of betweenness, the shopping centre in the Modern neighbourhood was located at a lower rate of betweenness. These findings help to explain the continuing robustness of the Ottoman and Italian market

street on one hand, and the closure of the Modern quarter shopping centre on the other.

In the Ottoman quarter, the analysis shows a drop in the betweenness rate inside the residential area which has preserved the privacy and sanctuary of the residential areas for a long period of time throughout the history of the area's urban form. However in the Italian quarter's case, we notice a network of emergence, which changes the land use patterns in some of the residential streets and consequently intrudes on the socio-cultural privacy norm. The same case was found in the Modern neighbourhood, where the network of emergence has resulted in the development of an unplanned market street on the thoroughfare street along the side of the modern neighbourhood border which has the highest level of betweenness rate.

The closeness measure in both the Ottoman and Italian quarters indicates a high correlation of "to movement*"* between the market street and the adjacent sides of the neighbourhood. However, in the Modern neighbourhood, closeness was concentrated in the middle of the neighbourhood with a low rate at the thoroughfare which is reflected in the marginalisation of the important thoroughfares. In both the Ottoman and Italian cases, the high closeness rate of the thoroughfare (Market Street) shows that it performs well as an optimum reachable space for people to access services. It also acts as a space which creates social unity between the adjacent residential areas, through the reachable shared space between them at the market street.

6.3.4. Second Approach Analysis: Street (Routes) Types

If we compare a neighbourhood in a city fabric with an old town block that contains a limited number of families, there is a noticeable difference. In the latter, the sense of community is stronger. The opportunity exists to enter casually into a comfortable environment, to sit and socialise with neighbours, to walk to the Market Street, mosque and playgrounds without being threatened by heavy traffic. A typical design is based on the separation of heavy traffic circulation from the lower movement network as much as possible. There is a main road collector for cars that gives birth to secondary roads and cul-de-sacs in a systematic way. This allows for possible

erection of a continuous network of walkways that start from the doorsteps of each house and collect in a main street route.

In Islamic neighbourhoods with a market street, the Mosque is considered to be one of the main catchment areas and is usually located on strategic routes. By connecting the route that hosts catchment areas such as the Mosque, with secondary routes/ walkways, there is a chance for each person to meet and socialise with a group of neighbours going in the same direction and acquaintanceships are bound to occur over time. The walk is not more than ten minutes and the way passes through playgrounds, causing children to see adults walking to the mosque on a daily basis. In this case, an advertisement for social coherence and healthy life style is made through the repetition of a desirable act, a basic technique to convince, which eventually remains in a child's mind as an example to be copied.

The route type, second approach analysis, is based on typing the streets as routes to socio-cultural activities and services, such as the mosque and Market Street, as explained in previous paragraphs and in Chapter 4. In summary, the method of route type analysis presented in this thesis is based on the principle of classifying routes by their relative location within a network of routes and catchment centres. In this sense it is purely physical and social rather than either quantitative or qualitative. Because of the joint relationship between movement, routes and catchment centres, nevertheless, the approach does offer good understandings into relative levels of movement, choice of route direction, permeability and growth.

6.3.4.1. The Ottoman Quarter

Conducting the route type analysis on the Ottoman section shows an excellent amount of semi-strategic level of routes making up 57.14% of the total routes. There is only one strategic major route, typical of the traditional old Arabic towns which are based on one main street between the Grand Mosque and the food market that hosts the main Market Street (See Figures 6.23 and 6.24).

The Secondary strategic routes make up 31.42% of the overall routes, while there are very few Sub-secondary strategic routes found in the network, forming only 8.57% of the overall. It can be noticed that the middle location of the main Strategic route has helped in raising the number of Semi-strategic routes and consequently the number of Secondary strategic routes linked to them, while the Sub-secondary routes seem to be on the periphery areas of the neighbourhood, and usually formed from short length streets. In terms of street length, the Strategic route comes first, the Secondary strategic comes in second, the Semi-strategic third, and the shortest is the Sub-secondary strategic.

	Numbers of routes	Percentage from the total
Total number of routes	35	
Strategic routes	1	%2.85
Semi-strategic	20	%57.14
Secondary strategic	11	%31.42
Sub-secondary strategic	3	%8.57

Figure 6.23: The Route Type Analysis for the Ottoman Quarter. *Source:* By the Author.

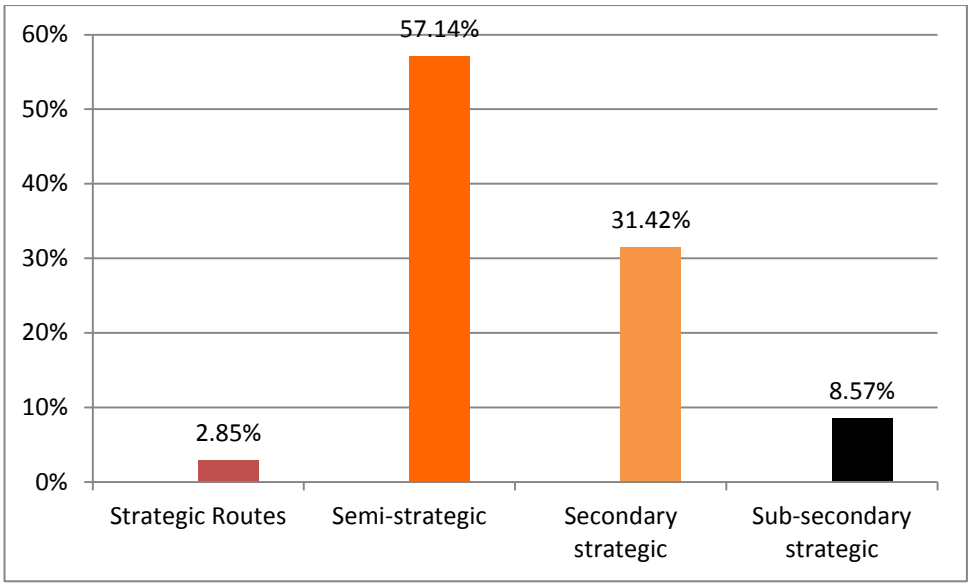


Figure 6.24: Percentage of Route Types for the Ottoman Quarter.

6.3.4.2. The Italian Quarter

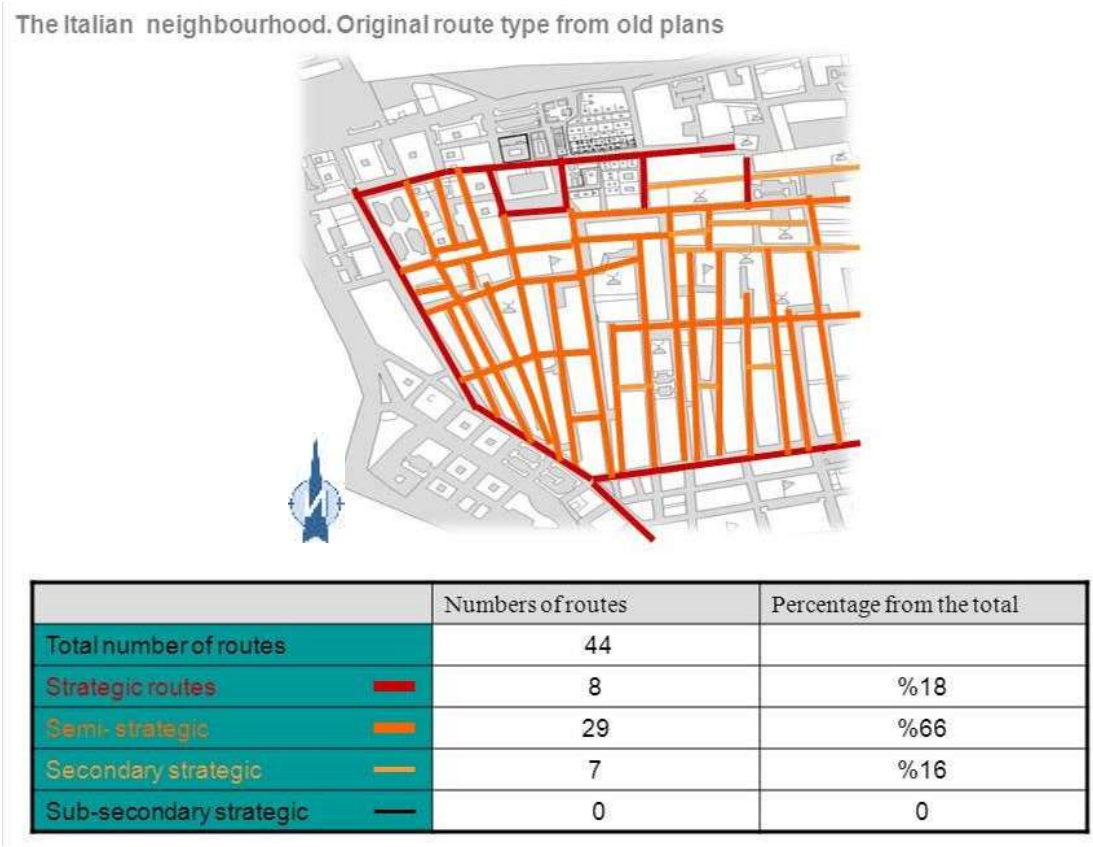
The Italian section is studied in two periods: the old period when it was first constructed according to the original plans that locate the market street on its periphery boundary only, and the second period when the land use has changed as a result of new shops which have emerged from front garages or saloons opened on some streets and thus change the routes from one type to another.

6.3.4.2.1. The Old Period Original Plan

Conducting the route type analysis on the Italian section shows an excellent amount of Semi-Strategic level of routes totalling 66 % of the total routes. The network had 8 Strategic major routes which mainly take the shape of the loop on the periphery of the quarter, surrounded by major administrative blocks which generate movement and act as catchment points.

The Secondary strategic routes total 16% of the overall routes, and there is a total absence of Sub-Secondary Strategic routes found in the network. In the Italian quarter, we notice that the peripheral location of the main Strategic route has helped in raising the number of Semi-Strategic routes and consequently the number of Secondary Strategic routes linked to them. In terms of street length, the Strategic

route comes first, and Secondary Strategic comes second, followed by the Semi-Strategic which comes third.



	Numbers of routes	Percentage from the total
Total number of routes	44	
Strategic routes	8	%18
Semi- strategic	29	%66
Secondary strategic	7	%16
Sub-secondary strategic	0	0

Figure 6.25: The Original Route Type Analysis for the Italian Quarter. *Source:* By the Author.

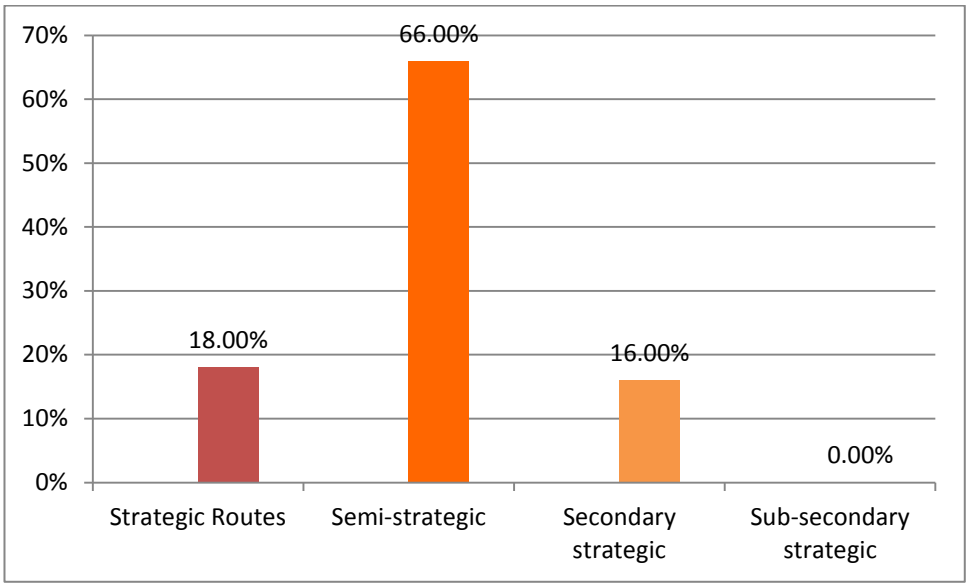
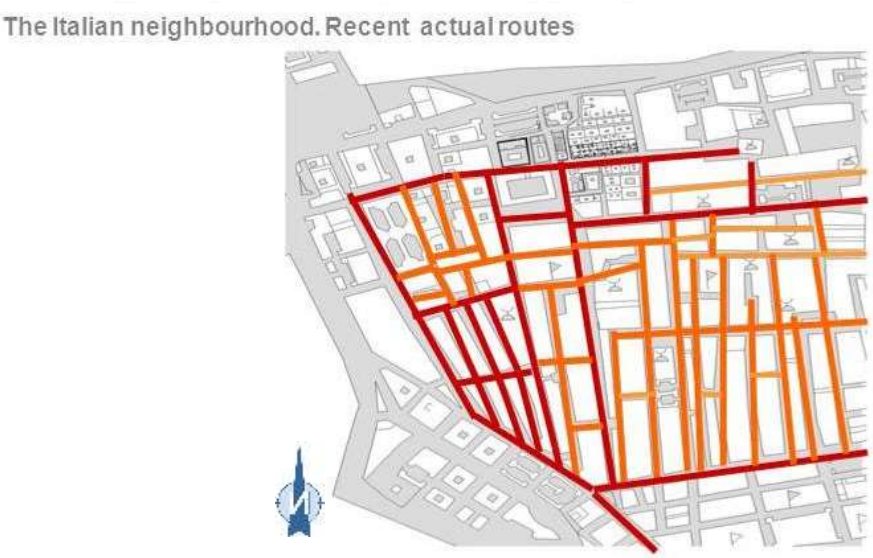


Figure 6.26: Percentage of Original Route Types for the Italian Quarter.

6.3.4.2.2. The Recent Emerged Italian Plan

The analysis shows an increase in the number of short Strategic routes compared to the original plans in which they make up 34% of the total routes. The number of Semi-strategic routes has decreased in favour of the Strategic ones and total an amount of 50% of the overall network. The newly emerged Strategic major routes, mostly located on the south west corner of the quarter, have consequently made a cluster of shops and commercial spaces that is known in Benghazi as the Computer Market, which has developed in the last 15 years as a network of emergence and in the absence of the control of the planning authority.

The Secondary strategic routes total 16% of the overall routes, while the Sub-secondary strategic routes remain absent from the network. In the Italian quarter, we notice that the peripheral location of the main Strategic routes have helped in creating other Strategic routes which are intended to be Semi-strategic. In terms of street length, it is observed that the newly emerged Strategic routes are shorter in length than the usual strategic routes in previous cases of the Ottoman and the original Italian plans, as they were designed to be from lower types of streets.



	Numbers of routes	Percentage from the total
Total number of routes	44	
Strategic routes	15	%34
Semi- strategic	22	%50
Secondary strategic	7	%16
Sub-secondary strategic	0	0

Figure 6.27: The Recent Route Type Analysis for the Italian Quarter *Source:* By the Author.

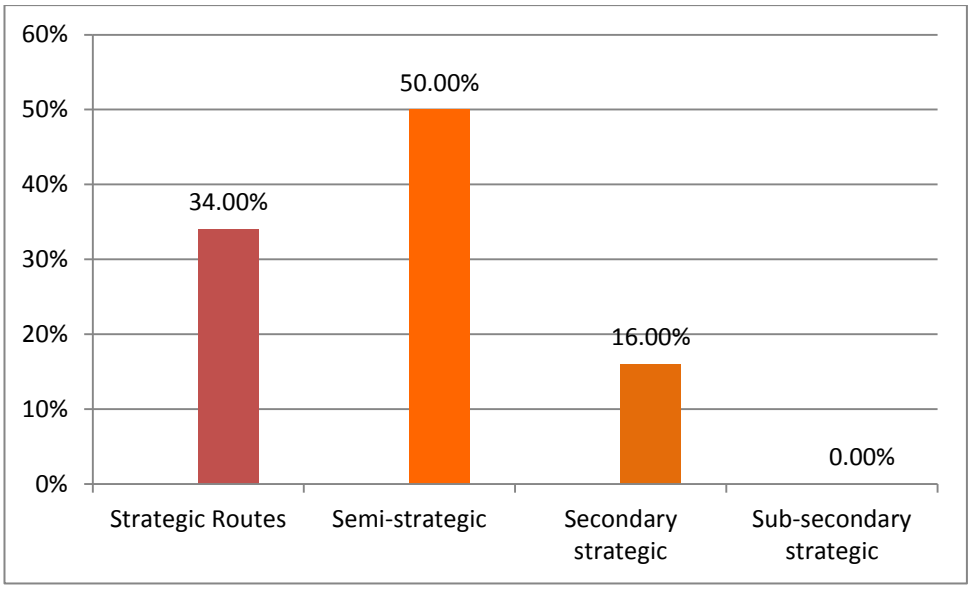
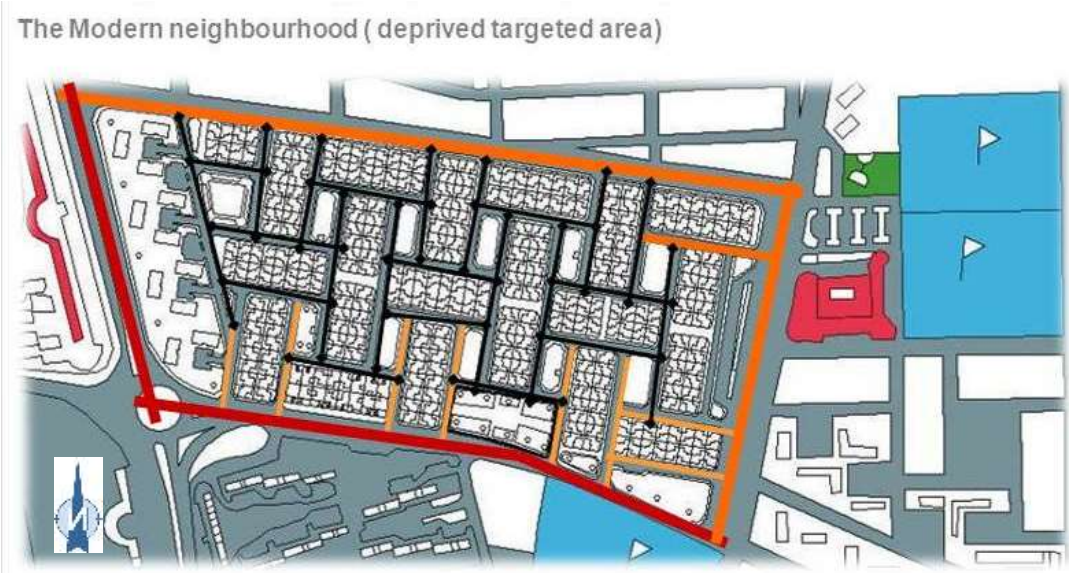


Figure 6.28: Percentage of Recent Route Types for the Italian Quarter.

6.3.4.3. The Modern Neighbourhood

Conducting the route type analysis on the Modern deprived neighbourhood shows a very large amount of Sub-secondary strategic level of routes totalling 64.86 % of the total routes. The network has two Strategic major routes which take the shape of two side loops on the western and southern peripheries of the quarter. The strategic route is primarily the thoroughfare route that connects the neighbourhood with the whole city network. It is noticed that the strategic route in the original land use plans is not used as a host route for any commercial or catchment social space, such as the Mosque or the market centre.

The Secondary strategic routes total 21.62% of the overall routes. In terms of street length, the Strategic route comes first; Semi-Strategic comes in second, followed by the Secondary-Strategic and Sub-secondary which are a similar length. In the Modern quarter, we notice that the short length of the Semi-Strategic routes - which is vertical on the main thoroughfares - has resulted negatively in creating more Sub-Secondary routes.



	Numbers of routes	Percentage from the total
Total number of routes	37	
Strategic routes	2	%5.40
Semi- strategic	3	%8.10
Secondary strategic	8	%21.62
Sub-secondary strategic	24	%64.86

Figure 6.29: The Route Type Analysis for the Modern Neighbourhood *Source:* By the Author.

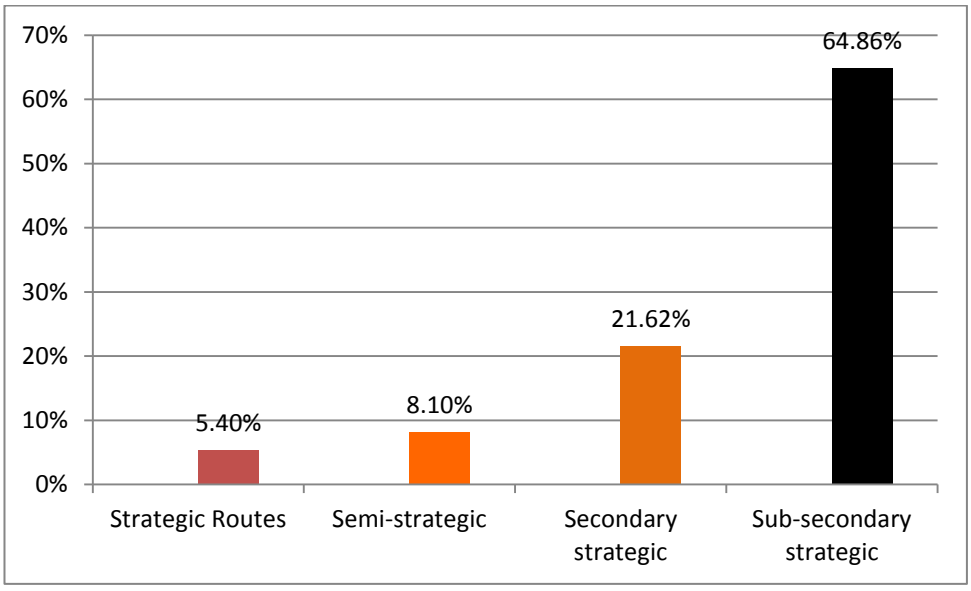


Figure 6.30: Percentage of Recent Route Types for the Modern Neighbourhood

6.3.4.4. Conclusion of Street (Routes) Types

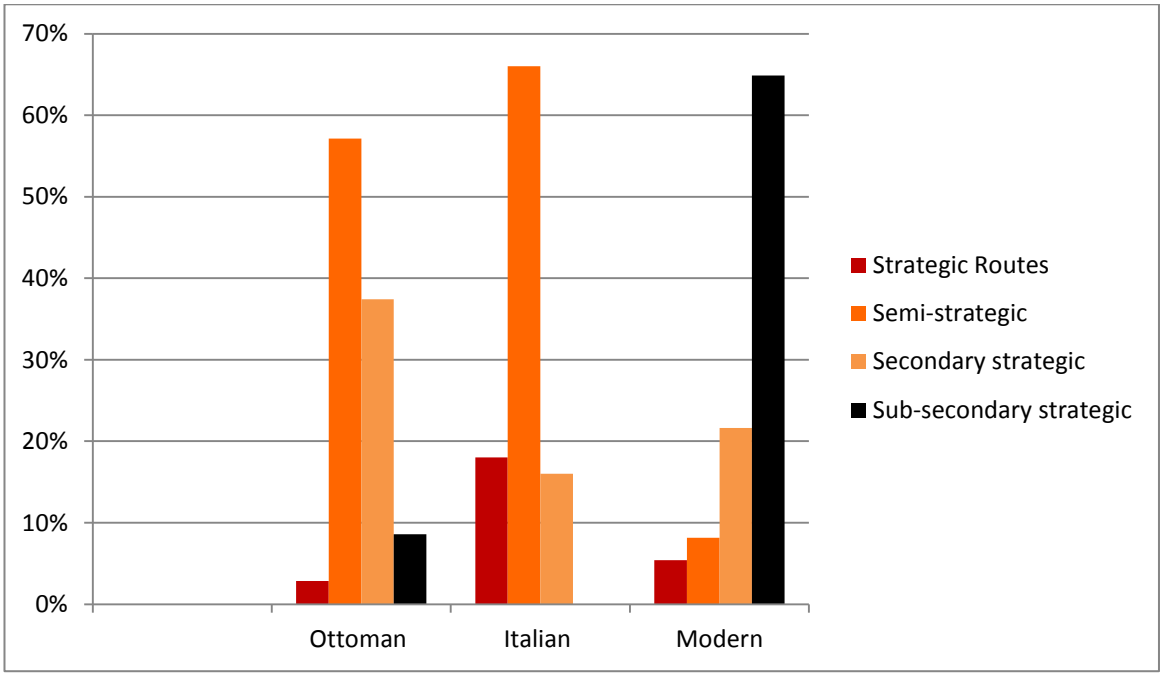


Figure 6.31: A Comparison of Percentages of the Route Types for the Three Case Studies

Analysing streets in term of their links to social catchment spaces or commercial streets have provided significant results. The findings show an abandonment of both Semi-Strategic and Secondary Strategic routes in both the Ottoman and Italian quarters, which means that most of the routes lead to social or commercial services, thus helping to improve the liveability of the neighbourhood and its social inclusion. In addition, the grid pattern of the Ottoman and Italian networks help in creating more Semi-Strategic routes, while in the Modern case this grid is broken into short streets which stop the continuity of the route and thus create more Sub-Secondary Strategic routes.

The Analysis: Exploring the Link between Socio-Cultural Values and Urban Form in Benghazi

Chapter 7
Intermediate Scale Elements: Urban Block, and Open Public Spaces

Chapter 7: Intermediate Scale Elements: Urban Block, and Open Public Spaces

7.1. Third Element: Urban Block

7.1.1. The Physical Urban Block

The block forms the basic structural element of the city; the urban structure is considered an amalgamation of rectangular, square and triangular blocks. The residence-blocks and the market street-blocks characterise the physical form of the urban quarter (Osmani, 1988). Urban blocks, including urban plots, are a widely researched area in urban studies. In urban morphology, Jacobs (1961) asserts the important of the size of the block, where size is considered to be a crucial criterion for the liveability of the city, and should be kept to small dimensions. Urban morphology scholars, for example Moudon (1986), Brown and Johnson (1985), and Maitland (1984, 1985), have all made important contributions to the study of the block in term of three aspects: the area and dimensions of the block's physical structure; the block's shape; and the diversity of the block's internal plots (Siksna, 1997).

Based on these aspects, many studies have developed quantitative criteria to measure the effect of different block sizes and patterns on the natural urban development, in terms of land parcelling, building forms, circulation patterns and land use. Investigations and findings have illustrated that the choice of certain block forms and sizes enable prediction of their later development in terms of the physical changes that may occur in the life cycle of the block (Siksna, 1997). These changes might be considered either negative or positive in terms of a community's socio-cultural needs. For example, changes in plot sizes are considered positive in terms of allowing big parcels to be changed to small ones through inheritance or selling, and vice versa. However, changes in a block's land use are considered to have a negative effect for interfering with the privacy custom in Arabic communities.

The aim of this study is to describe Benghazi's different block models and their physical properties, shapes, sizes characteristics and performance of different blocks

and the diversity of their plots. To do so, it is essential to conduct a realistic analysis to grasp different information about these physical properties and shapes of the blocks which were employed in different periods and places in Benghazi, and understand their relative performance in meeting and accommodating the socio-cultural needs of localities in providing a greater variety of plots within the block perimeter. The study seeks to examine the effect of different block sizes, forms and shapes in terms of the previously illustrated socio-cultural norms (Chapter 2), which allow the mix of different income classes of communities to be accommodated within the same block, by: firstly, permitting the variation of plot parcelling; secondly, allowing better circulation patterns around the blocks through the compactness of their shape. The rationale and method for understanding the best block performance in terms of size, shape (forms) and plot diversity in Benghazi's different urban fabric periods will be illustrated in later paragraphs.

7.1.1.1. Rationale and Method

According to Siksna (1997), size and shape (form) of blocks affect the functioning of circulation patterns and the development of the inertial buildings that can create optimum conditions for better performance specifications. The hypothesis of this approach is that certain forms (shapes), sizes and plot diversities have performed better in the past and could perform better for current development and socio-cultural requirements.

Large block mesh sizes affect the circulation pattern and may cause inconvenience for walkability and accessibility. Smaller blocks perform better than larger ones as they create finer-mesh circulation patterns and finer-grained blocks of urban fabric. This concept also indicates the range of block sizes and shapes (forms) that enable optimal performance of circulation patterns, of block fabrics and the overall fabric made by block fabric, streets and open spaces (Siksna, 1997).

The block analysis method is comprised of five steps which will be followed for each block type. Firstly, the physical character of the blocks will be described by their basic geometrical shapes for example a square or rectangle. This is called shape

(compactness) of the block that will be measured by calculating the percentage of the total area of the block on the area of the circumscribed circle with the centre in the block centre (Porta and Romice, 2010); secondly the size of the block will be calculated from the total area of the block within its perimeter; thirdly, the diversity of block plots will be measured by adapting the diversity index developed by Morello and Ratti (2009), and plots in each block period will be classified into three categories, small, medium and large, and these ranges will differ from one period to another as long they make diversity in each block.

$$D = 1 - \frac{\sum_{i=1}^{S} n_i(n_i - 1)}{N(N-1)},$$

Block Plots Diversity Index. *Source:*Morello and Ratti (2009)

Where D represent the Diversity Index of block, S is the number of plots' classes (i.e. small, medium, large), n is the plots area in each class, N is the total number of plots' area.

Finally, a three dimensional chart will be drawn by implementing the three measured variables mentioned above (compactness, size, and diversity), in order to see the optimum block that is most favourable in term of compactness, size and plot diversity, and how each studied block tends to form (or not) a cluster with the other blocks from the same historical period of Benghazi's urban forms (Italian, Ottoman, and Modern).

7.1.1.2. Blocks Types of Case Studies

Three different types of blocks in Benghazi will be studied in this research. The first type is the Ottoman block where plots are interlocked and consist of courtyard houses. Within the blocks, cul-de-sacs emerge to allow entrances to inner plots. Blocks were drawn in a semi gridiron pattern as shown in (Figure 7.1). The Ottoman blocks manage to give flexibility, allowing inner blocks to change in size and shape, as will be illustrated in later paragraphs.

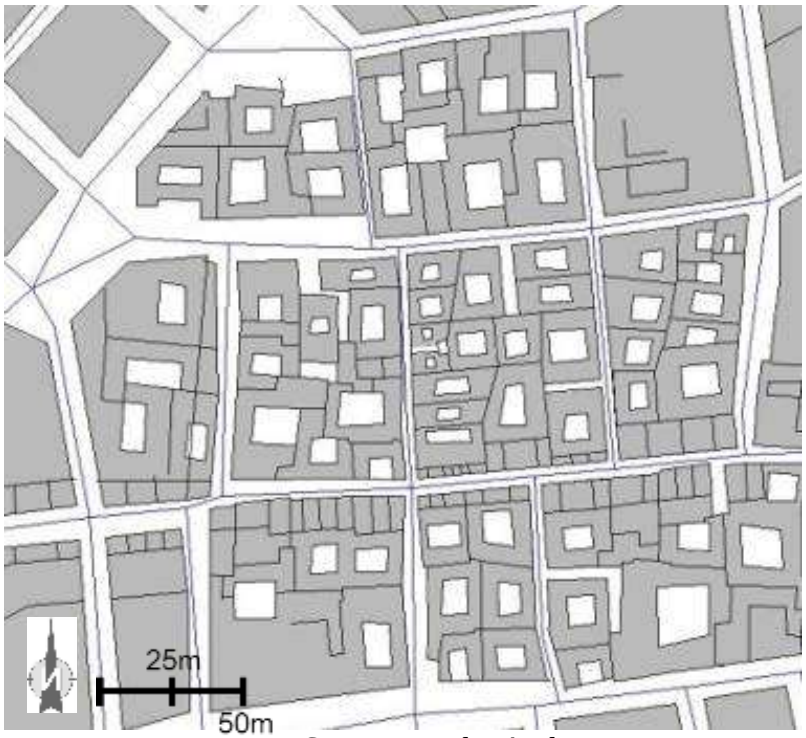


Figure 7.1: The Ottoman Blocks *Source:* By the Author.

The second type is the Italian quarter where plots are arranged in two rows of plots, shaping a rectangle large block. The plots have a small inner shaft for lighting and air circulation only. The Italian blocks were arranged together in rows around long streets allowing the continuity of streets. The Italian blocks are resilient in shape and size but changes have occurred in their land use functions, especially in blocks adjacent to the main thoroughfares (see Figure 7.2).

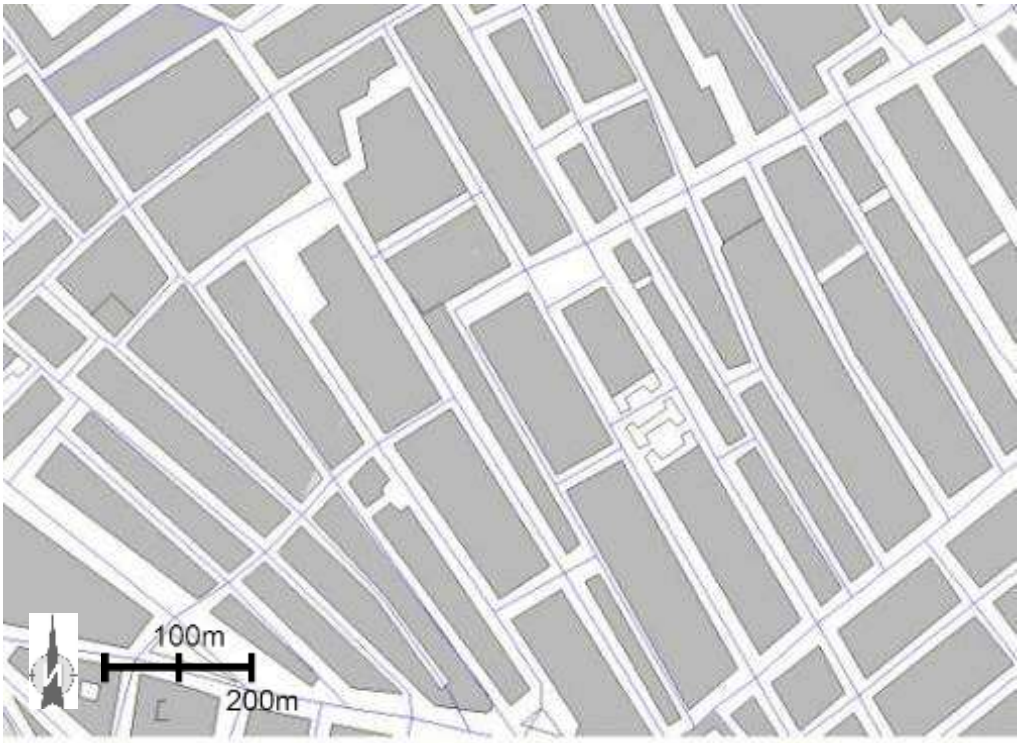


Figure 7.2: The Ottoman Block*s Source:* By the Author.

The third type is the modern deprived neighbourhood blocks which are located within the low density residential zones of the city as detached dwellings. The dwelling is often located in the middle of the plot - due to the imposition of setback planning regulations - and has front and back gardens. As can be seen from (Figure7.3) each cluster consists of a group of four blocks and each block contains about two rows of 16 attached plots.

Figure 7.3: The Modern Deprived Neighbourhood Blocks *Source:* By the Author.

Each cluster (four Blocks), is arranged together in groupings around a common area or garden. Such a layout is characterized by a common area in the middle that is surrounded by four streets which provide access to the surrounding plots, which mean high costs of infrastructure and maintenance are incurred for these common areas and streets (see Figure 7.3).

7.1.1.3. The Analysis

7.1.1.3.1. The Ottoman Quarter Blocks

Table 7.1: An Analysis of Three examples of the Ottoman Quarter Block according to Area (size), Shape (Compactness) and Plot Diversity

1	2	3
		
Perimeter: 270 m Area (size): 4525.68 m^2	Perimeter: 262 m Area (size): 4161.36 m^2	Perimeter: 277 m Area (size): 4783 m^2
Radius: 48.25 m Shape(Compactness): 61.9%	Radius: 47 m Shape (Compactness): 59.99%	Radius: 50m Shape (Compactness): 60.92%
Number of small plots: 2 Number of medium plots: 3 Number of large plots: 5 Number of huge plots: 0 Total number of plots:10 Plots Diversity index: 0.63	Number of small plots: 3 Number of medium plots: 5 Number of large plots: 2 Number of huge plots: 0 Total number of plots: 10 Plots Diversity index: 0.69	Number of small plots: 4 Number of medium plots: 9 Number of large plots: 4 Number of huge plots: 0 Total number of plots:17 Plots Diversity index: 0.65

The common geometrical shape of the Ottoman quarter blocks is an irregular square. The areas of the range between 4000 m^2 and 5000 m^2 which fall into the Small category of block area. Compactness percentage is in the range of 59% to 62%, which means high occupancy of the built form within the block and this reflects in the good circulation around the block. The diversity index of the Ottoman blocks' inner plots ranges between 0.63 and 0.69, which is considered to be a strong indication and reflection of a good mix of different plot sizes, and thus also bringing a diverse mix of income classes of dwellers (see Table 7.1).

7.1.1.3.2. The Italian Quarter Block

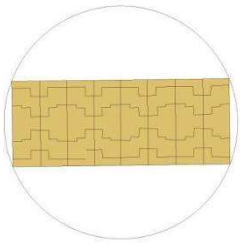
Table 7.2: An analysis of three examples of the Italian Quarter Block according to Area (size), Shape (Compactness) and Plot Diversity

1	2	3
		
Perimeter: 504 m Area (size): 1121.5 m^2	Perimeter: 794 m Area (size): 8836 m^2	Perimeter: 485 m Area (size): 40098 m^2
Radius: 103.5 m Shape (Compactness): 33.35%	Radius: 101 m Shape (Compactness): 27.58%	Radius: 144m Shape (Compactness): 64.23%
Number of small plots: 5 Number of medium plots: 3 Number of large plots: 2 Number of huge plots: 0 Total number of plots:10 Plots Diversity index: 0.69	Number of small plots: 10 Number of medium plots: 3 Number of large plots: 4 Number of huge plots: 0 Total number of plots: 17 Plots Diversity index: 0.60	Number of small plots: 0 Number of medium plots: 4 Number of large plots: 1 Number of huge plots: 1 Total number of plots:6 Plots Diversity index: 0.83

The common geometrical shape of the Italian quarter blocks is that of a long rectangle for the residential areas and large squares for the administrative blocks of the quarter. The area of residential blocks ranges from 8000 m^2 to 12000 m^2 which falls within the medium range of block areas. Compactness percentage is in the range of 27% to 34%, which means low occupancy of the built form within the block and this reflects in the good circulation around the block. The diversity index of the Italian blocks' inner plots range between 0.60 and 0.69, which is considered a strong indication and reflection of a good mix of different plot sizes, allowing a mix of dwellers from various in-come classes to live in the same community (see Table 7.2).

7.1.1.3.3. The Modern Neighbourhood Block

Table 7.3: An Analysis of Two examples of the Modern Quarter Block according to Area (size), Shape (Compactness) and Plot Diversity

1	2
	
Perimeter: 280 m Area (size): 3893.5 m^2	Perimeter: 178 m Area (size): 1959.72 m^2
Radius: 54 m Shape (Compactness): 43. 5%	Radius: 31.75 m Shape (Compactness): 64.93%
Number of small plots: 0 Number of medium plots: 16 Number of large plots: 0 Number of huge plots: 0 Total number of plots:16 Plots Diversity index: 0.0	Number of small plots: 0 Number of medium plots: 8 Number of large plots: 0 Number of huge plots: 0 Total number of plots: 8 Plots Diversity index: 0.0

The common geometrical shape of the Modern quarter blocks is a rectangle in the residential areas. The areas of residential blocks range from 1900 m^2 to 3900 m^2 which fall into the small range of block areas. Compactness percentage is in the range of 31% to 43.5%, which means medium occupancy of the built form within the block and is reflected in good circulation around the block. The diversity index of the Modern blocks inner plots is (0) which means there is no diversity in their plots, thus the situation that different parcels of lots may attract dwellers of different income classes is not applicable in these types of blocks (see Table 7.3).

7.1.1.4. Conclusion of Urban Block

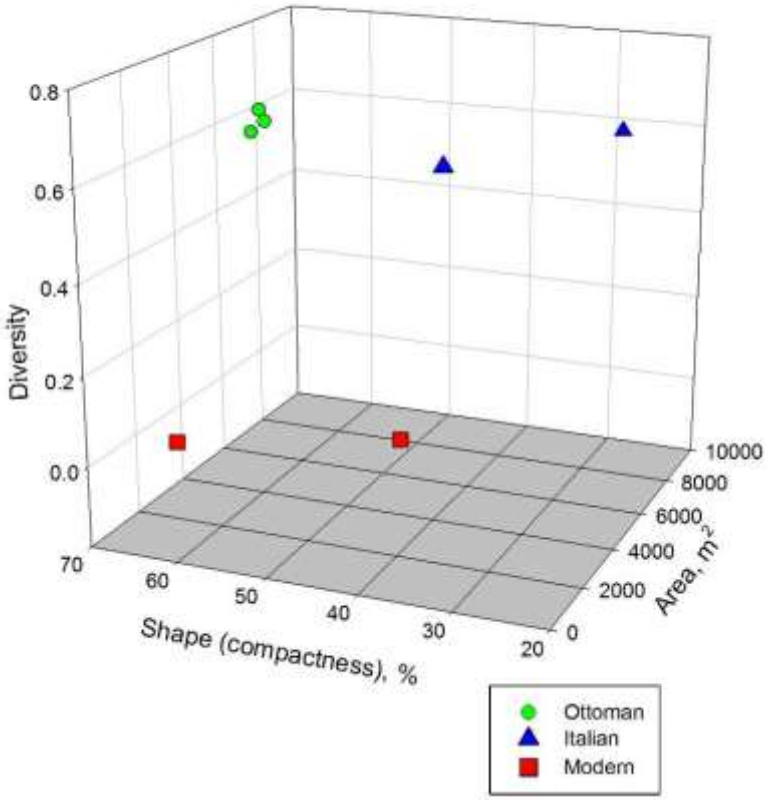


Figure 7.4: A 3-Dimensional Chart for the Three Case Studies Blocks accruing to their Compactness, Area and Diversity. *Source:* By the Author.

The above three-dimensional chart shows how the Ottoman blocks tend to cluster together within the category of small mesh area, high compactness and high diversity of its plots. The Ottoman residential and market street blocks are similar in size and shape, and only differ in their frontages on the main thoroughfare street. The Italian blocks tend to have two clusters, one for its residential blocks and the other for the administrative blocks. The administrative blocks are big in area and large in size. The residential cluster seems to be in the lower category of shape (compactness), while the administrative one is in a high category of shape (compactness). Both of them have a high plot diversity index, which indicates different parcels to be inhabited. The Modern quarter consists of two types of block that contain the same plot sizes and shapes. The two types have medium and high compactness compared to the Italian ones, but with zero plot diversity, which is viewed as having a seriously negative effect on their characteristics.

The analysis findings support the initial hypothesis that certain forms (shapes), sizes and plot diversities have performed better in the past, such as the Ottoman ones, and we can learn that these specifications in shape and size and diversity to be implemented in regeneration projects or new developments will perform better in terms of their socio-cultural requirements. The findings will be presented under three headings. These are: firstly, block size which includes the area of the blocks and the optimum range of area that allows better mesh circulation; secondly, the block shapes (form) including the geometrical shape (square, rectangular), length, width and compactness of the block and the optimum choice for allowing circulation around the block and high built up area within the block; thirdly, the diversity index of the plots within the block, which will illustrate the best optimum block ranges among the historical periods that allow a variety of plot parcels, such that different income classes can be accommodated in the same block.

Small and medium areas of blocks, for example the Ottoman blocks and the small block of the Modern case, are more suitable for circulation networks. The illustrated block areas in this study are in the range of 2000m^2 to 5000m^2. These blocks produce better meshed circulation layouts which is favourable for facilitating change in travel

direction. Layouts with finer mesh are satisfactory for residential areas for the increasing level of its circulation. Layouts of small blocks provide greater length of block perimeters within the same area than large ones, thus allowing more frontages and access to the plots (Siksna, 1997).

The study illustrated that layouts with square blocks contain more block area (built-up area) in proportion to the surrounding fabric than the layouts with a rectangular shape, which is considered an optimum form. Square shaped blocks will maximise circulation space, whereas rectangular blocks will maximise surrounding open space and developable land. In this study, the Ottoman and the small Modern blocks are considered to have an optimum performance in terms of their square shape and competence. The compactness rate for the Ottoman blocks and the small modern block ranges between is 60% and 65%, while the Italian rectangular blocks range from around 27% to 34%, which is considered low in terms of the circulation network around the block (Siksna, 1997).

The plot diversity index reflects the range of variety in which the block can contain different parcels of plots sizes. This diversity in plot parcels is considered to be helpful in accommodating different in-come classes within the same block boundary. Thus, it will maintain the mix of poor and rich in the same area and the same block, and will limit the segregation between rich and poor areas and enhance social bonds (see Chapter 2). Both the Ottoman and Italian blocks rated well in the diversity index, between 0.60 and 0.70, while the Modern blocks had zero diversity in the variety of plot parcels.

Compatibilities between block size, shape and diversity could help in creating optimum blocks that work better in terms of circulation and compactness of their built up area and the diversity of their plots. Those specifications reflect a better evolution of block sizes and form in regeneration areas by adjusting their shapes, such as splitting rectangular blocks into squares with streets, alleys and cul-de-sacs. The identified optimum forms also suggest that they might be used as ‘models’ for the layout of new neighbourhoods. If certain block shapes have worked well in the

past, there is reasonable to suppose that they will perform similarly in other cases in the future.

7.1.2. Social Block

The Social Block, as mentioned and defined in Chapter 4, focuses on the streets and void spaces between residential blocks that offer places for interaction between neighbours allowing them to socialise and encouraging short meetings. As mentioned in Chapter 4, the analysis developed by Gehl (1987) focuses on the hearing and sight senses. These are based on a metrical scale which will help in quantitatively understanding the level of social interaction resulting from different configurations of block arrangements and void spaces and understanding the relation between them.

7.1.2.1. The Analysis

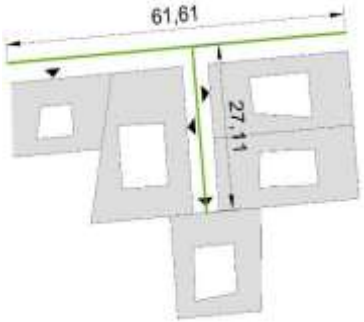
The analysis will chose six samples from the three different morphological periods of Benghazi, The Ottoman, the Italian and the Modern Deprived neighbourhoods. From each of the three periods two samples will be chosen to cover both residential Social blocks within the middle of the neighbourhood and Social blocks on the Market Street or the Thoroughfare Street. The samples will reflect and comment on the block arrangements of these periods, which represent different social characteristics within their Social Block. The different types of Social Blocks will be analysed in detail and compared, in order to understand how they better serve the social dimension, hence informing future further design guidance or suggestions. Social Interaction areas are based on the proposed social distances such as Social Block Social Distance (SBSD), Personal Social Distance (PSD), Social Distance (SD), Public social Distance (PD), and Weak Social Distance (WSD) are defined and explained in Chapter 4 (refer to figure 4.7).

7.1.2.1.1. The Ottoman Social Block

Table 7.4: The Ottoman Quarter Social Block Analysis, Market Street

Shape of the Social Block	Social Interaction Areas		The Proportion of Social to Commercial Frontages
			
Total area: 1,072.72 m^2 Perimeter : 178m Void area: 393 m^2 Solid area: 679.72 m^2 Number of houses: 0 Number of shops: 21 No. opening housing doors: 0 No. opening shops doors: 21 Total number of opening doors:21 Number of streets: 1 Number of cul-de-sacs: 0	Void area: 63.3%		Characters of proportions: Mixed bands or Segregated: S Length of residential: 0 Length of commercial:65.8m
	SBSDareas:679.72 m^2 PSD area: 0 SD area:679.72 m^2 PD area: 0 WSD area: 0	100% 100%	

Table 7.5: The Ottoman Quarter Social Block Analysis, Residential Inner Blocks

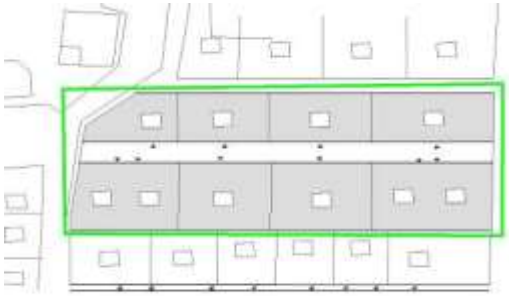
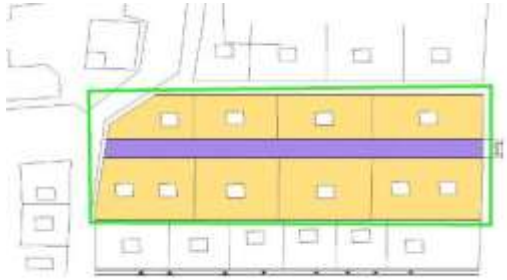
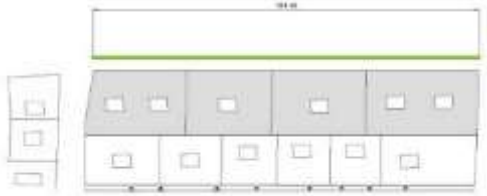
<table>
<tr><td>Shape of the Social Block</td><td colspan="2">Social Interaction Areas</td><td>The Proportion of Social to Commercial Frontages</td></tr>
<tr><td>  </td><td colspan="2">  </td><td>  </td></tr>
<tr><td rowspan="2">Total area: 4,162.6 m^2
Perimeter : 315.2 m
Void area: 198 m^2
Solid area: 3,964 m^2
Number of houses: 9
Number of shops: 0
No. opening housing doors: 8
No. opening shops doors: 0
Total number of opening doors:8
Number of streets: 1
Number of cul-de-sacs: 1</td><td colspan="2">Void area: 4.99 %</td><td rowspan="2">Characters of proportions:
Mixed bands or Segregated: S
Length of residential:88.73 m
Length of commercial: 0</td></tr>
<tr><td>SBSD areas:198m^2
PSD area:198 m^2
SD area: 0
PD area: 0
WSD area: 0</td><td>100%
100%</td></tr>
</table>

7.1.2.1.2. The Italian Social Block

Table7.6: The Italian Quarter Social Block Analysis, Market Street blocks

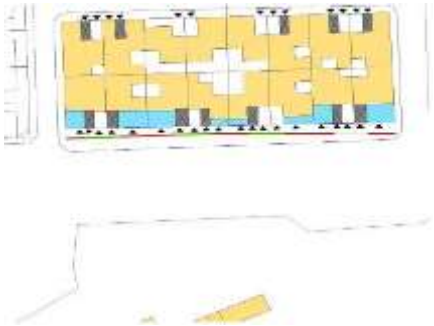
Shape of the Social Block	Social Interaction Areas		The Proportion of Social to Commercial Frontages
			
Total area: 12,805.63 m^2 Perimeter : 523.53 m Void area: 5,861 m^2 Solid area: 6,944.63 m^2 Number of houses: 69 Number of shops: 27 No. opening housing doors: 69 No. opening shops doors: 27 Total number of opening doors: 96 Number of streets: 1 Number of cul-de-sacs: 0	Void area;45.7%		Characters of proportions: Mixed bands or Segregated: M Length of residential: 12 m Length of commercial: 185 m
	SBSD areas: 5,861 m^2 PSD area: 2,359 m^2 SD area: 0 PD area: 3,509 m^2 WSD area: 0	100 % 40.24 % 59.76 %	

Table7.7: The Italian Quarter Social Block Analysis, Residential Inner Blocks

Shape of the Social Block	Social Interaction Areas		The Proportion of Social to Commercial Frontages
			
Total area: 12,383 m^2 Perimeter : 508 m Void area: 1,823 m^2 Solid area: 5,439 m^2 Number of houses: 8 Number of shops: 27 No. opening housing doors: 8 No. opening shops doors: 0 Total number of opening doors: 8 Number of streets: 1 Number of cul-de-sacs: 0	Void area: 43.92 % SBSD areas:1,823 m^2 PSD area: 0 SD area: 0 PD area: 1,823 m^2 WSD area: 0	100 % 100 %	Character of proportions: Mixed bands or Segregated: S Length of residential: 194.5 m Length of commercial: 0

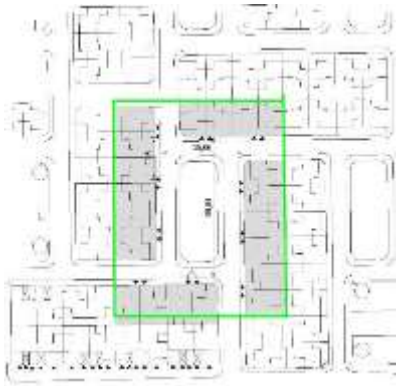
7.1.2.1.3. The Modern Deprived Area Social Block

Table 7.8: The Modern Deprived Neighbourhoods Social Block Analysis Market Street Blocks

<table>
<tr><td>Shape of the Social Block</td><td colspan="2">Social interaction areas</td><td>The proportion of purely social to commercial frontages</td></tr>
<tr><td>N/A due to long distance between opposite frontages</td><td colspan="2">  </td><td>  </td></tr>
<tr><td rowspan="2">Total area: 2,591 m^2
Perimeter : 250 m
Void area: 703.5 m^2
Solid area: 1,915 m^2
Number of houses: 8
Number of shops: 8
No. opening housing doors: 8
No. opening shops doors: 8
Total number of opening doors:16
Number of streets: 1
Number of cul-de-sacs: 0</td><td colspan="2">Void area: 36.7%</td><td rowspan="2">Character of proportions:
Mixed bands or Segregated: M
Length of residential: 40 m
Length of commercial: 60 m</td></tr>
<tr><td>SBSD areas:703.5m^2
PSD area: 0
SD area: 703.5m^2
PD area: 0
WSD area: 0</td><td>100 %

100 %</td></tr>
</table>

Table 7.9: The Modern Deprived Neighbourhoods Social Block Analysis, Residential Inner Blocks

Shape of the Social Block	Social interaction areas		The proportion of social to commercial frontages
			
Total area: 8,698.63 m^2 Perimeter : 381.3 m Void area: 3,919 m^2 Solid area: 4,779.63 m^2 Number of houses: 20 Number of shops: 0 No. opening housing doors: 20 No. opening shops doors: 0 Total number of opening doors:20 Number of streets: 4 Number of cul-de-sacs: 0	Void area: 45% SBSD areas:415.2 m^2 PSD area:100 SD area:315.2m^2 PD area: 0 WSD area: 3,503	 10.59 % 2.55 % 8 % 89.40 %	Character of proportions : Mixed bands or Segregated: S Length of residential: 30 Length of commercial: 0

7.1.2.2. Conclusions of Social Block Anylsis

Physical distance most commonly refers to the separation between objects in physical space. Physical closeness and distance play a role in social interface, since the occurrence of social interface is clearly correlated with such physical distance. Nonetheless, physical distance definitely plays a significant role in communication, for example between neighbours who live on opposite fronts of the block.

Table 7.10: Market Street Social Block

Market street	Social area (m^2)	Solid area(m^2)	Void area(m^2)
Ottoman	63.3	36.7	63.3
Italian	45.7	54.3	45.7
Modern	36.7	63.3	36.7

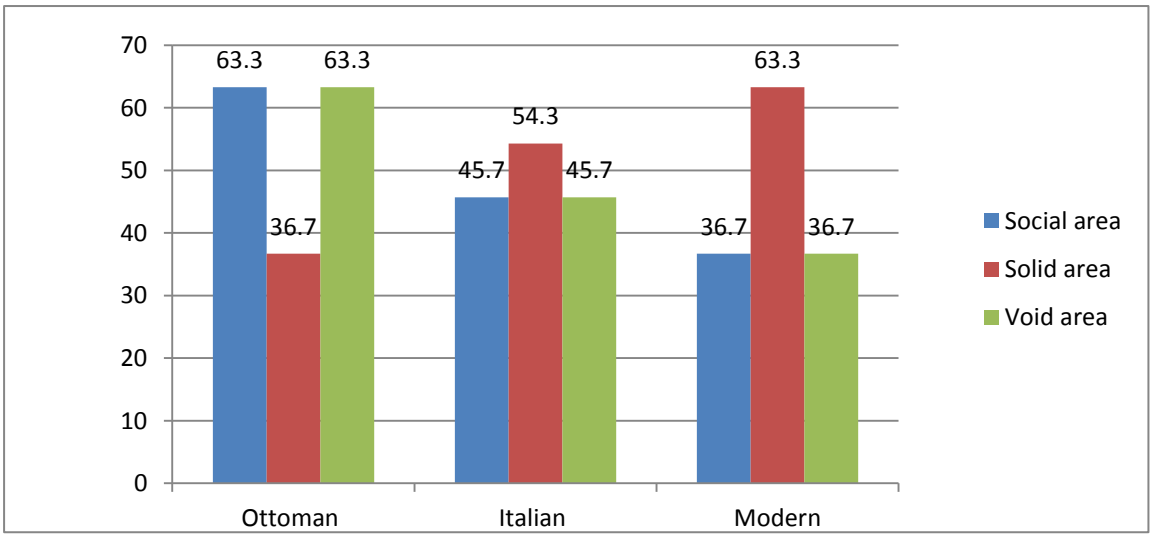


Figure 7.5: Comparison of Social, Solid, and Void areas among the Three Case Studies in the Market Street.

Table7.10 and chart 7.5 above show the results of the analysis of the market street cases. We notice that in term of Social areas, the Ottoman case study comes first where 63% of the entire void area between blocks is sociably usable; while the

Italian comes second scoring 45.7%, and the lowest is the Modern case study which only reaches 36.7%. In the Ottoman case study, the void social area shapes are almost double the solid area of its surrounding plots (Social area 63% and Solid area 36.7%). In this case, this social void area mainly functions to allow a good flow of people movement on Market Street at the main thoroughfare of the quarter. It seems that the market street in the Ottoman case study has accommodated more space for movement than other cases. The worst case is seen in the Modern neighbourhood, where the Social area that is used for the market street is almost half of the Solid area. In term of activities, segregation between economic services and residential areas exist in the Ottoman area, while in both the Italian and the Modern neighbourhoods, the market streets are mixed, which contradicts the socio-cultural norms of privacy and segregation.

Table 7.11: Residential Social Blocks

Residential area	Social area(m^2)	Solid area(m^2)	Void area(m^2)
Ottoman	4.99	95.01	4.99
Italian	43.92	56.08	34.91
Modern	10.59	55	45

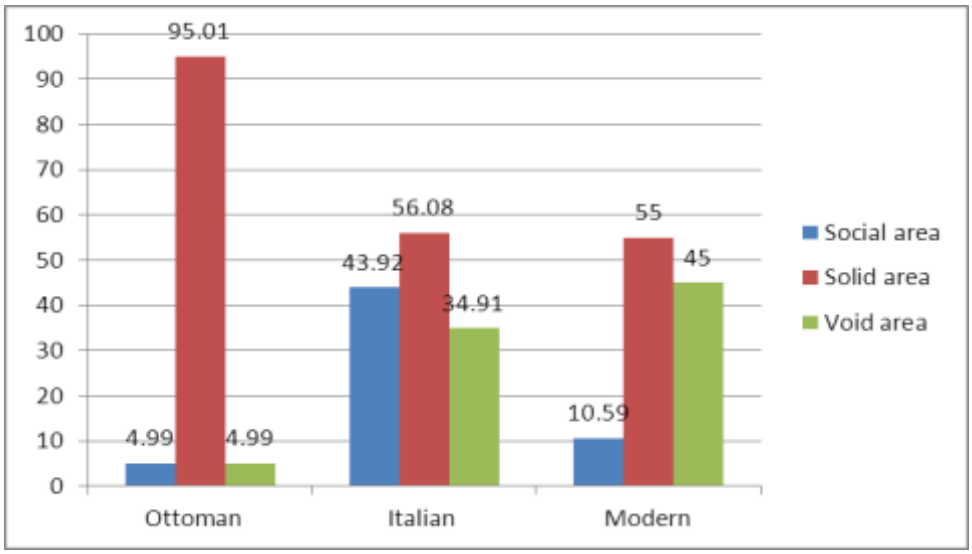


Figure 7.6: Comparison of Social, Solid, and Void areas among the Three Case Studies in the Residential Social Block.

In terms of residential Social blocks, the results show that in the Ottoman quarter the social area is almost 5% of the overall Social Block, while it increases to 44% in the Italian case. This could be a result of widening the roads in the Italian area in order to accommodate car movement, but in the Ottoman and the Italian quarters all of the void area remains socially active. In the Modern case, the Social area totalled 10.59% of the overall Social Block, and only a third of the void area that reached a staggeringly high percentage of 45%, which is not for social use. This void area is planned as parks between blocks, but nowadays it is not usable by neighbours and is sometimes turned into unplanned car parking lots (See Table 7.11, and Figure 7.6).

These findings suggest that the four physical factors introduced, the Personal Social Distance, the Social Distance, the Public Social Desistance, and the Week Social Distance, could contribute much to the understanding of the social process of the spaces between blocks. The width plays a crucial rule in the design of successful areas between blocks, as it can assist in creating and supporting the local social and cultural activities significantly.

7.2. Fourth Element: Public Open Spaces

7.2.1. Configurations

Configuration of public open spaces involves the street layout of their location and their particular functional features. A distinction can be made between a public space's macro-design - its relationship with the routes into it and its connections with its surroundings neighbourhood street network, and its micro-design- the specific features of the place itself. Micro –design is what attracts people to locations through the activity of the surrounding active frontages, as will be explained in later paragraphs. With regard to macro-design, every public place is part of a greater physical environment and therefore its location, boundaries and connections are essential for influencing its liveability and success:

"Places are not local things. They are moments in large-scale things, the large-scale things we call cities. It is cities that make places. Places do not make cities. The distinction is vital. We cannot make places without understanding cities." (Hillier, 1996, p. 42)

7.2.1.1. Macro-Design: Centrality and Connectivity

Macro-design can be understood with regard to two key factors: Centrality and Connectivity. Places that are well-located are good with centrality and connectivity. The movement pattern around those places will have greater potential and thus create greater potential for different social activities to be come together in space and time (Hillier, 1996; Porta *et al.*, 2008). The surrounding functions of public spaces matter little in terms of its successfullness if it is poorly located within the local movement pattern, as it is unlikely to be used effectively except where there are changes to the wider area, such as higher density of uses or alterations to the movement network that increase connectivity. Thus, understanding open spaces in relation to the network of movement should include location in terms of centrality and connectivity. Therefore, in this thesis the analysis of public open spaces will include any adjacent or through movements as part of its configuration. The method of how this aspect is included will be illustrated in later paragraphs.

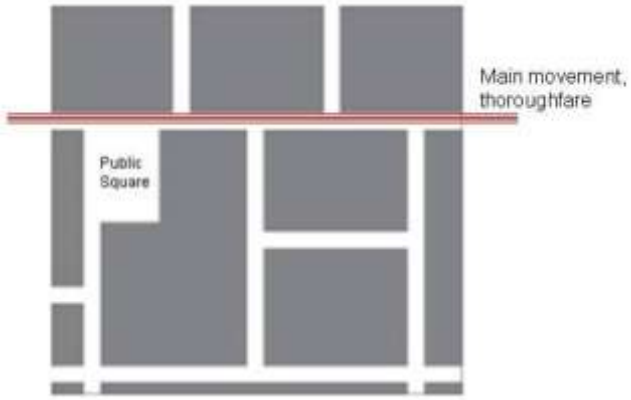


Figure 7.7: An Image of Location of Main Movement thoroughfare to the Public Square. *Source:* by the author.

7.2.1.2. Micro-Design: Active Frontage

Micro-design, in urban design literature advocates the importance of active frontages that include different shops, religious buildings, theatres, Cafes, restaurants etc., on the borders of public places:

"Building facades should be designed so that buildings reach out to the street and offer an active frontage onto public space, adding interest and vitality to the public realm, as windows and doorways suggest a human presence, the more doors and windows onto public space, the better." (Carmona *et al*., 2003, p. 173)

This allows for a more pleasurable walking experience, creates enjoyable social surveillance and adds to the liveliness of a public place through a spill over effect. In Tibbald's words (1992, p. 40):

"…a town or city centre draws its vitality from the activities and uses in the buildings lining its streets. In this respect the facades and activities provided at street - level – closest to eye-level - are particularly important. Too often new buildings have bleak and unfriendly frontages at street level. These deaden the adjacent area."

In this thesis understanding the relationship between active frontages adjoining open spaces is important as it plays a crucial role in their success (Gehl and Gemzoe, 2004).

Figure7.8: Active Frontages adjoining the Grand Mosque Public Square in Benghazi. *Source:* virtualtourist.com

7.2.2. The Importance of Religious Buildings and Market Places as Part of Active Frontages for Public Open Spaces

In the European Middle Ages, religion played a significant role in the life of towns and cities as they underwent a period of significant down turn. At most-times public spaces were located only in front of the church, and functioned also as a market on a weekly basis (Carmona *et al*., 2010). The landscape of the medieval urban public space was dominated by three elements: the religious space for congregation, under the control of the church; the marketplace, under the control of the guilds, and the street. The first urban civic squares were developed in this historical period from small marketplaces, such as Piazza San Marco in Venice (Carr *et al*., 1992, p. 55). These were to evolve into the majestic plazas in the following Renaissance period. After the enlightenment period and specifically the industrial era, civic and public

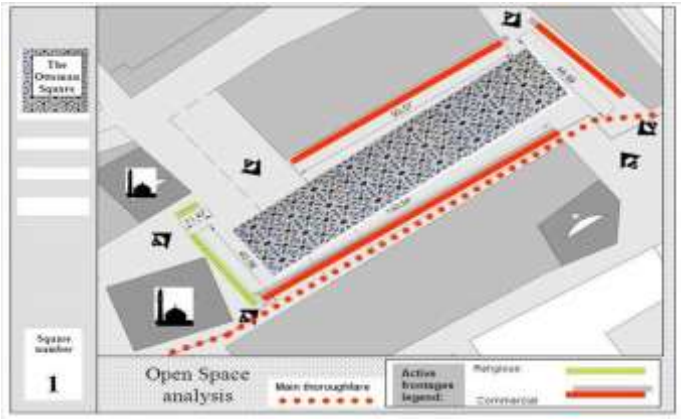
spaces evolved from different perspectives, where religious buildings were not essential to the configuration of the city's public spaces.

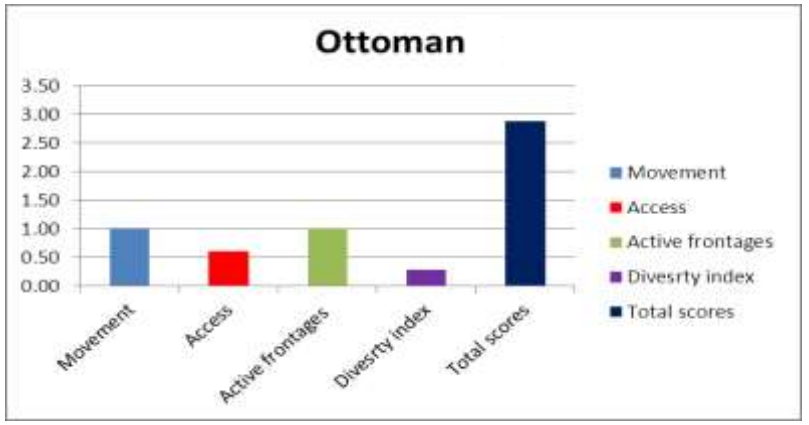
On the contrary, in the Islamic world the mosque and the market place were and still are key pillars for the life of urban settlements. This thesis will include the socio-cultural dimension in analysing public spaces and will give a certain weight to mosques bordering public spaces, as it brings movement which helps to create liveability within the space, whereas locating houses frontages adjacent to public spaces will weigh negatively, as it violates the privacy of the residence.

7.2.3. The Analysis

7.2.3.1. The Ottoman Case Analysis

Table 7.12: The Ottoman Case Analysis

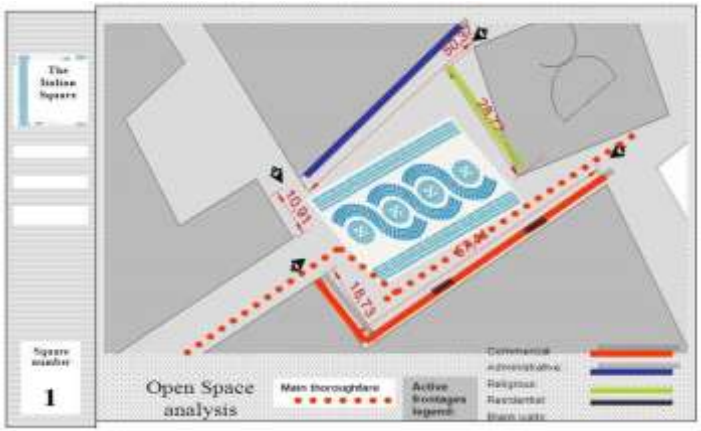


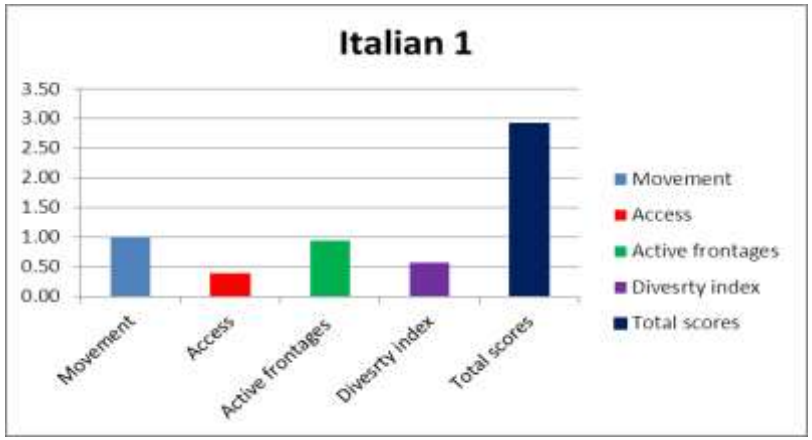


Public Open space layout	Movement Thoroughfares	Access	Active frontages (per meter)									Total score
	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total perimeter	**Active frontage**	Diversity Index	
			Shops (+)	Cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (+)	(0)				
The Ottoman	**1**	**0.6**	**270**	**0**	**53**	**0**	**0**	**0**	**323**	**1**	**0.28**	**2.88**

7.2.3.2. The Italian Cases

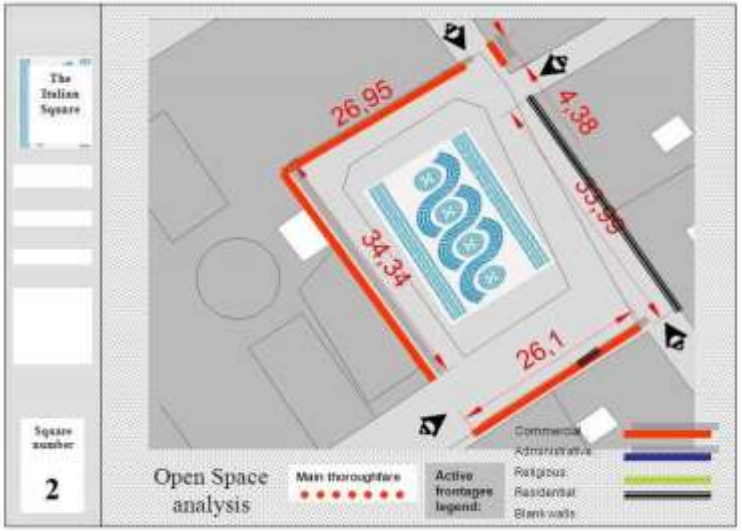
Table 7.13: The Italian Case No.1 Analysis

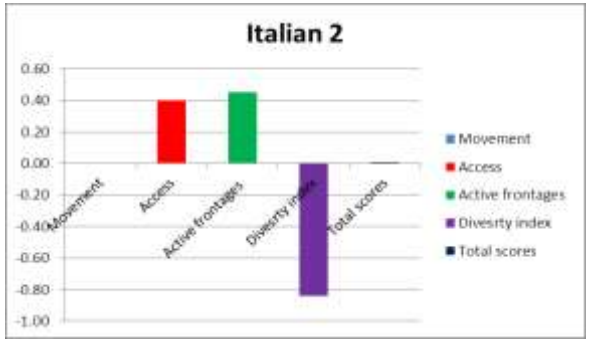




Public Open space layout	Movement Thoroughfares	Access	Active frontages (per meter)									Total score
			Commercial		Religious	Administrative	Housing	Blank walls	Total perimeter	Active frontages	Diversity Index	
	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Shops (+)	Cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (-)	(0)				
The Italian (1)	**1**	**0.4**	**97.08**	**0**	**28.72**	**50.37**	**-4**	**0**	**180**	**0.95**	**0.57**	**2.92**

Table 7.14: The Italian Case No.2 Analysis

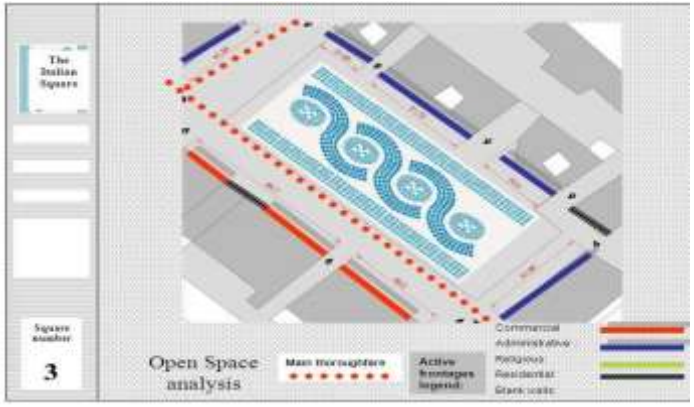


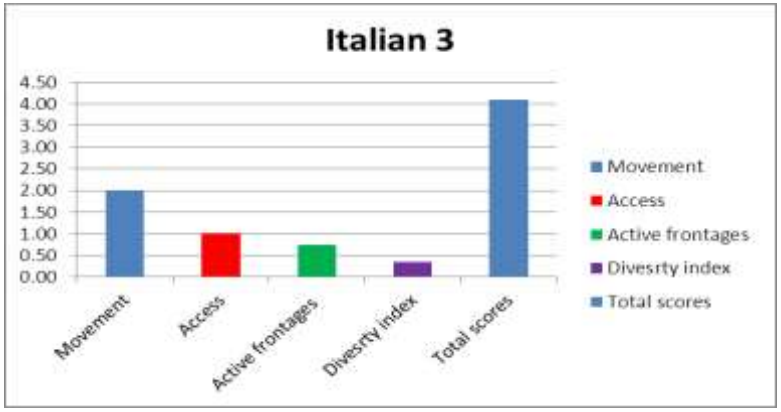


The diversity index is in (-) for its contradiction with the socio-cultural norm of privacy to residential areas. In this example, a mix of residential with shops and coffees are not favoured in the conservative Arabic culture. From experience, this square has witnessed many anti-social

Public Open space layout	Movement Thoroughfares	Access	Active frontages (per meter)								Total score
	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total perimeter	Active frontages	Diversity Index	
			Shops (+)	Cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (-)	(0)				
The Italian (2)	**0**	**0.4**	**65.67**	**26.1**	**0**	**0**	**-33.99**	**0**	**125**	**0.45**	**-0.84**	**0.01**

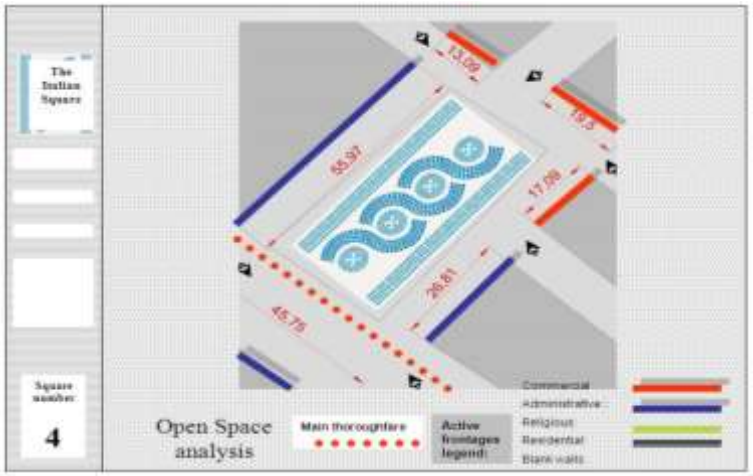
Table 7.15: The Italian Case No.3 Analysis

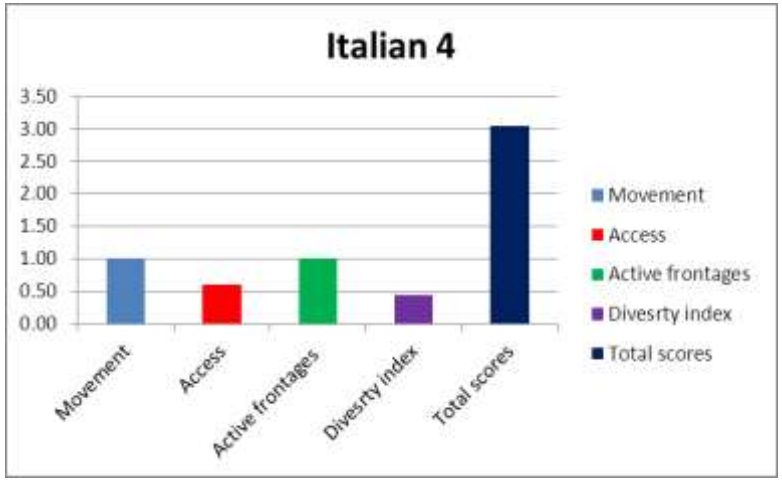




Public Open space layout	Movement Thoroughfares	Access	Active frontages (per meter)									Total score
	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total perimeter	Active frontages	Diversity Index	
			Shops (+)	Cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (-)	(0)				
The Italian (3)	**2**	**1**	**124.3**	**0**	**0**	**200.81**	**-30**	**0**	**230**	**0.74**	**0.35**	**4.9**

Table 7.16: The Italian Case No.4 Analysis

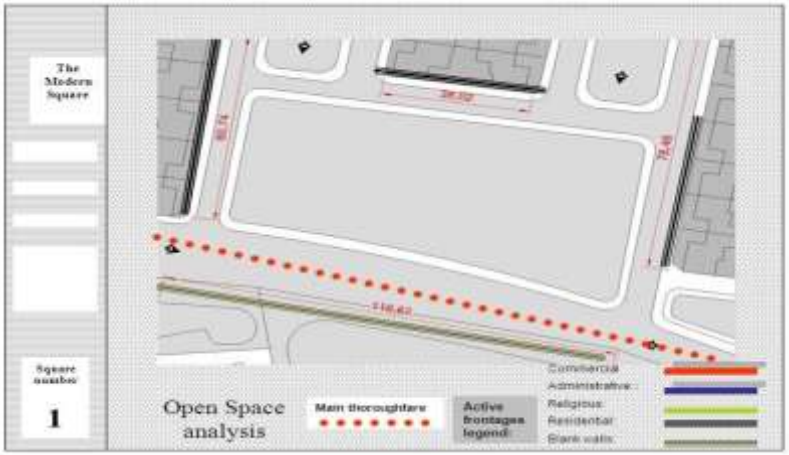


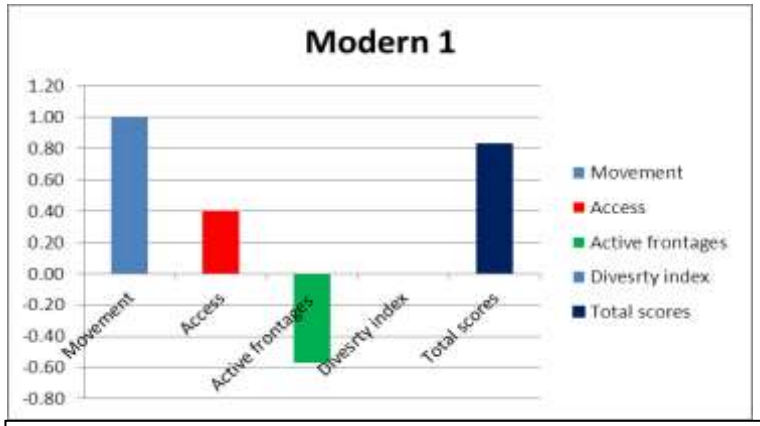


Public Open space layout	Movement Thoroughfares	Access	Active frontages (per meter)									Total score
	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total perimeter	**Active frontages**	Diversity Index	
			Shops (+)	Cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (-)	(0)				
The Italian (4)	**1**	**0.6**	**67.49**	**0**	**0**	**128.53**	**0**	**0**	**196**	**1**	**0.45**	**3.05**

7.2.3.3. The Modern Deprived Case

Table 7.17: The Modern Deprived Case No.1Analysis

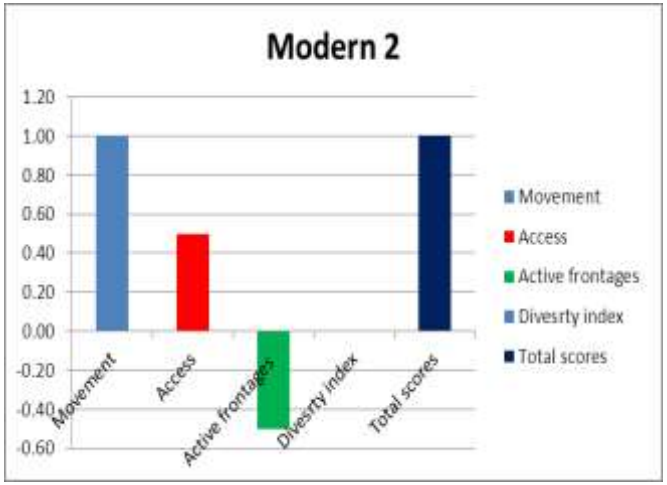




The school wall adjacent to the main thoroughfare has negative weight on the overall of the perimeter active frontages. The school's blank wall, and the residential frontages, plus the zero diversity have resulted in low total scores for the liveability of the public square, when compared to the Ottoman and Italian ones.

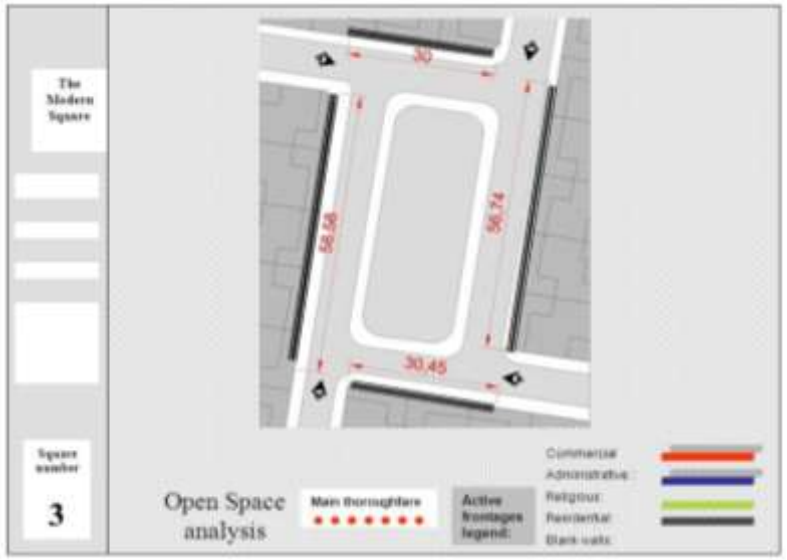
Public Open space layout	**Movement Thoroughfares**	**Access**	**Active frontages (per meter)**									Total score
	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total Front ages perim eter	Active frontag es	Diversity Index	
			Shops (+)	Cafe's (+)	Mosques (0)	Such as banks and offices. (+)	Residenti al (-)	(0)				
The Modern (1)	**1**	**0.4**	**0**	**0**	**0**	**0**	**-158**	**116.6**	**274**	**-0.57**	**0**	**0.83**

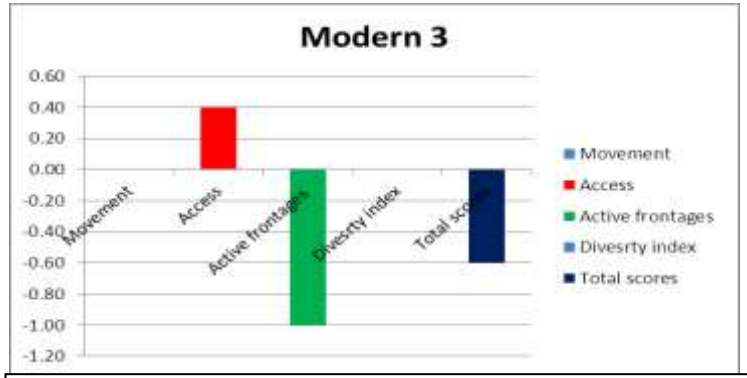
Table 7.18: The Modern Deprived Case No.2 Analysis



	Movement Thoroughfares	**Access**	**Active frontages (per meter)**									Total score
Public Open space layout	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total	Active frontages	Diversity Index	
			Shops (+)	cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (-)	(0)				
The Modern (2)	**1**	**0.5**	**0**	**0**	**0**	**0**	**-153**	**150**	**303**	**-0.50**	**0**	**1**

Table 7.19: The Modern Deprived Case No.3 Analysis





The inner public spaces in the Modern case, have negative total scores for openings of residential frontages onto the open space, which contradicts with the privacy norm. Thus it won't be used by dwellers for socio-cultural reasons. These spaces are now used as unplanned parking lots or garbage areas.

	Movement Thoroughfares	**Access**	**Active frontages (per meter)**									
Public Open space layout	Two at the middle (4) Points. Two edges (4) One edge (1) No edge (0).	(0.1) Points for each access. (Maximum 1 point)	Commercial		Religious	Administrative	Housing	Blank walls	Total	Active frontages	Diversity Index	Total score
			Shops (+)	Cafés (+)	Mosques (0)	Such as banks and offices. (+)	Residential (-)	(0)				
The Modern (3)	**0**	**0.4**	**0**	**0**	**0**	**0**	**-174**	**0**	**174**	**-1**	**0**	**-0.6**

7.2.4. Fourth Element (Public Open Space) Conclusion and Findings

From the following table7.20 and chart (Figure 7.9), both the Ottoman and the Italian squares have high scores, mostly based on: good location of the squares in terms of being adjacent to thoroughfare streets with high numbers of access; high percentage of active frontage out of the overall square perimeter; and also the high diversity of their functional frontages. The only negative score in the Italian squares is the second case, where negativity comes from the high percentage mix of residential and commercial that contradicts with socio-cultural norm of privacy and being away from any thoroughfare street. This square is well known for its anti-social behaviour activities, and is very low in social liveability.

Table 7.20: A Summary of Public Open Spaces Ranking Scores

	Movement	Access	Active frontages	Diversity index	Total scores
Ottoman 1	1.00	0.60	1	0.28	2.88
Italian 1	1.00	0.40	0.95	0.57	2.92
Italian 2	0.00	0.40	0.45	-0.84	0.01
Italian 3	2.00	1.00	0.74	0.35	4.09
Italian 4	1.00	0.60	1	0.45	3.05
Modern 1	1.00	0.40	-0.57	0	0.83
Modern 2	1.00	0.50	-0.5	0	1.00
Modern 3	0.00	0.40	-1	0	-0.60

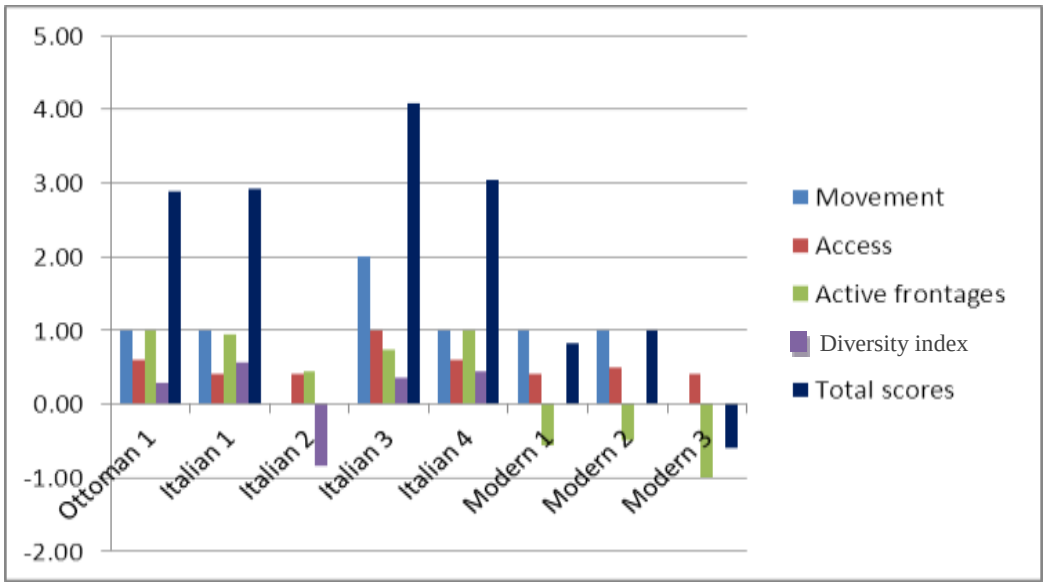


Figure 7.9: A Comparison Chart of the Analysed Case Studies

The modern cases show the lowest scores compared to the Ottoman and Italian squares. Although the two Modern cases, 1 and 2 are situated at a good location adjacent to the main thoroughfare street, their scores are very low as a result of not being surrounded by any social or commercial activities such as shops, mosque or cafes. The opportunity to create successful public squares in the Modern neighbourhood was hindered by bordering them with only residential houses or blank walls.

The multi-attribute ranking method used in the analysis is based on four main categories: the movement supplying the public square; the accessibiity to the square; the percentage of active frontage bordering the square, and finally the diversity index of functions surrounding the square. The results have reflected the actual liveability of these studied squares, which agree with the perceptions of many Benghazi residents. The multi-attribute ranking method enables us to represent these perceptions in a quantitative way.

The Analysis: Exploring the Link between Socio-Cultural Values and Urban Form in Benghazi

Chapter 8:
Small Scale Elements: Housing, and Public Building

Chapter 8: Small Scale Elements: Housing, and Public Building

8.1. Fifth Element: Public Buildings Analysis

8.1.1. Type of Service: Mosque

8.1.1.1. The Ottoman Quarter

Figure 8.1: Ped-Shed Analysis, (300 metre) for the Mosque Type of Public Building. *Source:* By the author.

Table 8.1: Mosque Ped-Shed Analysis in Ottoman Quarter

Diameter of the Ped –shed	300 m
Ped-Shed circle total area	282,600 m^2
Reachable total area (built fabric)	218,127 m^2
Percentage of reachable built fabric	77.18%

Conducting Ped-Shed analysis on the Ottoman case has resulted in 77.18% of the whole sample area (300 metre diameter) in which the dwellers benefited from reaching the mosque in 5 minutes (See Table 8.1). Several reasons for this high percentage can be observed, the first being the location of the neighbourhood mosque on the main thoroughfare street (The Market street), which scored highly on MCA betweenness factor, as analysed previously in the street element section (refer to Chapter 4). The location of the mosque on the main thoroughfare also benefits from being well connected at a central level with the local and the global street fabric. In addition, the type of the street patterns surrounding the Mosque has a crucial impact on the percentage of the Ped-Shed area coverage. Stephen Marshal, in his book "Streets and Patterns" has illustrated street patterns by their different types. In this case, and according to Marshall's types of street patterns, the street layout of the Ottoman quarter can be categorised as an A-type or Altstadt, in Marshall's terms, which is a typical layout found in the core areas of old cities.

A-type usually consists of angled routes, oriented in a variety of directions, generated as a basic radius when such a pattern is located at the core of a neighbourhood (Marshall, 2005). The characteristics of the A-type street pattern in the Ottoman neighbourhood has helped to generate better results in the Ped-Shed analysis for the Mosque's service area, when compared to the modern case which is analysed in coming paragraphs.

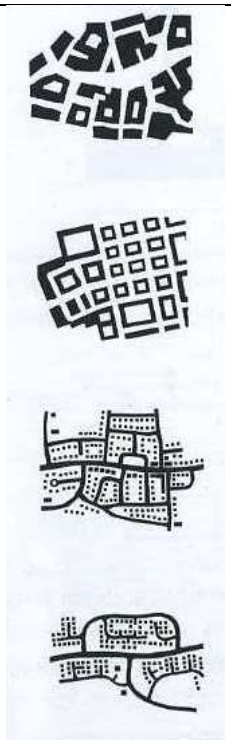
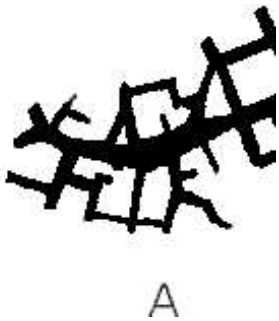
type	Example pattern	Typical location	Frontages	Transport area
A-type Altstadt		Historic core	Built frontages	Era of pedestrian and horseback
B-type Bilateral		Central, or extension, or city wide	Built frontages	Era of horses and carriages
C-type Characteristic/ conjoint		Anywhere, including villages or suburban extensions; often astride arterial routes	Built frontages or buildings set back in space (pavilions)	Any era of public transport, cars
D-type Distributory		Peripheral development: off-line pods or superblock infill.	Buildings set back in space, access only to minor roads	Era of the car

Figure 8.2: ABCD Typology according Stephen Marshall: the Four Types of Street Patterns. *Source:* Marshall (2005)



A

Figure 8.3: A-type, the Ottoman Quarter. *Source:* Marshall (2005)

8.1.1.2. The Italian Quarter

The Italian quarter has no Mosques, as they were not built by the Italian colonial government becauae the area was built to serve the Italian colonial settlers only. Therefore, analysing this type of public building (Mosque) is not applicable.

8.1.1.3. The Modern Deprived Neighbourhood

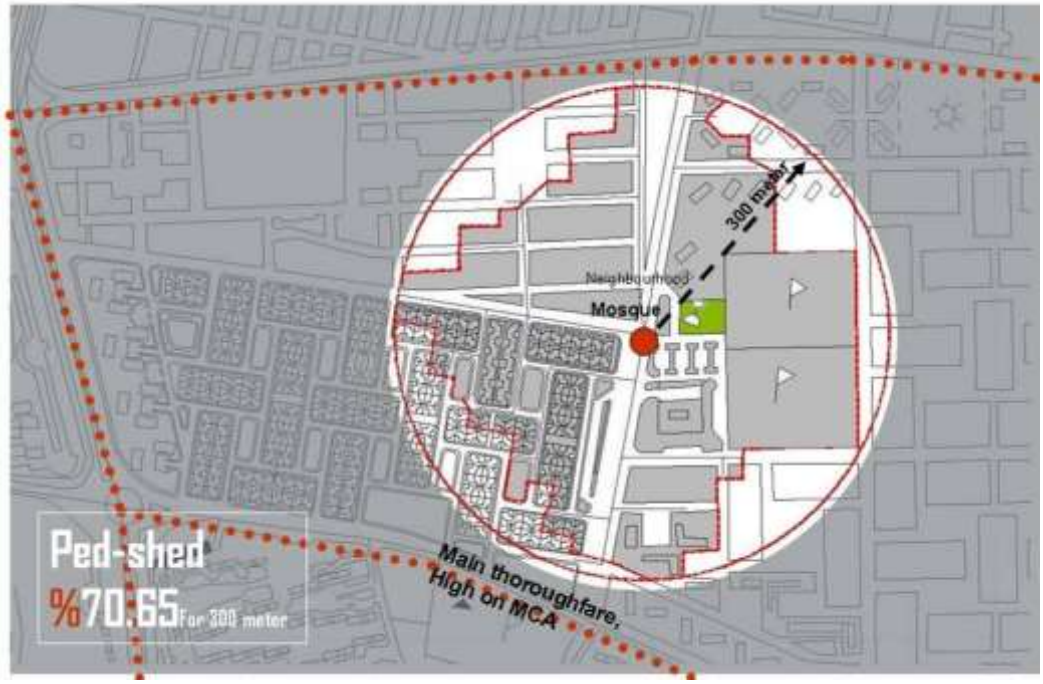


Figure 8.4: Ped-Shed Analysis, (300 metre) for the Mosque Type of Public Building. *Source:* By the author.

Table 8.2: Mosque Ped-Shed Analysis in Modern Deprived Neighbourhood

Diameter of the Ped–Shed	300 m
Ped-Shed circle total area	282,600 m^2
Reachable total area (built fabric)	199,428 m^2
Percentage of reachable built fabric	70.65%

Conducting Ped -Shed analysis on the modern neighbourhood case study has resulted in 70.65% of the whole sample area (300 metre diameter) in which dwellers benefit from being able to reach the mosque in 5 minutes (See Table 8.2). The reasons behind this percentage are observed, such as the location of the neighbourhood mosque in the centre of the neighbourhood built fabric and far from the main thoroughfare street (The Market street), which scores lower on the MCA betweenness factor as analysed previously in the street element section (refer to Chapter 4). This location of the mosque reduced its centrality and connectivity ratio which resulted in lower linkage with the local and global built fabric surrounding the service. Also, the street type pattern in this case has some impact on reducing the Ped-Shed ratio of reachable areas to the mosque service.

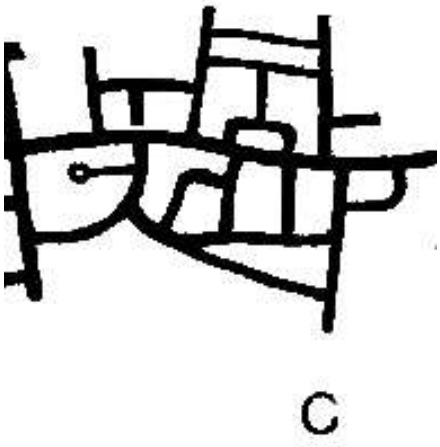


Figure 8.5: C-type, the Modern Deprived Neighbourhood. *Source:* Marshall (2005).

According to Stephen Marshall's typology of street patterns illustrated in (Figure 8.5) mentioned in previous paragraphs, the case of the modern neighbourhood can be categorised as a C-type or a Characteristic/Conjoint type. C-type is usually rooted to the modern 1960's era of suburban extension of cities, similar to Benghazi city. C-Type is commonly characteristic by being astride an arterial route along the city's main radial routes. C-type usually has a low connectivity ratio, as concluded by Marshall in his analysis of C-type street structure and characteristics (Marshall, 2005), (see Figure 8.6).

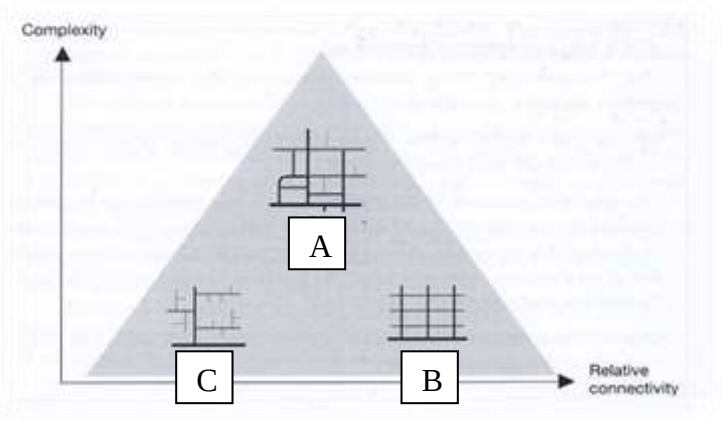


Figure 8.6: Characteristic Structure of Street Pattern Types according to Connectivity *Source:* Marshall (2005).

A statistical comparison of the Ottoman and Modern neighbourhoods using Ped-Shed analysis is illustrated below (Figure 8.7). The comparison clearly shows the resultant percentage of the Ped-Shed analysis to be in favour to the Ottoman quarter, where the location of the Mosque is on the main thoroughfare street and the street pattern is A-type.

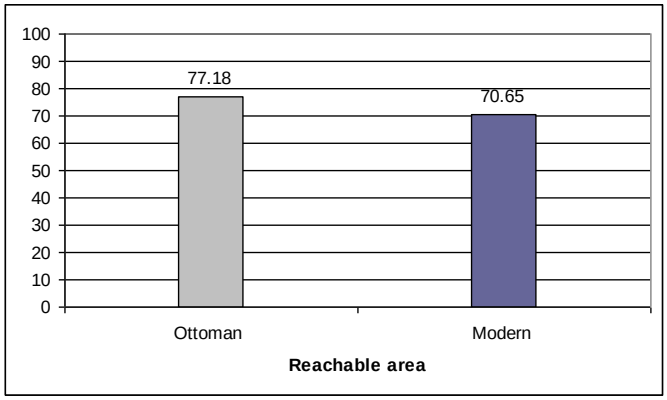


Figure 8.7: Comparison of Mosques Ped-Shed results between the Ottoman Quarter and the Modern Neighbourhood in Benghazi.

8.1.2. Type of Service: Schools

8.1.2.1. The Ottoman Quarter

In Islamic communities like in Benghazi, mosques usually hold an educational role. The Quran repeatedly urges believers to acquire knowledge, knowledge that will bring benefit in this life and the hereafter and bring the faithful ones closer to God by seeking knowledge that is embedded in every corner of his creation. Thus, in the light of the Quran's verses and the Prophetic tradition that encourages the believer to seek both religious and rational knowledge, Mosques facilitate these activities. In Libya, until the start of 20th century, educational spaces where not separated from religious buildings, and both religious and rational sciences where delivered within the Mosque building. For this reason, schools as separate public buildings are absent from the Ottoman-built fabric of Benghazi. In this analysis neighbourhood schools will not be studied due to their absence from the Ottoman built fabric (Zaimeche, 2002).

8.1.2.2. The Italian Quarter

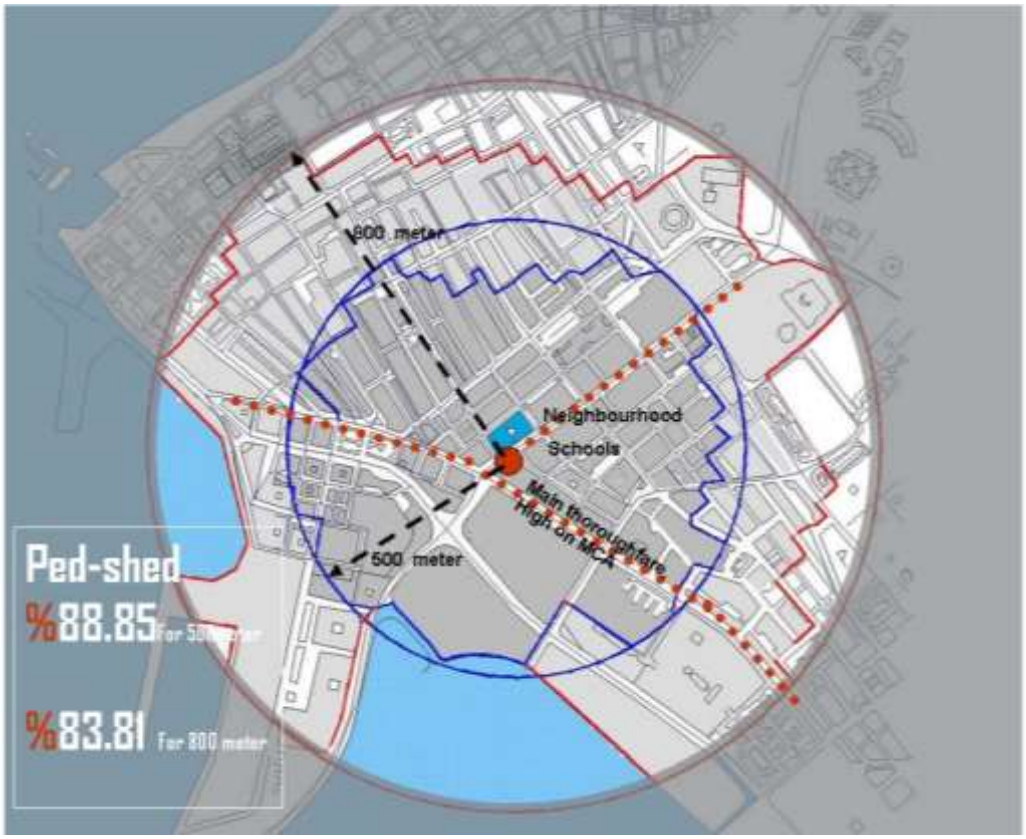


Figure 8.8: Ped- Shed Analysis (500m for School type of Public Building. *Source:* by the author.

Table 8.3: School Ped-Shed Analysis in Italian Quarter

Diameter of the small Ped–shed (primary schools)	500 m
Ped-Shed circle total area	785,000 m^2
Reachable total area (built fabric)	658,263 m^2
Percentage of reachable built fabric	88.85%
Diameter of the large Ped–shed (Secondary schools)	800 m
Ped-Shed circle total area (less sea area)	1,779,703 m^2
Reachable total area (built fabric)	1,491,714 m^2
Percentage of reachable built fabric	83.81%

Conducting Ped–shed analysis on the Italian case study for both primary and secondary schools has resulted in 88.85% of the whole sample area (500 metre diameter) for primary schools and 83.81% for secondary schools (800 meter diameter) in which the dweller benefits from reaching the primary school in just over 5 minutes and secondary school in 10 minutes (See Table 8.3).

There are several explanations for these high percentages. The location of the neighbourhood schools is very close to the main thoroughfare street, which scores highly on MCA betweenness factor, as analysed previously in the street element section (refer to Chapter 4). The location of schools close to the main thoroughfare has also brought benefits from being well-connected at a central level with the local and the global street fabric.

In addition, the type of street patterns surrounding the schools has a crucial impact on the percentage of the area of Ped-Shed coverage. According to Marshall's street pattern types (refer to Figure 8.6), the street layout of the Italian quarter can be categorised as a B-type, or Bilateral in Marshall's terms, which is a typical layout found in central areas of 20thcentury cities.

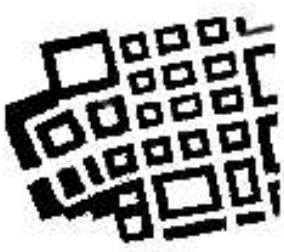


Figure 8.9: B-type, The Italian Quarter. *Source:* Marshall (2005).

B-type are commonly made up of four-way perpendicular junctions that naturally gives rise to bilateral directionality, with implication on the grid form at the wider scale (Marshall, 2005). The characteristics of the Type–B street pattern in the Italian neighbourhood **have** helped to achieve better results in the Ped-Shed analysis for

school service when compared to the modern case that is analysed in coming paragraphs.

8.1.2.3. The Modern Deprived Neighbourhood

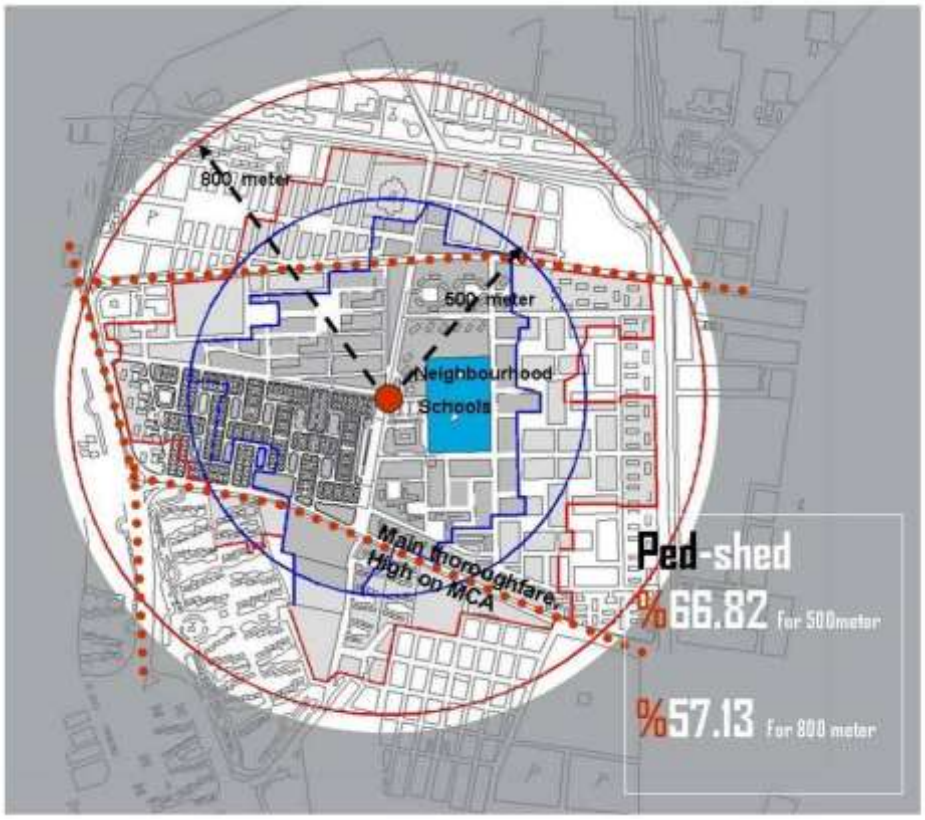


Figure 8.10: Ped- Shed Analysis (500m for School type of Public Building. *Source:* by the author.

Table 8.4: School Ped-Shed Analysis in Modern Deprived Neighbourhood

Diameter of the small Ped-Shed (primary schools)	500 m
Ped-Shed circle total area	785,000 m^2
Reachable total area (built fabric)	524,600 m^2
Percentage of reachable built fabric	66.82%
Diameter of the large Ped-Shed (Secondary schools)	800 m
Ped-Shed circle total area (extract sea area)	2,009,600 m^2
Reachable total area (built fabric)	1,148,148 m^2
Percentage of reachable built fabric	57.13%

Conducting Ped-Shed analysis on the Italian case for both primary and high schools has resulted in 66.82% of the whole sample area (500 metre diameter) for primary school and 57.13% for high school (800 meter diameter) in which dwellers benefit from reaching the primary school in just over 5 minutes and the secondary school in 10 minutes (See Table 8.4).

Several reasons can be observed for this low percentage such as the location of the neighbourhood schools in the centre of the neighbourhood built fabric and far from the main thoroughfare street (The Market Street), which scored lower on MCA betweenness factor analysis, in the previous street element section (refer to Chapter 4). The location of the mosque reduces its centrality and connectivity ratio which results in lower linkage with the local and global built fabric surrounding the service. Furthermore, the street type pattern in this case has some impact on reducing the Ped-Shed ratio of areas which can reach the school service.

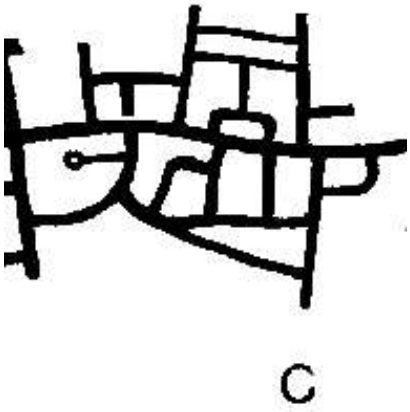


Figure 8.11: C-type, The Modern Deprived Neighbourhood. *Source:* Marshall (2005).

According to the typology of street pattern of Stephen Marshall illustrated in Figure (8.6) and mentioned in previous paragraphs, the case of the modern neighbourhood can be categorised as C-type or Characteristic/Conjoint type. C-type is usually rooted to the modern 1960's era of suburban extension of cities, similar to that of Benghazi city. C-Type is commonly characteristically astride an arterial route along a city's main radial routes. C-type is usually low in connectivity ratio as concluded by Marshall's analysis of C-type street structure and characteristics (see Figure 8.11), (Marshall, 2005).

A statistical comparison between the Italian and Modern neighbourhoods using Ped-Shed analysis is illustrated below (Figure 8.12). The comparison clearly shows that the resultant percentage of the Ped-Shed analysis is in favour of the Italian quarter, where the location of schools is close to the main thoroughfare street and the street pattern type is B-type.

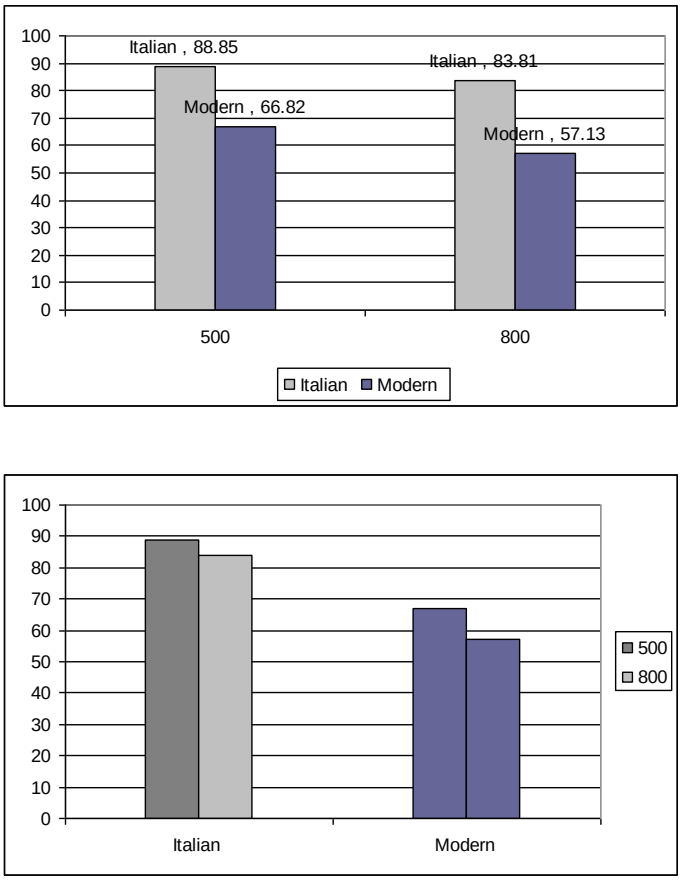


Figure 8.12: Comparison of School Ped-Shed results between the Italian Quarter and the Modern Neighbourhood in Benghazi.

In addition, when comparing between both cases, it is found that one of the main reasons for the lower Ped-Shed percentage of the Modern neighbourhood is that schools occupy very large blocks when compared to surrounding blocks, while in the Italian neighbourhood, school blocks are similar in size to surrounding neighbourhood blocks. Furthermore, large blocks mean more walking distance to reach destinations behind and around the school block, and it is noticed that the areas behind schools are less reachable.

8.1.3. Fifth Element (Public Buildings) Conclusion and Findings

Throughout the previously conducted analysis, two main factors have contributed considerably to the analytical results: the location of the public building to the main thoroughfare and the street pattern of the adjacent fabric. Those two factors are considered to be the main elements behind the percentage results of the Ped-Shed analysis for areas of the built fabric which can easily reach a certain public building. In the cases studied, the analytical findings mainly favour the historic (Ottoman and Italian) street structures over the modern one.

Both Ottoman and Italian street pattern types serve better in enabling dwellers to reach certain public buildings when compared to the Modern street layout type. This is assumes the public building is on the main thoroughfare or very close to it.

In Stephen Marshall's book, Street Patterns, he presents a concept relatively close to these findings, when he examines the importance of the location of public activities or buildings on street patterns relative to their success, and points out that urban activities took place on the main thoroughfare street of older neighbourhoods and this is reversed in modern ones (Marshall, 2005). In old street patterns, such as the Italian and Ottoman forms, Main Streets were not just for through passage, but for meeting, trading and a variety of socio-cultural activities. On main thoroughfare streets there was a natural relationship between the liveliest vital streets and the most important public buildings such as the Mosque.

The Modern neighbourhood in this case study have broken this relationship between movement on busy streets and urban places. This relationship is reversed by creating an inverse connection between movements and urban places (Marshall, 2005). Both historic quarters: the Italian and the Ottoman street patterns locate their public buildings on the main thoroughfare streets to benefit from their liveability and accessibility.

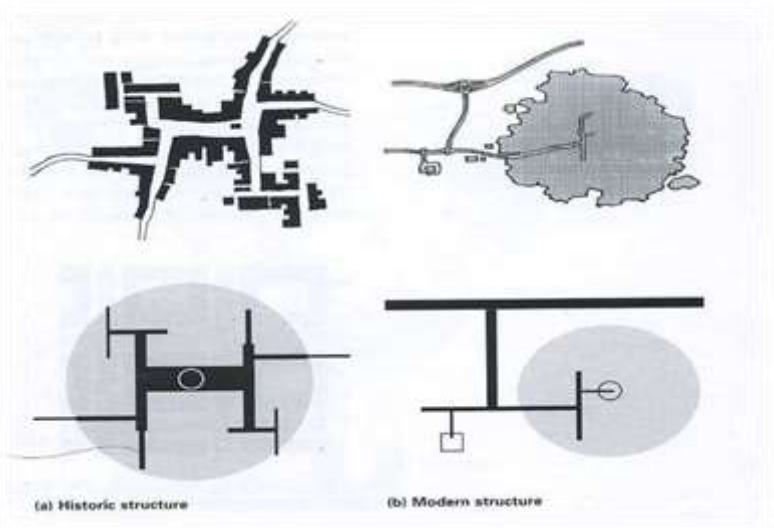


Figure 8.13: Drawing of Historic and Modern Urban Structure: the Main Centre and Public Buildings in the Historic One are usually on the main thoroughfare. *Source:* Marshall (2005).

8.2. Sixth Element: Housing

8.2.1. Housing Open Spaces

8.2.1.1. The Ottoman Case

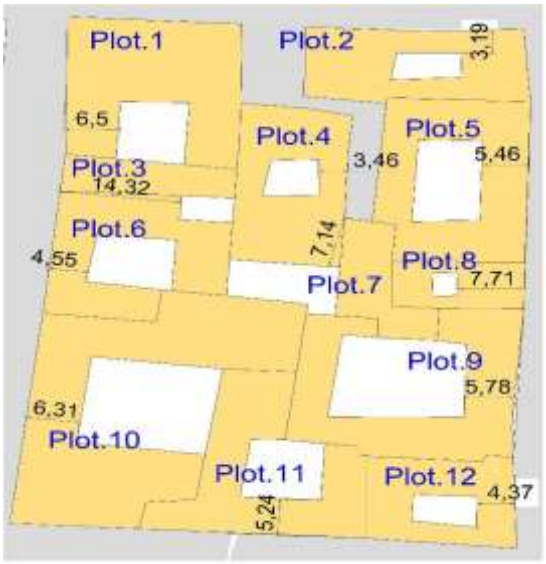


Figure 8.14: Open Spaces in the Ottoman Urban Block/Plots

Table 8.5: The Ottoman Housing Open Space Analysis

Plot Number	Plot total Area(m^2)	Courtyard Area(m^2)	Percantge of Void to Solid area (V/S%)	Distance of courtyard to the plot front wall (m)
Plot. 1	420	70	16.67	6.5
Plot. 2	275	30	10.90	3.19
Plot. 3	127	20	15.74	14.32
Plot. 4	296	40	13.51	3.46
Plot. 5	292	40	13.69	5.46
Plot. 6	318	70	22.01	4.55
Plot. 7	195.5	76	38.87	7.14
Plot. 8	106	12.5	11.79	7.71
Plot. 9	506	173	34.18	5.78
Plot. 10	760	193	25.39	6.31
Plot. 11	394	80	20.30	5.24
Plot. 12	216	32.5	15.04	4.37
Averages			19.84%	6.16 m

8.2.1.2. The Italian Case

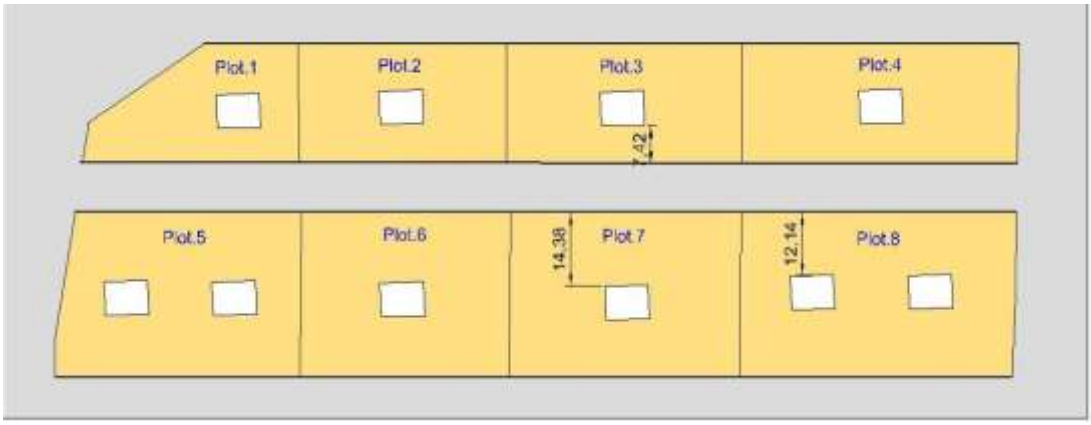


Figure 8.15: Open Spaces in the Italian Urban Block/Plots

Table 8.6: The Italian Housing Open Space Analysis

Plot Number	Plot total Area (m^2)	Courtyard Area (m^2)	Percantge of Void to Solid area(V/S%)	Distance of courtyard to the plot front wall (m)
Plot. 1	822	57	6.93	7.42
Plot. 2	987	60	6.07	7.42
Plot. 3	1120	60	5.35	7.42
Plot. 4	1310	60	4.58	7.42
Plot. 5	1570	120	7.64	14.38
Plot. 6	1381	60	4.34	14.38
Plot. 7	1532	60	3.91	14.38
Plot. 8	1807	120	6.64	12.14
Averages			5.68%	10.62m

8.2.1.3. The Modern Deprived Case

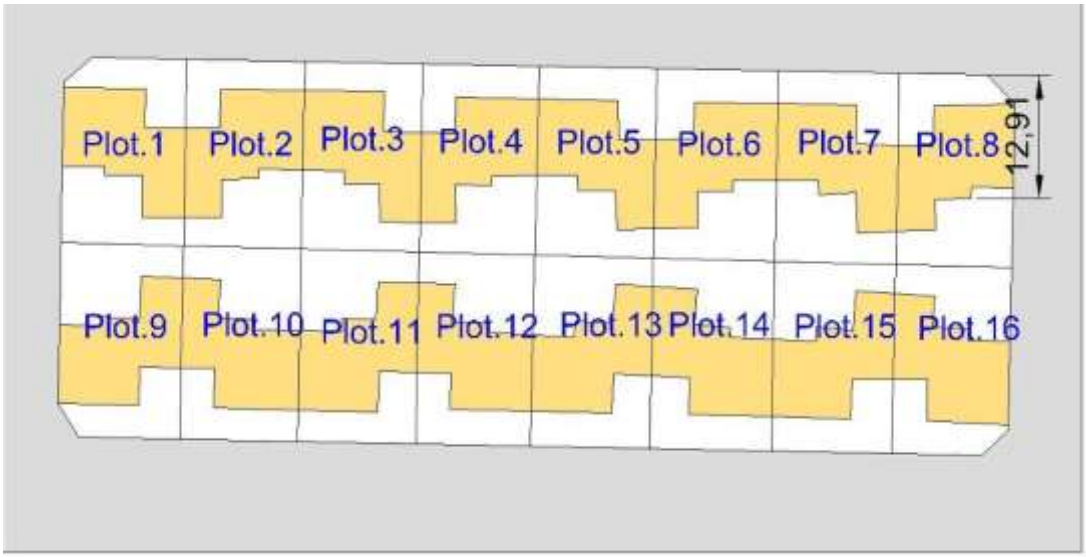


Figure 8.16: Open Spaces in the Modern Deprived Neighbourhood Block/Plots

Table 8.7: The Modern Deprived Housing Open Space Analysis

Plot Number	Plot total area m^2	Front garden area, m^2	The front garden (V/S %)	Back garden area, m^2	The back garden (V/S %)	Total Percentage of Void to Solid area (V/S %)	Front garden distance to the front wall (m)	Back garden distance to the front wall (m)
Plot1-16	247	54	21.86	75	30.36	52.22	0	12.91
Average			21.86%		30.36%		0	12.91m

8.2.1.4. Conclusions of Housing Open Spaces Analysis

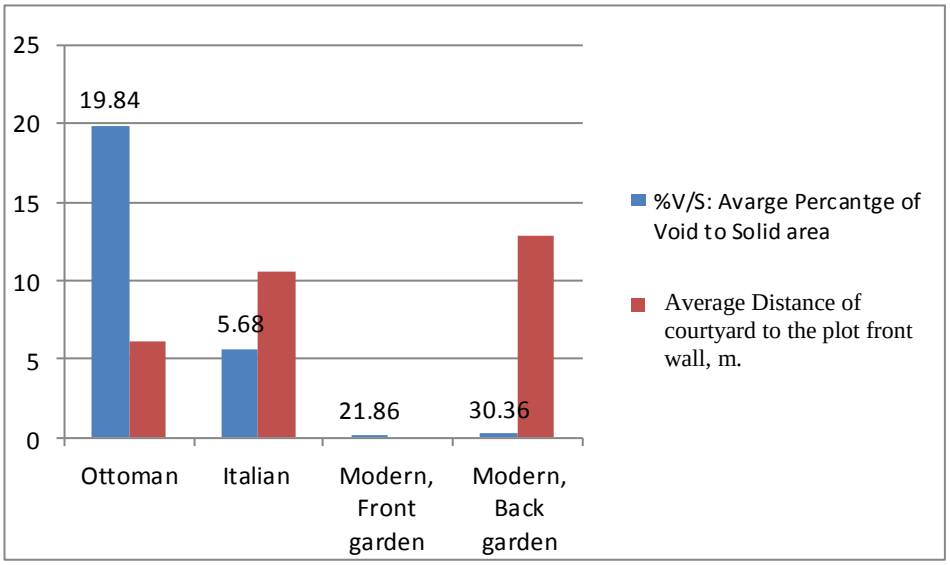


Figure 8.17: Comparison of Housing Open Spaces and their Distance in the Three Case Studies

The above graph shows a visual illustration of the previous analysis divided into two factors; the first is V/S% which is the average percentage of void (open spaces) to the solid area in the different houses types studied; the second is AD which is the average distance calculated between houses' open spaces and the adjacent public street.

The Modern case showed a higher rate in the V/S% factor than the other two cases, with the Ottoman coming second and the Italian last with a very low rate. The problem with the Modern area is that the open spaces are divided into two spaces in two locations, at the front and back of the house plots, and if this separation is taken into account with the AD factor - which regards privacy as an important element - we find that the front garden space is less usable compared to the back garden, thus only the back garden is counted as a fully functioning social private open space for the family to enjoy. These front gardens are commonly under-used by Libyan families and especially among the female members of the family in Libyan society. Front

gardens are seen to be a foreign concept that does not suit the socio-cultural element of the Libyan communities.

In the Italian case study, while the AD factor of the open spaces seems to be good, a reduction can be noted in the V/S% size of the inner open spaces. This has an effect on the social function of the space, when compared to the Ottoman courtyards, which can function only to provide light and air circulation, and could be classified as a light shaft rather than a courtyard.

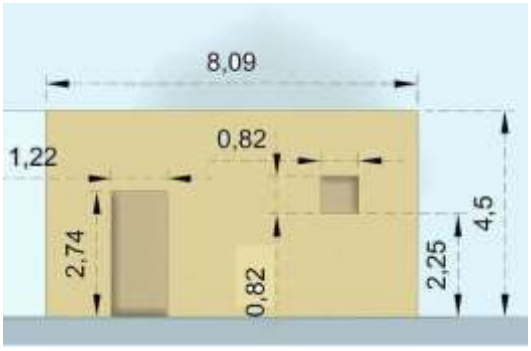
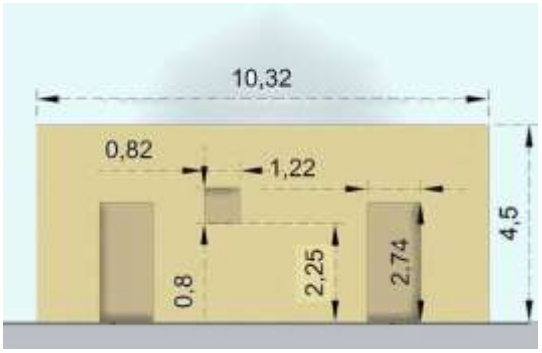
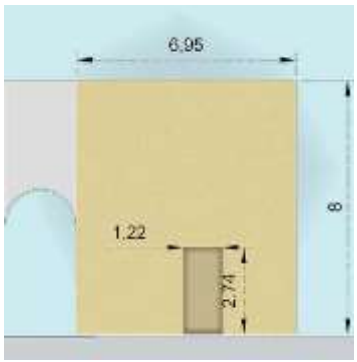
Based on the findings mentioned above regarding the different sizes of case study courtyards and their distance from the public street, it can be concluded that both the Ottoman courtyards and the inner back garden of the Modern case study function well in terms of their privacy and area provided for the dwellers to enjoy their inner family social life away from any street disturbance.

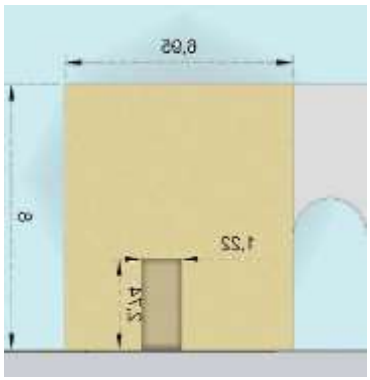
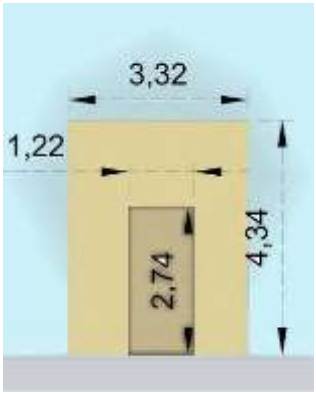
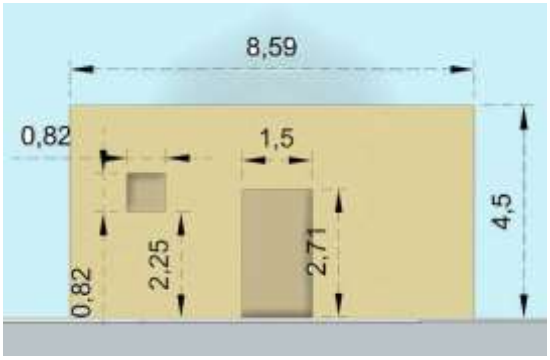
8.2.2. Walls and Doors

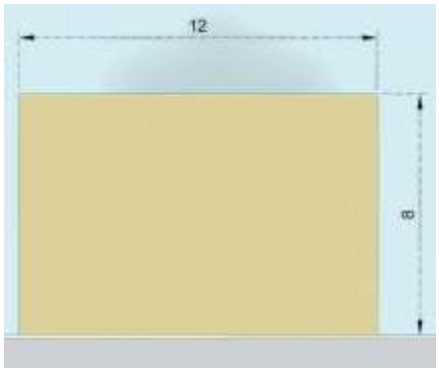
8.2.2.1. Walls Permeability and Diversity Index Analysis

8.2.2.1.1. Ottoman Quarter

Table 8.8: Ottoman Quarter Walls Permeability Analysis

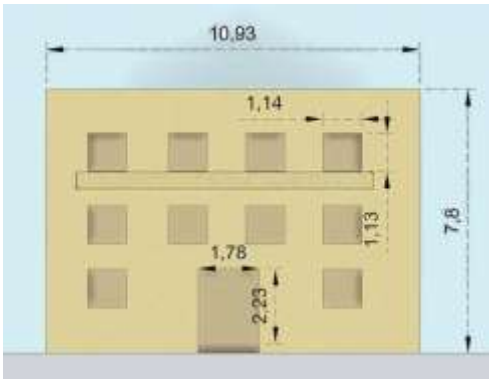
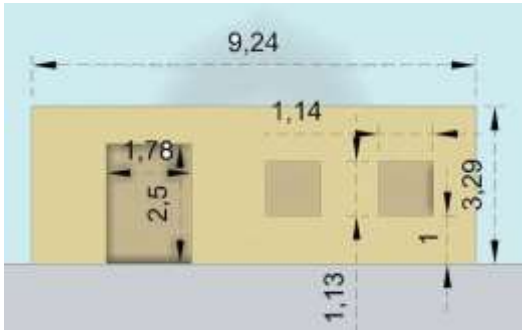
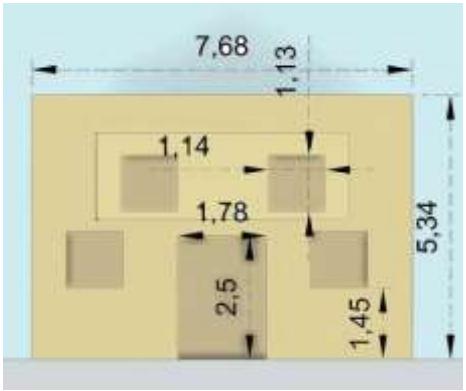
Walls diagrams	Permeability analysis.
	Wall total area: 36.4 Windows area: 0.64 Windows height: 2.25 Doors area: 3.34 Total opening area: 3.98 **Permeability:** Percentage of windows opening to the total area of the wall: **1.75%**
	Wall total area: 46.44 Windows area: 0.65 Windows height: 0.8 Doors area: 6.68 Total opening area: 7.33 **Permeability:** Percentage of windows opening to the total area of the wall: **1.39%**
	Wall total area: 55.6 Windows area: 0 Windows height: 0 Doors area: 3.34 Total opening area: 3.34 **Permeability:** Percentage of windows opening to the total area of the wall: **0%**

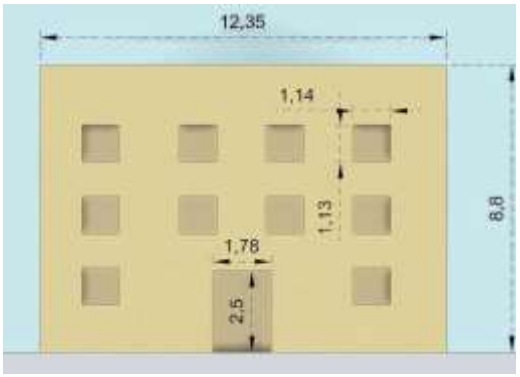
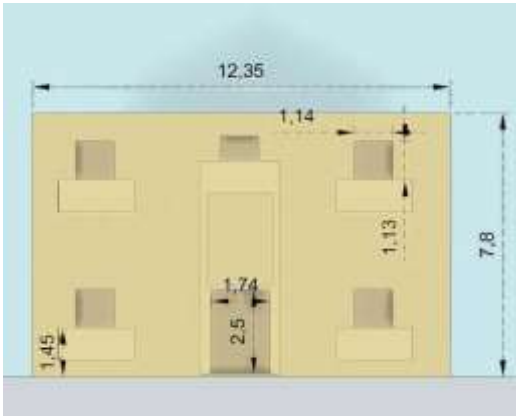
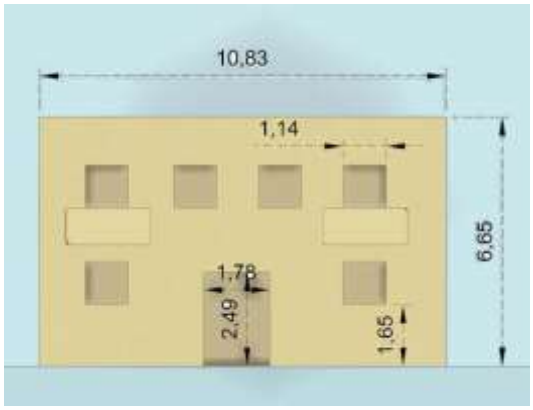
	Wall total area: 55.6 Windows area: 0 Windows height: 0 Doors area: 3.34 Total opening area: 3.34 **Permeability:** Percentage of windows opening to the total area of the wall: **0%**
	Wall total area: 14.4 Windows area: 0 Windows height: 0 Doors area: 3.34 Total opening area: 3.34 **Permeability:** Percentage of windows opening to the total area of the wall: **0%**
	Wall total area: 38.65 Windows area: 0.67 Windows height: 2.25 Doors area: 4 Total opening area: 4.67 **Permeability:** Percentage of windows opening to the total area of the wall: **1.73%**

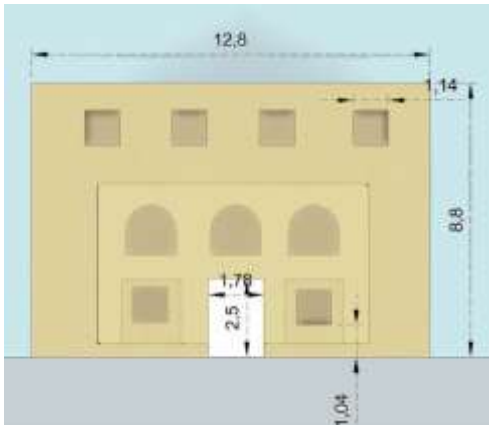
	Wall total area: 96 Windows area: 0 Windows height: 0 Doors area: 0 Total opening area: 0 **Permeability:** Percentage of windows opening to the total area of the wall: **0%**
Overall Block Front Wall	
	Average Windows Height: 2.25 **Average Permeability:** Percentage of windows opening to the total area of the wall: **1.5%** Diversity index for wall length: 0.85

8.2.2.1.2. Italian Quarter

Table 8.9: Italian Quarter Walls Permeability Analysis

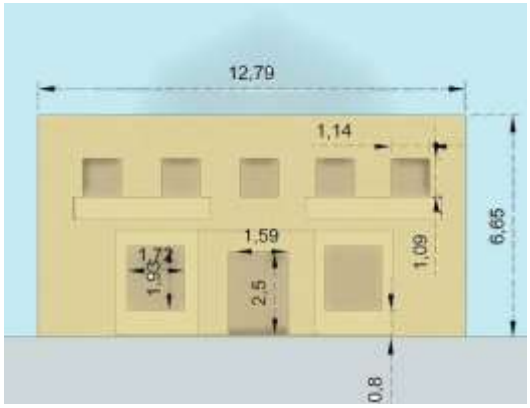
Walls diagrams	Permeability analysis
	Wall total area: 85.8 Windows area: 13 Windows height: 1.34 Doors area:3.96 Total opening area: 17 **Permeability:** Percentage of windows opening to the total area of the wall: **19.81%**
	Wall total area: 30.39 Windows area: 2.6 Windows height: 1 Doors area:4.45 Total opening area: 7.05 **Permeability:** Percentage of windows opening to the total area of the wall: **8.55%**
	Wall total area: 41 Windows area: 5.20 Windows height: 1.45 Doors area:4.45 Total opening area: 9.65 **Permeability:** Percentage of windows opening to the total area of the wall: **12.68%**

	Wall total area: 108.68 Windows area: 13 Windows height: 1.45 Doors area:4.45 Total opening area: 17.45 **Permeability:** Percentage of windows opening to the total area of the wall: **11.96%**
	Wall total area: 96.33 Windows area: 6.5 Windows height: 1.45 Doors area:4.45 Total opening area: 10.95 **Permeability:** Percentage of windows opening to the total area of the wall: **6.74%**
	Wall total area:72 Windows area: 7.8 Windows height: 1.65 Doors area:4.45 Total opening area: 18.74 **Permeability:** Percentage of windows opening to the total area of the wall: **10.83%**

<table>
<tr>
<td> 
</td>
<td>Wall total area:112.65

Windows area: 11.7
Windows height: 1.04

Doors area:4.45
Total opening area: 16.15

Permeability: Percentage of windows opening to the total area of the wall: 10.38%</td>
</tr>
<tr>
<td> 
</td>
<td>Wall total area:85.12

Windows area: 13.14
Windows height: 0.8

Doors area:4
Total opening area: 17.14

Permeability: Percentage of windows opening to the total area of the wall: 16%</td>
</tr>
<tr>
<td colspan="2">Overall Block Front Wall</td>
</tr>
<tr>
<td colspan="2"> 

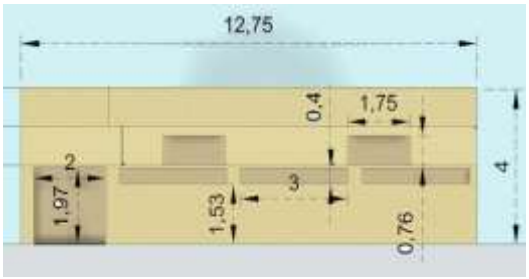
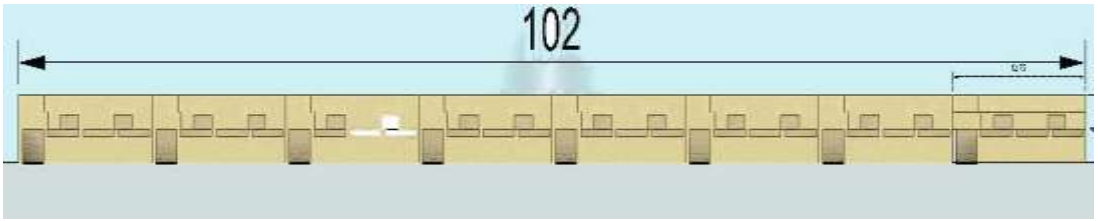
Average Windows Height: 1.45

Average Permeability: Percentage of windows opening to the total area of the wall: 12.11%

Diversity index for wall length: 0.81</td>
</tr>
</table>

8.2.2.1.3. Modern Neighbourhood

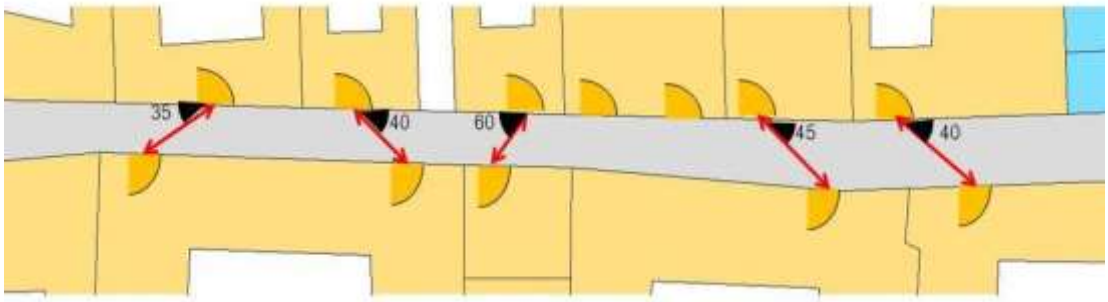
Table 8.10: Modern Neighbourhood Walls Permeability Analysis

Walls diagrams	Permeability analysis
	Windows area: 4.1 Windows height: 1.53 Doors area:4 Total opening area: 8.1 **Permeability:** Percentage of windows opening to the total area of the wall: **0.8%**
Overall block front wall	
 Average Windows Height: 1.53 **Average Permeability:** Percentage of windows opening to the total area of the wall: **0.8%** **Diversity index** for wall length: **0**	

8.2.2.2. Opposing Doors Angle Analysis

8.2.2.2.1. The Ottoman Quarter

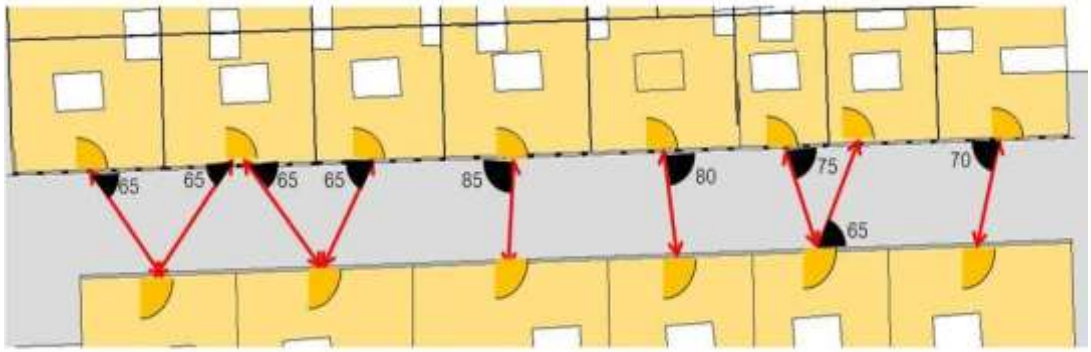
Table 8.11: Opposite Doors Analysis in the Ottoman Quarter



Number of street plots: 14
Number of doors opening on shared street: 12
Number of door opposite to each other: 10
Percentage of opposite doors to the total numbers of doors: 80.33%
Average mean of angles of opposite doors: 44.

8.2.2.2.2. The Italian Quarter

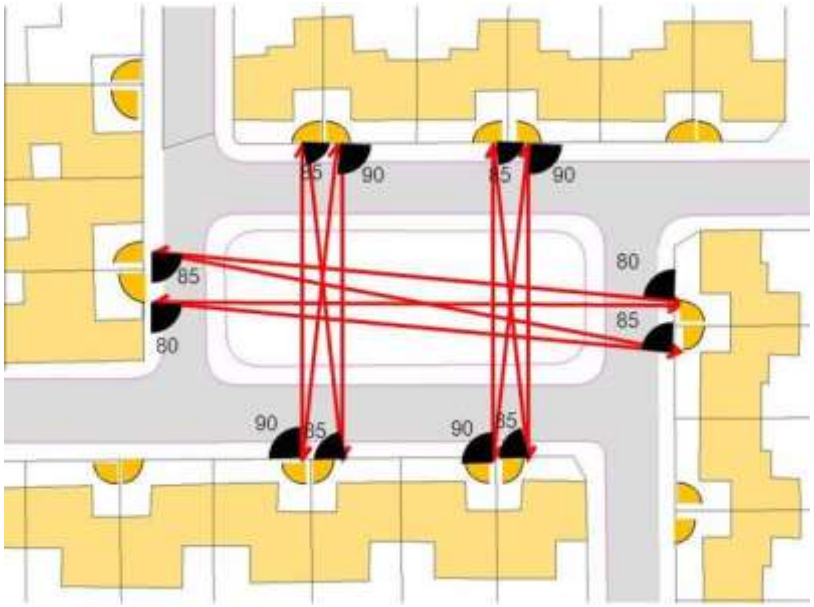
Table 8.12: Opposite Doors Analysis in the Italian Quarter



Number of street plots: 14
Number of doors opening on shared street: 14
Number of door opposite to each other: 14
Percentage of opposite doors to the total numbers of doors: 100%
Average mean of angles of opposite doors:70.55

8.2.2.2.3. The Modern Deprived Neighbourhood

Table 8.13: Opposite Doors Analysis in the Deprived Modern Neighbourhood



Number of street plots: 20
Number of doors opening on shared street: 20
Number of door opposite to each other: 12
Percentage of opposite doors to the total numbers of doors: 60%
Average mean of angles of opposite doors:87.5

8.2.2.3. Conclusions from Walls and Doors Analysis

From the previous analysis results, a chart can be drawn (Figure 8.18) for the Permeability factor of case studies. The lower the permeability, the better the privacy is. The graph shows that the Modern case has the lowest rate, followed by the Ottoman case, and the Italian case which shows the highest rate of Permeability. Both the Ottoman and the Modern cases are almost the same in terms of Permeability rate. The reason behind the good privacy of the Modern case is the setback of the house building behind the front wall. The Italian case has much less privacy compared to the others, due to cultural design differences which favour having more out-side windows for the dwellers to enjoy the street live..

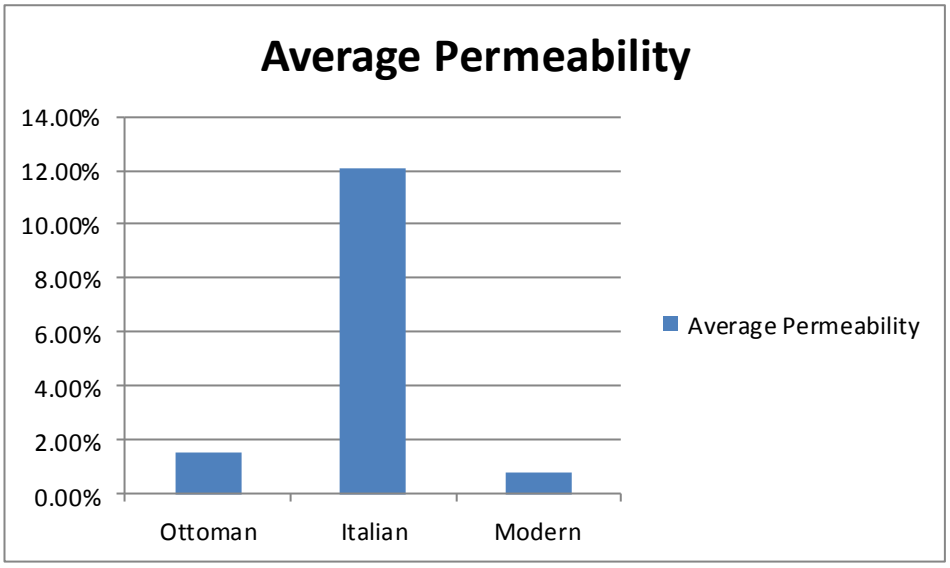


Figure 8.18: A Comparison of Housing Average Permeability in the Three Case Studies

In terms of window height, as seen in the graph below (Figure 8.19), the Ottoman case had the best score, which is considered positive with regard to the privacy norm. In Arabic towns, where plain white walls mask the different sizes of plots, it is hard to tell the difference between poor and rich plots based on their sizes or the outward appearance of their walls. Wall length diversity indicates the level of mix of different income classes located wall to wall in close proximity to one another, which in turn encourages a situation of social cohesion between different income classes of society. The application of the diversity index to the walls of the case studies in this

thesis shows that both the Ottoman and the Italian cases score highly in terms of wall diversity and the Modern case study scores zero. The Modern case relies on designing its plots on the repetition of the same pattern of parcels rather than mixing different sizes of plots.

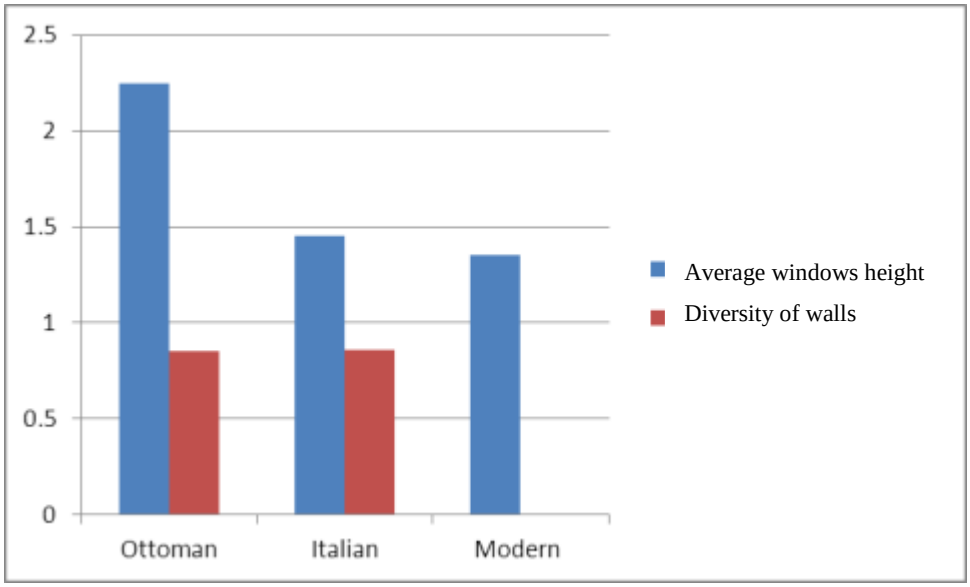


Figure 8.19: A Comparison of Housing Average Windows Height and Diversity in the Three Case Studies

As for the Opposing Door Angles, as seen in the chart below, the Ottoman case study has the best scores regarding the creation of an appropriate physical setting for opposing neighbours' doors. This helps to preserve the privacy of both households. The Italian case study came in second, scoring an average of 70.5 degrees for angles of opposing doors, while the Modern case study has the highest with around 87.5 degrees, which means more doors opening face to face and consequently less privacy between opposing dwellers' plots (see Figure 8.20).

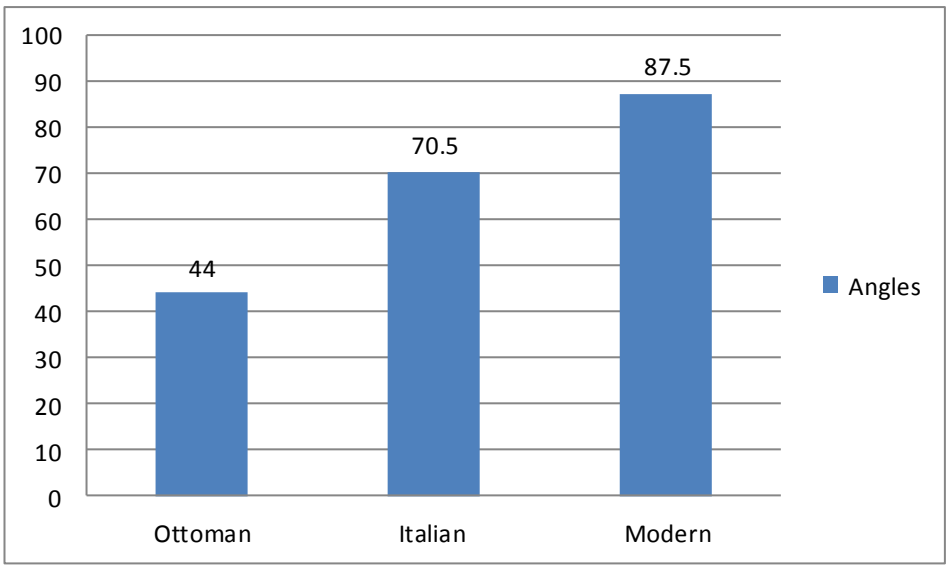


Figure 8.20: A Comparison of Opposite Doors Angles in the Three Case Studies

Chapter 9:
Design Guidance and Conclusion

Chapter 9: Design Guidance and Conclusion

9.1. Design Guidance

As previously mentioned in Chapter 1, the lack of any form of urban design guidance among Libyan government planning agencies was one of the issues impeding the progress of regeneration of deprived areas. Thus, this guidance has been produced as a response to the lack of general urban design guidance relating to most regeneration areas - mentioned in Chapter 1 - throughout the city of Benghazi. The aim of this design guide is to fill the gap in the absence of urban design guidance in the under-developed Libyan planning system and Libyan urban design practice. The guide is intended to positively influence the urban design process as well as the outcome.

This guide aims to be as quantitative as possible and is supported by drawings and visual illustrations that guide practitioners by highlighting issues related to the local principles and norms for the production of a culturally informed urban form rather than imposing rigid, detailed foreign codes. The developed guidance is not intended to be the only guidance for deprived areas, but rather to be seen as one of the contributors to the overall regeneration process that takes into account both urban design and the socio-cultural context of Benghazi Islamic Arabic culture.

The guidance should help in enhancing the local urban life and social cohesion, by helping to create more chances of social interaction on the urban layout. The guidance should also help in preserving the sanctuary and quietness of residential areas by helping to strike a balance between the areas that need more vibrant social activities and the privacy of housing areas.

The previous analysis shows examples of both suitable and unsuitable forms of the Benghazi urban fabric in terms of how they better serve the socio-cultural need and principles of localities. The purpose of conducting this analysis is to develop urban design guidance that addresses the socio-cultural dimension of Benghazi's urban forms, through the theory of Typo-Morphology and develop a set of analytical tools that are more socially oriented. These tools have been used to facilitate the creation

of an enhanced set of design guidance focusing specifically on the socio-physical features associated with the six studied Typo-Morphological elements; the general plan; streets and street networks; blocks; public buildings, public open spaces and housing, through a comparative assessment of Benghazi's existing historical three case studies, the Ottoman, the Italian and the Modern. The proposed guidance has little to do with the architectural style of houses, buildings and the public realm. Rather, it is mainly focused on how to allow the previously mentioned principles and socio-cultural norms to be accommodated through the urban form.

The guidance is intended to be simple with flexible approaches and tools that the urban designer can follow without hindering creativity or design imagination by imposing very detailed coding or zoning criteria. The analytical tools used in this study are designed to be usable as parameters for the urban designer to measure how their design solutions work in support of the socio-cultural norms and principles of the Libyan society.

9.1.1. The General Plan Guidance

In order to highlight specific guidance for the general plan it is necessary to illustrate the previous findings and conclusions that were drawn from the thesis analysis chapter. The principle findings, related norms and the proposed guidance will be illustrated as following.

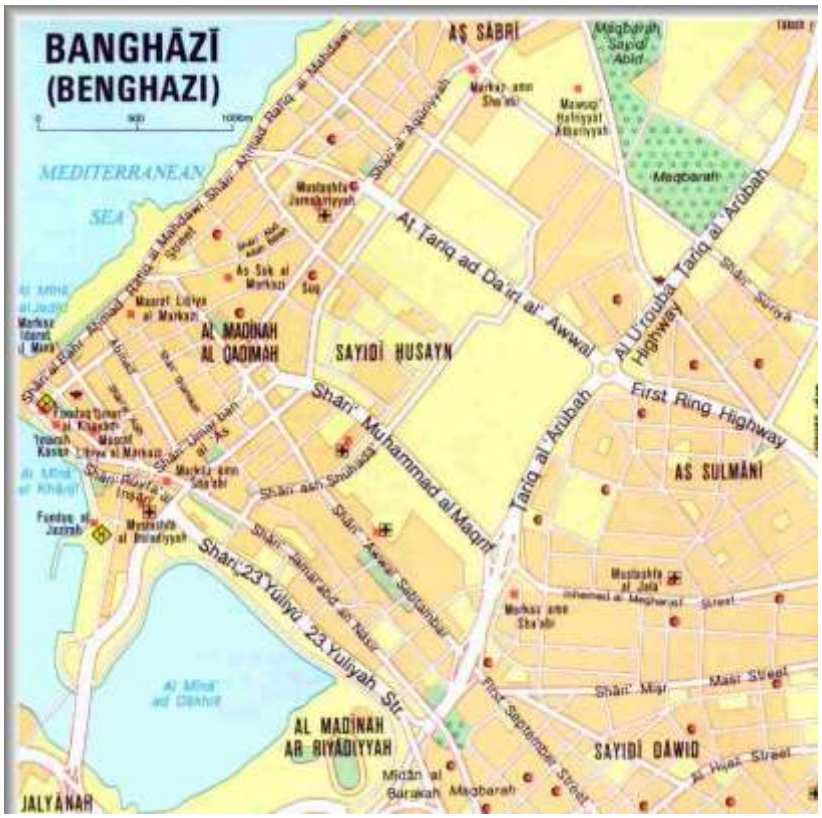
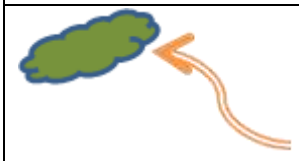


Figure 9.1: General Plan of Benghazi City Centre. *Source:* libyana.org.

Table 9.1: Guidance and Principles for the General Plan

Legend	Guidance	Principles and norms behind the Guidance
	Follow the rationale of topography and commercial opportunity embodied in the connection with the harbour and principal access to the east and northern regions.	This will bring more economic opportunity to the neighbourhood and better links to the surrounding regions.
	Usually in old Arabian quarters, the main collector street (market street) penetrates straight through the middle of the quarter and is surrounded symmetrically by the residential areas.	This will create unity between the two sides of the neighbourhood and the middle street will be the main hub for social and economic activities.
	Make the most of the desired sea wind.	By allowing the sea wind to penetrate through the urban fabric this will create a pleasant environment, especially in hot summertimes.
	Make the most of the environmental elements (such as wet lands) to hinder the undesired hot sandy wind.	Natural environmental barriers will mitigate undesired wind.
	Adoption of the Awqaf system through the presence of Awqaf facilities on the main thoroughfare and the city's expansion areas.	This has a profound social effect of helping the poor areas of the city and supports the micro economy of the

		neighbourhoods. Also, Awqaf facilities are usually found on the boundary of the city where it seems to help to sustain and direct the expansion of the city.

The following tables illustrate the three case studies according to the above principles and norms and the last table draws an example of recommended practice according to the above developed guidance to be incorporated in the deprived modern neighbourhood (17th Feb).

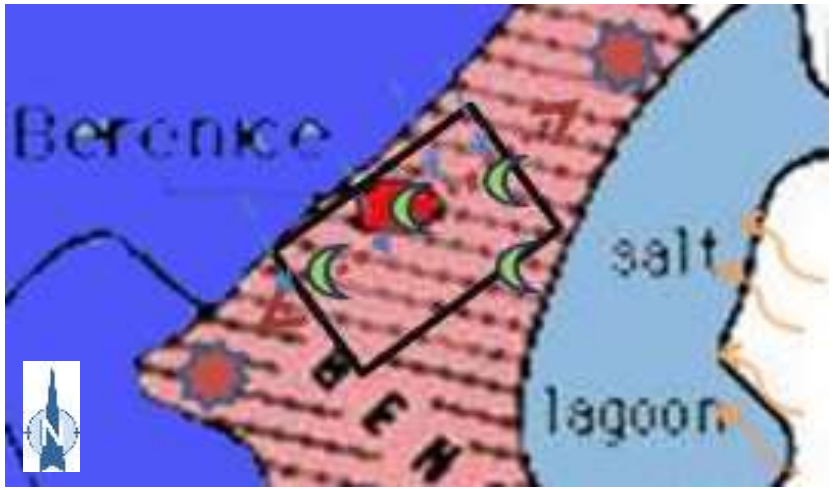
Table 9.2: The Ottoman Qaurter General Plan Analysis		
Main street 	Good link between two main routes and the harbour	
Main street 	Main street collector in the middle of the quarter	
	Desired sea wind parallel with the urban fabric	
	Undesired sandy winds obstructed by wet lands	
	Awqaf facilities along the main street and at the boundary	

Table 9.3:The Italian Quarter General Plan Analysis

Main street 	Good Linking between the main routes and the harbour
Main street 	Main street collector at the inner boundary of the quarter surrounded by administrative blocks and shops.
	Desired sea wind penetrating the urban fabric
	Absence

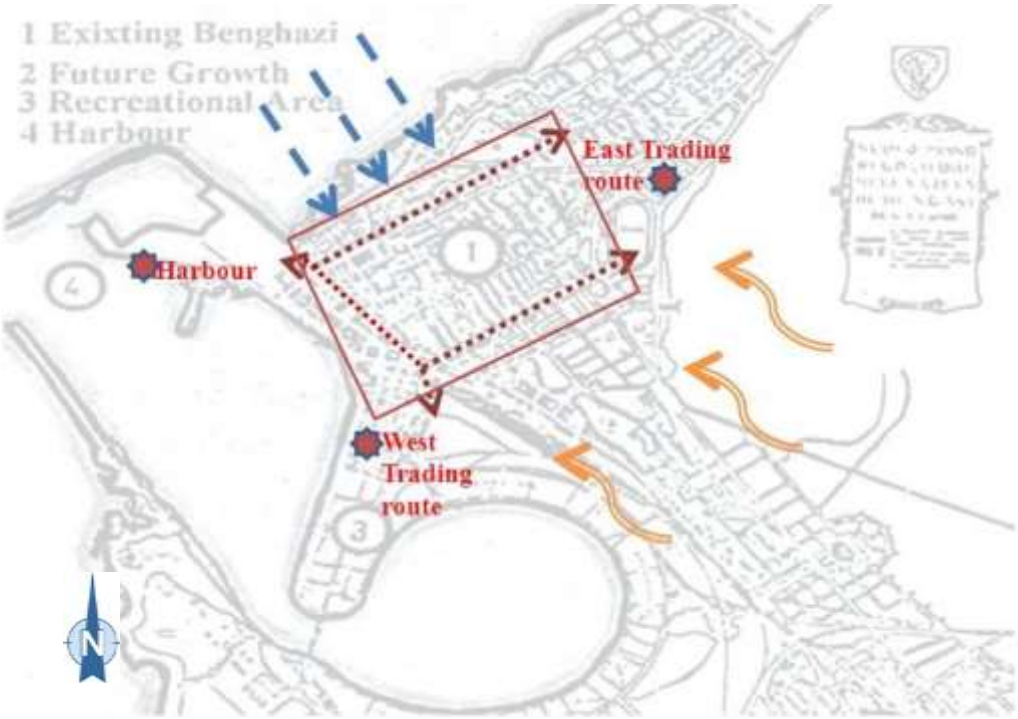


Table 9.4: The Modern Deprived Neighbourhood General Plan Analysis

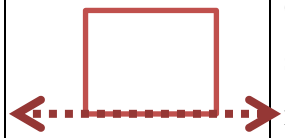
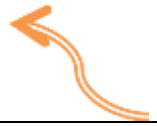
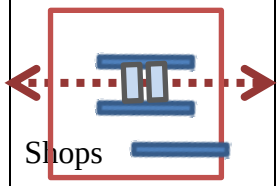
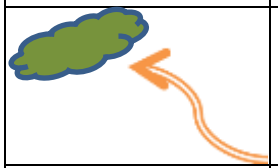
Main street 	Link between the city's major catchment areas.	
Main street 	Main street collector at one side of the neighbourhood border.	
	Desired sea wind not parallel with the urban fabric	
	Absence.	
	Awqaf facilities far from the main street.	

Table 9.5: Recommended Practice for the Modern Deprived Neigbourhood General Plan

Main street 	Enhance the link between the main routes and the harbour	
Main street  Safe pedestrian crossing 	Make the main street collector in the middle between adjacent neighbourhood by creating shops on both sides and safe pedestrian crossings	
	Planting natural green barriers to mitigate undesired wind	
	Awqaf facilities, such as Mosque and small shops	

9.1.2. Streets and Street Networks Guidance

Based on the previous chapters studying streets and street networks, this section will illustrate the main principles, findings, related norms and proposed guidance in the following tables and images.

Table 9.6: Streets Network (MCA Analysis) Guidance

Movement type	**MCA analysis**	**Principles and norms behind the guidance**	**Recommended guidance.**
Through movement in market street	High betweenness rate in the main market street thoroughfare	The liveability of main socio-cultural and shopping areas improved by increasing the *through movement*	Locate shops and a mosque at the main thoroughfare which is high on the MCA betweenness rate , this will help in the creation of more *through movement* and liveability
Through movement in residential areas	Low betweenness rate in residential areas	Reduce the *through movement* which helps to create a sanctuary environment in residential areas (preserving privacy)	Keep the adjacent residential areas low on the MCA betweenness rate, which helps to reduce the amount of through

			movement for keeping residential areas privacy and sanctuary
To movement	High Closeness	Enhancing the *To movement* to the neighbourhood services and shops from the both sides of the quarters will create unity between the two sides of the neighbourhood, social unity and cohesion by sharing the same social spaces.	Propose connections between the two parts of the neighbourhood surrounding the thoroughfare street. Those connections should be an extension of links between opposite streets, thus enhancing the *to movement* and improving the unity between the two parts.

Table 9.7: Streets Route Types Guidance

Route type	Legend	Principles and norms behind the guidance	Recommended guidance
Strategic		Very liveable routes that host commercial and socio-cultural activities.	Utilise these strategic routes to host the neighbourhood socio-cultural facilities and activities.
Semi –Strategic		Liveable routes that lead directly to commercial and socio-cultural activities.	Increasing the number of those routes will consequently increase the desired secondary-strategic streets.
Secondary-Strategic		Sufficiently balanced liveable route that is preferred to be the link route between the quite residential areas and the socio-cultural catchment places.	Increase those routes that shape most of the successful internal streets in old quarters.
Sub-Secondary Strategic		Unliveable routes, that are usually unsecure and encourage anti-social behaviour such as back streets and alleys.	Decrease the number of those routes by connecting them to the semi-strategic streets.

Table 9.8: The Ottoman Quarter Street Network Analysis according to Principles and Norms

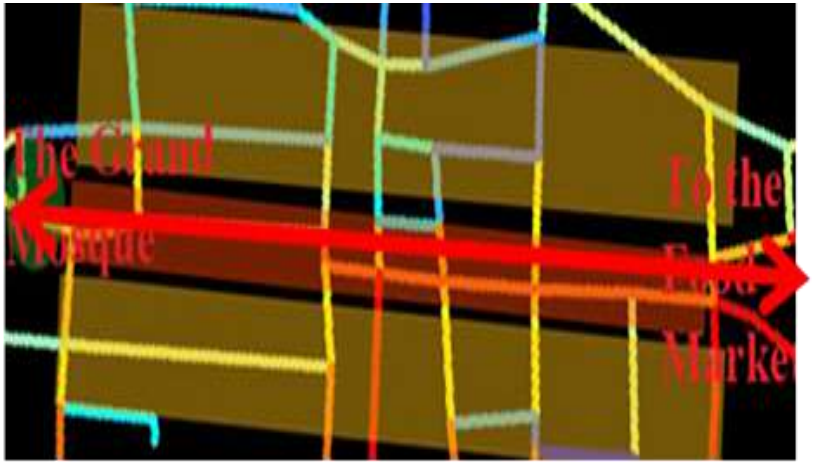
Through movement	The main street is high on the MCA betweenness rate, which helps in the creation of more *through movement* and liveability in the market street The adjacent residential areas are low on the MCA betweenness rate, which helps in reducing the amount of through movement for keeping the residential areas' privacy and sanctuary	
To movement	Both two parts of the neighbourhood surrounding the thoroughfare market street in the middle are high on the MCA closeness rate, which helps the *to movement* and enhances the unity between the two parts	

Table 9.9: The Italian Quarter Street Network Analysis according to Principles and Norms

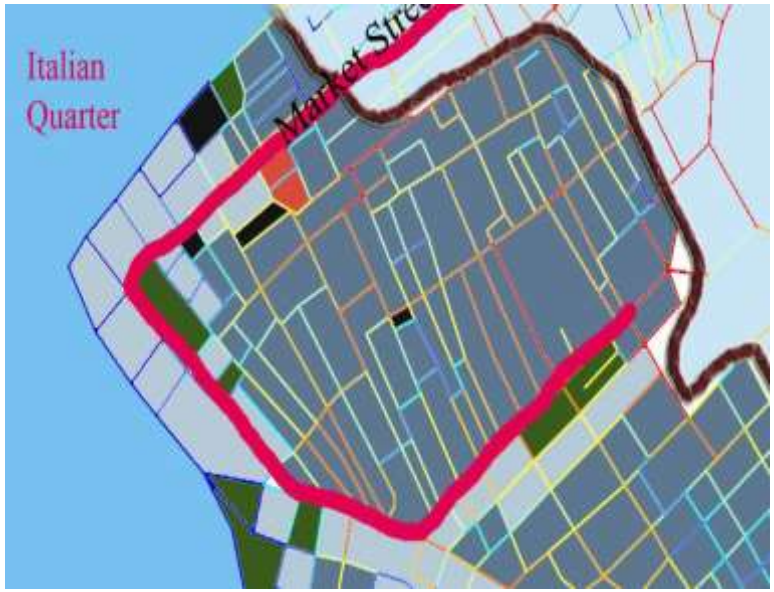
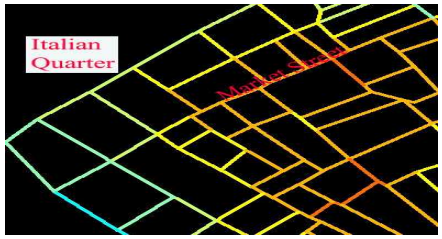
Through movement	The main street is high on the MCA betweenness rate, which helps in the creation of more *through movement* and liveability in the market street. The adjacent residential areas are low on the MCA betweenness rate, which helps in reducing the amount of through movement for keeping residential areas privacy and sanctuary.	
To movement	Both two parts of the neighbourhood surrounding the thoroughfare market street in the middle are high on the MCA closeness rate, which helps the *to movement* and enhances the unity between the two parts.	

Table 9.10: The Modern Deprived neighbourhood Street Network Analysis according to Principles and Norms

Through movement	Both the market centre and the mosque are located away from the main thoroughfare which is high on the MCA betweenness rate; this reduces the creation of more *through movement* and liveability. The adjacent residential areas are low on the MCA betweenness rate, which helps in reducing the amount of through movement for maintaining the residential areas' privacy and sanctuary	
To movement	Both parts of the neighbourhood surrounding the thoroughfare street in the middle are different on the MCA closeness rate, which reduces the *to movement* and does not enhance the unity between the two parts	

Table 9.11: Recommended Guidance according to The Principles and Norms for the Modern Deprived Neighbourhood Street Network

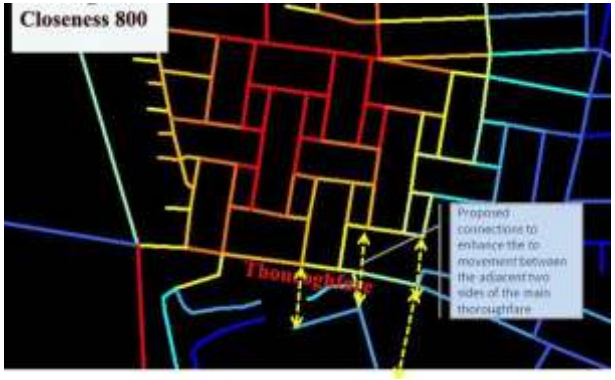
Through movement	Locate shops and a mosque at the main thoroughfare which is high on the MCA betweenness rate, this will help in the creation of more *through movement* and liveability. Keep the adjacent residential areas low on the MCA betweenness rate, which helps in reducing the amount of through movement and maintain the residential areas' privacy and sanctuary	
To movement	Propose connections between the two parts of the neighbourhood surrounding the thoroughfare street. These connections should be an extension of links between opposite streets, thus enhancing the *to movement* and improving the unity between the two parts	

Table 9.12: Summary of Results for the Street Route Type Analysis

Route Type	Numbers of routes	Percentage of the total (%)
Strategic routes	1	2.85
Semi- strategic	20	57.14
Secondary strategic	11	31.42
Sub-secondary strategic	3	8.57
Total number of routes	35	100

Route Type	Numbers of routes	Percentage of the total (%)
Strategic routes	8	18
Semi- strategic	29	66
Secondary strategic	7	16
Sub-secondary strategic	0	0
Total number of routes	44	100

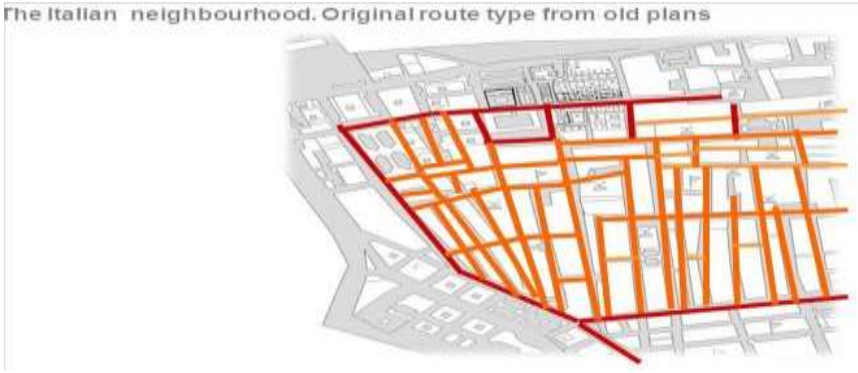


Table 9.13: Summary of Route Type Analysis for the Targeted Modern Deprived Neighbourhood

Route Type	Numbers of routes	Percentage of the total (%)
Strategic routes	2	5.4
Semi- strategic	3	8.1
Secondary strategic	15	40.54
Sub-secondary strategic	15	40.54
Total number of routes	37	100

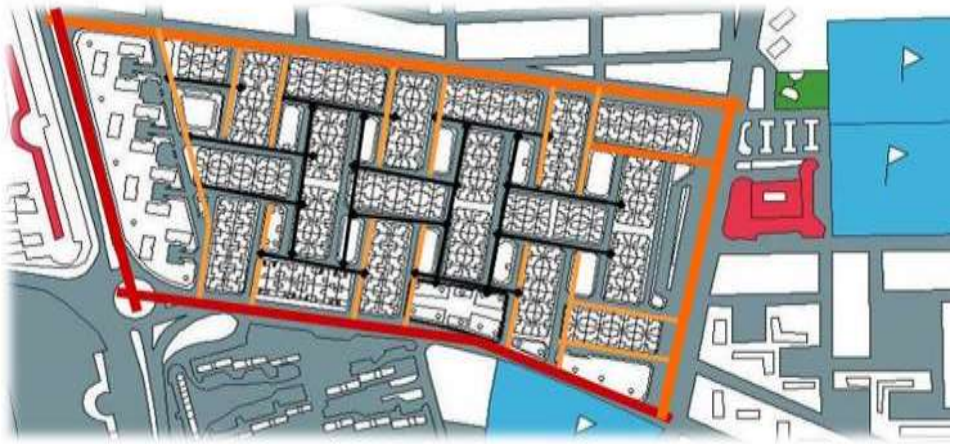


Table 9.14: Recommended Guidance according to the Route Type Analysis for the Targeted Modern Deprived Neighbourhood

Route Type	Numbers of routes	Percentage of the total
Strategic routes	2	5.40
Semi- strategic	5	13.51
Secondary strategic	19	51.35
Sub-secondary strategic	7	18.91
Total Number of Routes	37	100

Opening up some pedestrian routes to be changed to a higher level of strategic or semi-strategic category will consequently change the sub-secondary connected routes to a higher level, thus increasing the number of both desired semi-strategic and secondary strategic routes and decreasing the undesired sub-secondary routes.

9.1.3. Urban Block

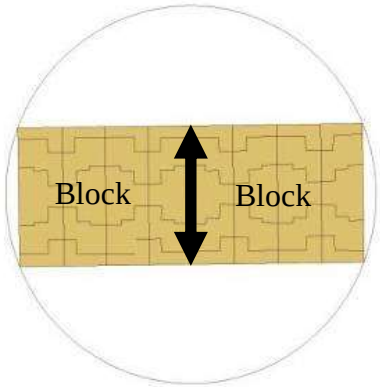
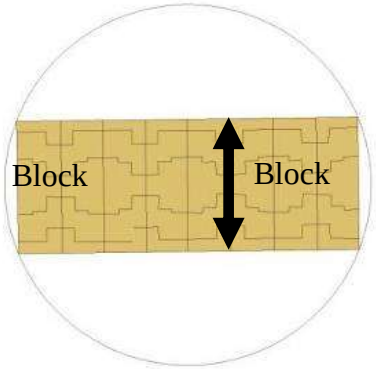
9.1.3.1. The Physical Urban Block Guidance

Based on the findings of the previous chapters which examined the physical blocks as part of the study of Typo-Morphological elements, this section will illustrate the main principles, findings and norms relating to block size, shape (form) and diversity, and propose guidance, presented in a series of tables. The guidance will illustrate the obtained ranges of block sizes, shapes (compactness) and diversity of the three case studies: the Ottoman, the Italian and the Modern. The optimum range on which to base the proposed guidance will then be calculated. This will be followed by proposing a recommended solution for the Modern block by suggesting a different block arrangement. Finally, the proposed arrangement will be measured against the obtained optimum ranges to check its performance.

Table9.15: Principles and Norms Driving the Urban Block Guidance

	Size (area) range			**Shape (form) or compactness range**			**Diversity range**		
The Ottoman block	4,000-5,800 m^2			60%- 61%			0.63-0.69		
The Italian block	8,800-40,000 m^2			27%- 64%			0.60-0.83		
The Modern block	1,900-3,900 m^2			43.5%- 65%			0		
The optimum range for recommended block guidance	**2,000-5,000 m^2**	**Principles and norms behind the guidance**	**Recommended Guidance**	**60-65%**	**Principles and norms behind the guidance**	**Recommended Guidance**	**0.60-0.70**	**Principles and norms behind the guidance**	**Recommended Guidance**
	Small and medium areas of blocks, for example the Ottoman blocks and the small block of the Modern case, are more suitable for circulation networks. Small and medium size blocks are favourable for facilitating change in travel direction and increasing the level of movement circulation.		Split some big blocks to increase their perimeter length and thus increase the circulation around them.	Square block shapes will maximise the surrounding circulation space. The square shapes are favourable in performance as shown in previous examples.		Make splits that change the block shapes to a square one. By opening small alleys or cul–de-sacs.	This diversity in plot parcels is considered to be helpful in accommodating different in-come classes within the same block boundary. It maintains the mix of poor and rich in the same area and block, and limits the segregation between rich and poor areas.		Allow adjacent neighbours to buy and selling portions of land depending on their needs.

Table 9.16: Recommended Practice according to the Proposed Block Guidance

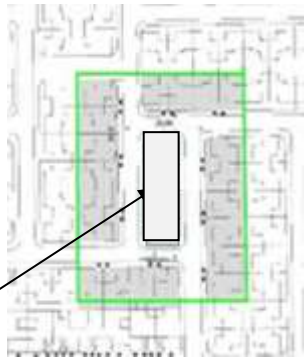
Option 1: Open an alley in the middle		**Option2: Open an alley at the side**	
			
	Option 1:Block A	**Option 2: Block A**	**Option 2: Block B**
Size (area)(m^2)	2,000	2,880	1,500
Shape (form) or compactness (%)	65.0	66.99	63.0

The splitting of these blocks could be coordinated with the previous guidance for streets and street networks, in which it is proposed that some streets penetrate the whole neighbourhood. Matching the two solutions will bring benefits for both elements, streets and blocks, in addition to knowing where precisely these openings should be made in order reduce the amount of land required to accommodate these alleys. It should be mentioned that in the those areas of regeneration projects there are many plots that need to be demolished and replaced entirely, thus it is recommended that the proposed openings be made on these plots.

9.1.3.2. The Social Block Guidance

In order to develop specific guidance for the social block it is necessary to illustrate some of the previous findings from the analysis chapter in this thesis. The following tables illustrate findings for the three case studies, according to the related principles and norms. In the last columns examples are drawn of recommended practice according to the developed guidance to be implemented within the deprived modern areas.

Table 9.17: Social Block Guidance

	Distance criteria	**Percentage of the (SD, PD, WSD) areas out of the total void area.**			**Principles and norms behind the guidance.**	**Recommended guidance.**	**Recommended practice**	**Measuring and checking the recommended practice**
		The Ottoman	The Italian	The Modern				
Socially active areas distance	Up to 30 m	100	100	10.59	The Social Block guidance, as mentioned and defined in Chapter 4, focuses on the streets and void spaces between residential blocks, which offer places for interaction between neighbours allowing them to socialise and encouraging short meetings.	Utilise spaces between blocks by reducing lengths between their front walls to less than 30 metres. Many solutions could be developed, such as *building new houses in waste spaces.*		100%
Non-socially active.	30 - 100 m	0	0	89.40				0%

9.1.4. Public Open Space Guidance

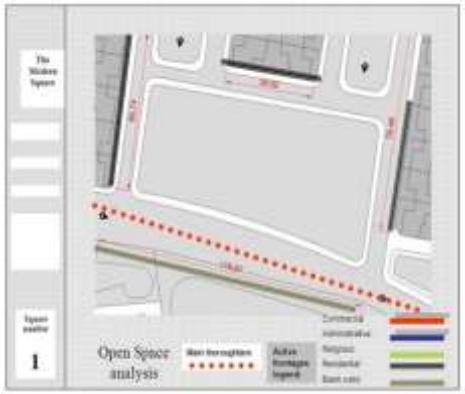
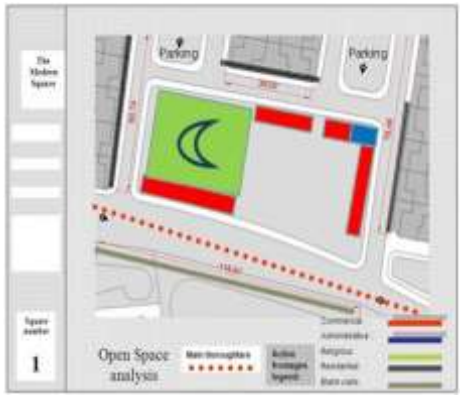
The public open space guidance will be based on the previously studied ranges of good scores for public spaces that are based on multi - attribute ranking. Those ranking scores are generally based on the macro-design and micro-design of the space. As illustrated in Chapter 4, the macro-design contains the movement thoroughfare scores that penetrate or are adjacent to the public space, while the accessibility scores are calculated through counting the number of access points to the public space. The micro-design is based on calculating the active frontages spans -such as the mosque, shops and administrative buildings - and their diversity index. After determining the good score ranges, guidance will be explained and recommended practice will be presented for the Modern case study.

Table 9.18: Public Open Space Guidance

	Macro-design		Micro-design		Total score
	Movement thoroughfares	**Access points**	**Active frontages**	**Diversity index**	
Score ranges	1-2	0.40-1	0.75-1	0.28-0.57	2.88-4
	One or two adjoining thoroughfares: considered to be a good score.	4 to 10 access points is considered to be good score	Active frontages that cover 75% to 100% of the overall length of the public space perimeter: considered to be a good score.	0.28-0.57 on the Diversity index range - based on the variety of different frontages functions.	
Recommended Guidance	Places that have good location in terms of centrality and connectivity are considered to have better chances for liveability. The public space should be well located through or adjacent to a good movement pattern.	Places that have good accessibility to the adjoining streets are considered to have better chances for liveability.	Buildings surrounding public spaces should be designed to offer active frontages, thus adding interest and vitality to the public realm, as shops and mosques and other functions encourage human presence. The more active frontages onto the public space, the better the vitality.	The more diverse the functions of the active frontages are, the more chances of attracting different social activities at different times of the day. For example, administrative buildings attract movement during day time, while cafes and shops add liveability during afternoon and evening times, and mosques bring people at different time slots all day long.	

9.1.4.1. Recommended Practice According to the Guidance

Table 9.19: Recommended Practice According to the Guidance applied to Modern Deprived Neighbourhood

Before		Multi-attribute raking	Movement thoroughfares	Access	Active frontages	Diversity index	Total scores
		Scores	1	0.40	-0.57	0	0.83
After		Multi-attribute raking	Movement thoroughfares	Access	Active frontages	Diversity index	Total scores
		Scores	1	0.40	0.67	0.54	2.61

9.1.5. Public Buildings Guidance

Based on the previous chapters which studied public buildings as a Typo-Morphological element, this section will illustrate the main principles, findings and related norms and proposed guidance, detailed in the following tables and images. As discussed in previous chapters, the main two public buildings on the neighbourhood scale in the Libyan society are the mosque and the local schools. The proposed guidance will be based on the location of these public buildings within the urban fabric, where location is considered vital to the success of the services that the public building provides to the neighbourhood community. As shown in the analysis chapter, Chapter 8, the Ped-Shed method of analysing this location will be used as the main tool to measure how reachable these buildings (services) are to the surrounded built fabric.

Table 9.20: Public Building Guidance

	The Ottoman	**The Italian**	**The Modern**	**Principle and norms related**	**Guidance**
Ped-Shed for Mosques at 300 metres range	77.18%	N/A	70.65%	Location is very important - to be on a central street. Also, the street pattern of the whole neighbourhood adds to the accessibility (reachability) of the public building to the surrounding built fabric.	Put public buildings on the main thoroughfare street. The location of the public building on the main thoroughfare is better on a 4 way intersection to increase the reachability to the surrounding built fabric.
Ped-Shed for Schools at 800 metres range.	77.18%	83.81%	57.13%		

9.1.5.1. Recommended Practice

By placing the mosque and school buildings on the main thoroughfare, and opening a linking pedestrian street as shown in the image below, the Ped-Shed of reachable built fabric will be improved by covering an area of 208,505 m^2 from the whole circle area of 282,600 m^2 which means that 73.78% of the overall area is reachable within 300 metres walk.

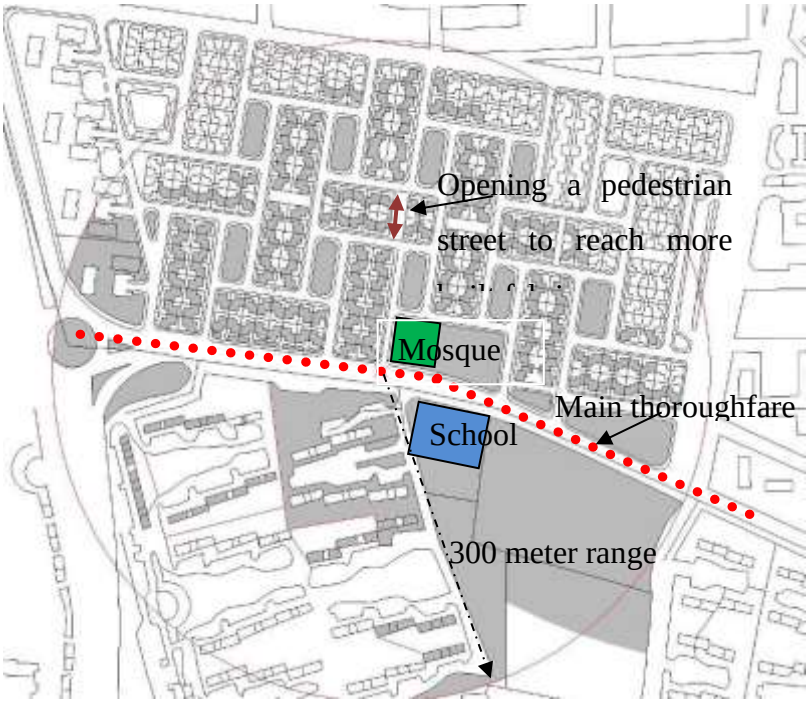


Figure 9.2: Recommended Practise for Public Open Spaces Location of the Modern Neighbourhood

9.1.6. Housing Guidance

As mentioned in previous chapters, the proposed guidance will seek to enhance both the sanctuary of the social hub space (courtyard) within the house, and also protect the privacy of houses through reducing the visual permeability of their frontage walls. For internal open spaces within housing, such as the courtyard, two main elements are associated with the socio-cultural needs: providing adequate space for the space's liveability and the distance of the space from the front street to preserve the privacy needed away from street life. In addition, the need is highlighted for an external seating area (Dikka) in front of the house, as a place that accommodates social exchange between dwellers and their street neighbours or visitors.

Table 9.21: Housing Guidance

		The Ottoman	The Italian	The Modern	Guidance
Internal housing spaces (courtyard)	Percentage of void to solid area (V/S %)	19.84	5.68	30.36	The size or area of the courtyard where family social activities will be performed plays a crucial factor in allowing enough space for these activates to take place.
	Distance between the courtyard and the plot front street.	6.16 m	10.62	12.91	The distance between the courtyard and the public street -the element of privacy requires good separation between them to provide a sanctuary for families to enjoy their group social life
External housing spaces		Available	N/A	N/A	Their locations are important – they should appear in a

(Dikka)					public and semi-public space where the users can see and be seen by those passing. Dikkas are usually built adjacent to the wall as an element of the external design of the residential wall.
Walls	Window height (m)	2.25	1.45	1.53	The higher from the ground the better in terms of privacy. It is better to be higher than the height of the average person, 1.7 m, to prevent them from gazing into the house.
	Wall - visual permeability (%)	1.5	12.11	0.8 (as a result of front wall fence)	The wall's permeability as a spatial boundary can act as separation or bring two or more spaces together (decrease or increase communication). The less percentage of visual permeability through front walls the better with regard to privacy.
	Average mean of angles between opposite doors.	44.0 degree	70.55 degree	87.5 degree	In terms of a door's opening, opposing houses' door locations are seen as an important factor in avoiding a straight line of sight between

					them. The smaller the degree of angle between them the better in terms of privacy. So 44 degrees in the Ottoman case is better than the 87.5 degrees in the Modern one.

9.1.7. Design Guidance Summary

This section documents the incorporation of the research findings from the literature review, and analysis into a set of enhanced guidelines to accommodate the needs of the socio-cultural based regeneration for the deprived Benghazi neighbourhood.

The guidelines are based on the Typo-Morphological approach which categorises the urban fabric into 6 elements: general plan; street network and streets; blocks; open public spaces; public buildings; and housing. These elements are related to the socio-cultural principles and norms of Libyan society's urban environment.

A number of guidelines have been introduced for the design and layout of the different urban morphological elements. In particular, the guidance calls for more socio-cultural related specifications to be implemented for the design and layout of deprived areas. The guidelines recommend that both social and cultural norms should be considered as an essential requirement rather than an optional extra and good will gesture from local authorities. Furthermore, the guidance has been simplified and made as quantifiable as possible to make it more realistic and practicable for local authorities to follow or as a tool to measure and audit suggested design solutions. In addition, the guidance is intended to be used by urban designers and architects as a design approach to find better socio-cultural solutions for deprived areas.

9.2. Thesis Conclusion and Main Findings

9.2.1. Research Aim

This thesis commenced with the recognition that the recent regeneration projects in Benghazi/Libya's deprived areas do not cater for the specific local socio-cultural requirements. Current Libyan urban design practices reflect the absence of the socio-cultural needs at a theoretical level, and also, the consideration of these issues in the built environment at a practical level. This thesis has investigated the socio-cultural norms and principles of the Libyan built environment and has analysed three cases studies to understand and measure the levels to which the different urban fabrics respond to these norms. The thesis has proposed a Typo-Morphological approach to analyse the physical layout of the different case studies, which helped in understanding the socio-cultural and historical dimensions of the spatial form. The Typo-Morphological approach was categorised into six elements that emerged from a literature review of typology and morphology theory, and the Libyan, Islamic socio-cultural principles and norms.

A number of analytical urban design tools were developed to be adopted for measuring the level of socio-cultural response of the three case studies and their urban fabrics. Those tools where designed to be realistic and easy to use by urban designers in order to help them in understanding and measuring their design solutions against the socio-cultural dimension of the local built environment, and thus deliver a high quality and inclusive urban design practice.

Finally, the research has delivered urban design guidance that is socio-culturally oriented and created to recognise the requirements of the local built environment, thus providing an approach to help planning authorities and urban designers to rehabilitate deprived Libyan areas. The developed guidance is not intended to be holistic, but rather offers a brief that focuses on considering communities' social needs within their spatial setting. The main aim of the developed guidance and techniques is to deliver an easy-to-use approach that can help to sustain a more

balanced social life for Libyan communities, and also the creation of an inclusive society where people can access and use places that reflect their cultural needs.
In addition, through conducting this work, important points relating to the Libyan/ Islamic urban environment were found, as will be presented in the following section.

9.2.2 Main Findings and Conclusions

9.2.2.1. The Role of Islamic Building Law (FigahEl –Bina'a)

Although the spread of modern urbanisation is a natural response to city expansion that was led by global international urban theories, the development and urbanisation of Muslim countries in general and also in Libya has suffered from alienation of the genuine principles and roots of its built environment. These international urban theories have transformed the country's physical environment and have had a major impact on the socio-cultural structure of society. The result of the implementation of these concepts has been the production of socially and culturally heterogenic urban fabrics, which are in sharp contrast to the traditional Muslim city.

These changes in the built environment are increasingly being questioned by a growing number of professional architects and planners, who have expressed a desire to find culturally -ensitive solutions to modernisation. These groups fear that the rapid imposition of Western urbanisation models onto the Islamic context has resulted not only in the physical destruction of the Muslim city but also in the loss of Muslim architectural heritage and the distortion of cultural identity. In order to formulate appropriate urban design criteria that can enable the retention of Muslim culture and heritage many urbanists have argued that the restoration of Islamic building law, Figuh El-Bina'a, should be one of the main elements that could preserve the traditional Muslim socio-cultural values within the spatial context.

Islamic building Law (Figuh El-Bina'a) is the backbone of the built environment in Muslim regions. The law is much more than a simple code of designing arches and architectural styles. In fact, Islamic building law gives more importance to the social

life than to the spiritual life. In this manner, building law (Figuh) becomes even more important.

In the traditional Islamic urban setting, there is no place for strict modern urban planning legislation that restricts the rights of the dwellers from making changes within their houses without harming or causing harm to others. Hence Islamic building law is seen by many as an empowering legal framework for the individual dweller and society as whole in preserving and regulating their rights within the spatial context.

9.2.2.2. Privacy

Privacy is one of the main elements that shape the Libyan/ Islamic building environment. The privacy norm is well defined by the legal terms of the Islamic building law, thus this has contributed to shaping the physical character and morphology of the traditional Islamic cities and their urban fabric. From the analytical part of the thesis, the findings verify that space can require different degrees of privacy and therefore can be studied and designed accordingly. Spaces with a similar degree of privacy can also be clustered into groups and zones of privacy, which could be categorised to provide relative measures of privacy degrees provided by each space in certain spatial aggregations, thus proposing guidance or a code for new buildings or spaces to be based upon those measures.

9.2.2.3. Socio-Physical Balance and Privacy

The central principle is that the street network should be perceived as the product of social relations, and the bridge between the residential area and the market street or the centre of the neighbourhood.

The “socio- physical” relationship between areas of local community interactions and their privacy are a crucial concern in every neighbourhood community. Sustainable neighbourhoods not only enhance and promote more humane local social interactions, but should also protect local residential privacy. In residential quarters,

it is important to set a balance between areas of interaction and more private and sanctuary areas in neighbourhoods (Hillier and Lida, 2005). On the one hand, in Benghazi's old Ottoman quarter for example, local residential street interactions have been significantly reduced, which integrates perfectly with human need for privacy and quietness. On the other hand the need for an easy-to-reach shopping area and other community facilities, which is very important for community sustainably, was relatively well embedded in the Ottoman neighbourhood of Benghazi

9.2.2.4. Charitable Facilities or Spaces: Waqaf

Findings from the thesis study show that Waqaf facilities, such as mosques and their attached schools or small apprenticeship shops, are present in the traditional old Ottoman quarter of Benghazi. Those facilities have maintained a significant role in shaping the physical urban fabric that contributes directly and positively to social welfare. Restoring the role of Waqaf in future regeneration and development projects will certainly bring benefit in sustaining the socio-cultural and micro economic life of neighbourhood communities.

9.2.2.5. Urban Centres and Street Thoroughfare

One of the main elements that help in regenerating urban deprived areas is selecting the optimum location for the urban centres, which can better serve urban communities in the long run. As demonstrated in previous chapters, one of the crucial relations is that of the individual with the market street or the daily shopping facilities. In other words it is important to consider how the locations of most of these services are situated within the neighbourhood. The analysis suggests that urban centres should be located on the main urban thoroughfares in order to benefit from the through movement that connect the centres with the city as whole. The location of urban centres on or adjacent to the main street of the neighbourhood street network will ensure liveability and prosperity for socio-cultural and economic life to be sustained and flourish (Porta *et al*, 2009; Mehaffy *et al.*, 2010; Hillier and Lida, 2005).

To conclude, the findings of this thesis can be used for Libyan urban design, to both inform further research in the field and provide the basis for future practical implementations for the research outputs. Future research should build on the successful employment of the socio-cultural centred methodology presented in this work and include it as both general good practice and as a fundamental source of evidence. Finally, this work is not an end in itself. Further collaborations with planners, city councils and the community liaison will ensure that these guidelines not only solve problems at present, but continue to evolve and ultimately improve the lives of many.

9.3. Limitation and Future research

The main challenge faced in this research study was the availability of and access of Libyan urban generation data and maps. Unfortunately, there is very little and basic documentation about the planning system of Libya in general, and of Benghazi city in particular. Since Libya is a country with homogenous religion and minimal cultural diversity (see Chapter 2), the application of this guidance to other Libyan cities on the coastline is feasible (as mentioned in Chapter 1, 88% of the population lives in the urban coastline). However, the application of this guidance to other Libyan cities in the south needs alteration due to the dry desert climate and its effect on the urban form and due to the Bedouin-specific cultural norms. Also, countries in the Arab/Middle-East regions need to take into consideration their citizens' heterogeneity of regions, religions and cultures, and make appropriate alterations accordingly.

Future research could enhance the developed framework both to the Libyan or other Arab/Middle-East contexts. More specifically, further development of the analytical elements and tools that are originated by the thesis author and those by other scholars will be highly valuable.

References:

Aazam, Z. (2005b). To, around and From the Centre: How the Kabah Continues to Integrate the Society and its Rituals. Van Nes, A. (Ed.), *5th International Space Syntax Symposium*: *Proceedings of a Conference, Delft* (pp. 309-322). Delft: University of Technology.

Aazam, Z. (2007). The Social Logic of The Mosque: a study in building typology. Van Nes, A. (Ed.), *6th International Space Syntax Symposium*: *Proceedings of a Conference, Istanbul, 58* (pp. 1-18)

Abdalla, A. (2007). Meeting housing needs in Libya: towards a responsive owner-built housing with particular reference to Benghazi City. Unpublished PhD thesis, Newcastle University.

Ahlbrandt, S., and Cunningham, V. (1979).*A new public policy for neighborhood preservation*. New York: Praeger.

Akbar, O. (1981). Comparison of the social behavior and the construction and the spatial of Islamic living quarters. Unpublished PhD thesis. The Technical University, Germany.

Allawi, I. (1988). Some Evolutionary and Cosmological Aspects to Early Islamic Town Planning. In Theories and Principles of Design in the Architecture of Islamic Societies. Margaret Bentley Sevcenko (Ed.), *Aga Khan Program for Islamic Architecture: Proceedings of a Conference, Cambridge, Massachusetts* (pp. 56-72).

AL-Naim, M. (2006). The Home Environment in Saudi Arabia and Gulf States: Growth of Identity Crises and Origin of Identity. *CRiSSMA*, Working paper, *1*(10), 7-289

Al-Sahili, K. and Aboul-Ella, M. (1992). Accessibility of Public Services in Irbid, Jordan. *Journal of Urban Planning and Development, 118*(1), 1–12.

Anderson, L. (2009). *Religion and Language in Libya*. Retrieved fromhttp://www.webcitation.org/5kwsdZv1K

Ansari, R. (1983). Building styles in the Arab world and the manufacture of the clay bricks. *Living Styles in Iraq, Ministry of Urban Affairs: proceeding of Conference*, Iraq, Baghdad, (pp. 150-165).

Argan, C. (1963). On the Typology of Architecture. *Architectural Design*. Translated by Joseph Rykwert, *33* (12), 564-565.

Awotona, A. (1990). Housing in Benghazi city. *Habitat international, 14* (1), 87-109.

Azab, K.M. (1997). *Planning and Designing Islamic cities*. Ummah Book 58, Doha, Qatar: Ministry of Waqaf and Islamic affairs.

Azlitni, B. (2005). The Development of Physical and Urban Planning Systems in Libya, Sustainability of Planning Projects. In World Congress on Housing, *Transforming Housing Environments through Design, Pretoria, South Africa, 2005, (pp. 1-7).*

Bachelor, P. (1969).The Origin of the Garden City Concept of Urban Form. *The Journal of the Society of Architectural Historians, 28*, (3), 184-200.

Bachelor, P. (1969). The Origin of the Garden City Concept of Urban Form. *The Journal of the Society of Architectural Historians, 28* (3), 184-200.

Bahammam, O. (2006). The role of privacy in the design of the Saudi Arabian courtyard house. In Edwards, B., Sibley. M., Hakmi, M., and Land, P., (Eds.), *Courtyard Housing: Past, Present and Future* (pp. 77-82). New York: Taylor and Francis.

Bandini, M. (1981). Aldo Rossi. *Architectural Association Files, 1* (1). 106-111

Bassett, K. (1993). Urban cultural strategies and urban regeneration: a case study and critique. *Environment and Planning A, 25* (12), 1773-1788.

Bekleyen, A. and Dalkilic, N. (2011). The influence of climate and privacy on indigenous courtyard houses in Diyarbakır, Turkey. *Scientific Research and Essays*, *6*(4), 908-922.

Ben-Hamouche, M. (2009). Complexity of urban fabric in traditional Muslim cities: Importing old wisdom to present cities. *Urban Design International, 14*, 22-35.

Bianca, S. (2000). Urban Form in Arab World: past and present. London: Thames and Hudson.

Bianchini, F. and Parkinson, M. (1993).*Cultural Policy and Urban Regeneration*. Manchester: Manchester University Press.

Boyte, C. (1980). *The backyard revolution*. Philadelphia: Temple University Press.

Brown, F. (1985). Medieval London: the growth of the city. *Journal of Architectural and Planning Research, 2,* 77-97.

Brown, F, and Johnson, J. (1985). An interactive computer model of urban development: the rules governing the morphology of medieval London, *Environment and Planning B: Planning and Design from, 12* (4), 377-400.

Bukamur, S. (1985).*Design Guidelines for housing in Libya based on climatic and social criteria*. Ann Arbor, Michigan: University Microfilms International.

Bulugma, H. (1964). *The Urban Geography of Benghazi*. Unpublished PhD thesis. University of Durham.

Business Monitor International (2009).*Libya infrastructure Report*. London.

CABE. (2001). The value of urban design: a research project commissioned by CABE and DETR to examine the value added by good urban design. London: Thomas Telford.

Caniggia, G. and Maffei, G. (2001).*Architectural composition and building typology: interpreting basic building*. Firenze: Alinea.

Carmona, M., Heath, T., Oc, T, and Tiesdell, S. (2003). *Public Places Urban Spaces: The dimensions of urban design*. 1st edn. Italy: Architectural Press, Elsevier Ltd.

Carmona, M., Heath, T., Oc, T, and Tiesdell, S. (2010). *Public Places Urban Spaces: The dimensions of urban design*. 2nd edn. Italy: Architectural Press, Elsevier Ltd.

Carr, S., Francis, M., Rivlin, L., and Stone, A. (1992).*Public space*. Cambridge: Cambridge University Press.

Cataldi, G., Maffei, G., and Vaccaro, P. (2002).Saverio Muratori and the Italian school of planning typology. *Urban Morphology, 6*(1), 3-14.

Chen, F. (2009). The role of typomorpholgy in sustaining the cultural identity of Chinese cities: the case study of Nanjing, China. Unpublished Ph.D. thesis, University of Strathclyde.

Chombart de Lauwe, P. H. (1966). Sociologie sciences humaines et transformations sociales. *Revue de L'Enseignement Superieur*, (1-2), 11-19.

CITTA Research Centre for Territory, Transports and Environment. (2009). Faculty of Engineering, University of Oporto. *Environment and Planning B: Planning and Design, 36,* 107 -127.

Coleman, S. (1988). Social Capital in the Creation of Human Capital. *The American Journal of Sociology, 94*, S95-S120.

Colijn, L. (2010). *Libya- Country Report*. Economic Research Department, Rabobank. Retrieved from http://www.docstoc.com/docs/82893620/Libya-Chart-Economy---PDF

Colors of Libya, Retrieved from: http://libocolors.wordpress.com/2009/09/15/pictures-of-an-older-benghazi/. Accessed in 2009

Congress for the New Urbanism. (2001). *Transportation Tech Sheets: Ped- Sheds*. Retrieved from Congress for the New Urbanism website: http://www.cnu.org/sites/www.cnu.org/files/CNU_Ped_Sheds.pdf

Conzen, M.R.G. (1968). The use of town plans in the study of urban history. In H.J. Dyos (ed.), *The Study of Urban History*, (p. 113-130). London.

Conzen, M. R. G. (1969). *Alnwick, Northumberland: a study in town-plan analysis*. 2nd ed. London, UK: Institute of British Geographers.

Conzen, M.R.G. (1988). Morphogenesis, Morphogological Regions and Secular Human Agency in the Historic Townscape as Exemplified by Ludlow, D. Denecke, G. Shaw (Eds.), *Urban Historical Geography: Recent Progress in Britain and Germany*, (pp. 253-72). Cambridge: Cambridge University Press.

Conzen, M.R.G., and Whitehand, J.W.R. (ed.). (1981). The Urban landscape: historical development and management /papers by M.R.G. Conzen. London; New York: Academic Press.

Couch, C. (1990). *Urban Renewal: Theory and Practice*. Hampshire, England: Palgrave Macmillan Ltd.

Crucitti, P., Latora, V., and Porta, S. (2005). Centrality measures in urban networks. Retrieved from Preprint website: arxiv.org preprint physics/0504163.

Cushmen, R., and Myers, J. (1999).*Construction Law Handbook.* Volume 2.NY: Aspen Law and Business.

Darin, M. (1998).The study of urban form in France. *Urban Morphology, 2*(2), p 63-76.

DETR. (2000). *By design: Urban design in the planning system: towards better practice.* London, UK: Commission for Architecture and the Built Environment, Thomas Telford Publishing.

Edwards, B., Sibley. M., Hakmi, M., and Land, P. (2006), *Courtyard Housing: Past, Present and Future*. New York: Taylor and Francis.

El Basyoni, M. (2011). Revitalization of the role of waqf in the field of architecture: activation of waqf to improve the function of public buildings. In C.A. Brebbia, L. Binda (Eds.), *Structural Studies, Repairs and Maintenance of Heritage Architecture XII* (pp. 129-140). UK: WIT Press.

Elshestawy, Y. (2004). Planning Middle Eastern Cities: Kaleidoscope in globalising world. New York: Routledge Chapman and Hall.

English Partnerships and Housing corporation (2000).*Urban Design Compendium*. Llewellyn-Davies.

Filion, P., and Hammond, K. (2003). Neighbourhood land use and performance: the evolution of neighbourhood morphology over the 20th century. *Environment and Planning B: Planning and Design, 30*(2), 271 – 296.

Finnmap Oy Consultants (1981). Sabha Region: existing conditions- inventory and condition analysis for settlements.

Franck, A., and Schneekloth, L. (1994). *Ordering Space Types in Architecture and Design.* New York: Van Nostrand Reinhold.

Freeman, L. (1977). A set of measures of centrality based on betweenness. Sociometry, 40 (1), 35-41.

Gehl, J. (1980). The residential street environment. *Built environment 6*, (1), 51-61.

Gehl, J. (1987). *Life Between Buildings: Using Public Space*. Translated by Jo Koch, New York: Van Nostrand Reinhold.

Gehl, J. and Gemzøe, L. (2000) *New City Spaces*. Copenhagen: The Danish Architectural Press.

Gehl, J. and Gemzoe, L. (2004). *Public Spaces, Public Life*, Danish Architectural Press.

General Information Authority of Libya. (2009). Retrieved from http://www.gia.gov.ly

General Popular Committee, (GPCom). (1989). *Benghazi Region: Baladiyat of Benghazi*. Final Report on the Master Plan, Part I. Tripoli: GPCom and Dioxides Associates.

Goetze, R. (1979). *Understanding neighborhood change*. Cambridge, Mass.: Ballinger.

Goodchild, R. (1962).Benghazi: (Euesperides, Berenice, Marsa ibn Ghazi): *The story of a city*. 2nd edn. Department of Antiquities, Cyrenaica, Libya.

Gottlieb, D. (1965). *Eniveroment and Design in Housing*. NY: Macmillan.

Grannis, R. (1998). The importance of trivial streets: residential streets and residential segregation. *American Journal of Sociology, 103*(6), 1530-1564.
Grannis, R. (2001). Our Boys: Gang Life in Orange County California. *Footnotes of the American Sociological Association, 29* (2), 1-6.

Gregotti, V. (1985).The Grounds of Typology, *Casabella, 509-510*, 1-111.

Güney, Y. (2005a) .Appropriated 'A la Franga: Examination of Turkish Modernization through the Lens of Domestic Culture. Ann Arbor, MI: University of Michigan.

Güney, Y., (2007). Type and typology in architectural discourse. *Journal of Balikesir University, 9*(1), 3-18

Gür, S. (2000).Housing culture in the example of the Eastern Black Sea Region. Istanbul, Turkey: YEM Publication.

Hakim, B. (1999). Urban form in traditional Islamic cultures: further studies needed for formulating theory. *Cities, 16*, (1), 51-55.

Hakim, B. (2008). Mediterranean urban and building codes: Origins, content, impact, and lessons. *Urban Design International, 13***,** 21–40.

Harvey, D. (1989). From managerialism to entrepreneurialism: the transformation of urban governance in late capitalism. *Geografiska Annaler, 7*(B), 3–17.

Harvey, D. (1993) From space to place and back again: reflections on the condition of postmodernity, InJ. Bird, B. Curtis, T. Putnam, G. Robertson and L. Tickner (Eds.), *Mapping the Futures: Local Cultures, Global Change* (pp. 3–29). London: Routledge.

Hebbert, M. (2005).The Street as locus of collective memory. *Environment and Planning D: Society and Space, 23*(4), 581 – 596.

Hillier, B. (1996).*Space is the Machine*. Cambridge: Cambridge University Press.

Hillier, B. (2002).A theory of the city as object. *Urban Design International, 7*, 153-179. Also in: Proceedings of the Third Space Syntax Symposium, Atlanta, 2001.

Hillier, B., and Hanson, J. (1984).*The social logic of space*. Cambridge: Cambridge University Press.

Hillier, B., and Lida, S. (2005). Network and Psychological Effects: A Theory of Urban Movement, In A. Cohn, Demark (Eds) *Spatial Information Theory, Lecture Notes in Computer Science 3603*, (pp. 473-490). Berlin: Springer-Verlag. Also in: Proceedings of the Fifth Space Syntax Symposium, Delft.

Hillier, B., and Vaughan.L. (2007).The City as One Thing. *Progress in Planning: special issue on The Syntax of Segregation*, edited by Laura Vaughan, *67* (3), 205-230.

Hofmeister, B. (2004). The study of urban form in Germany. *Urban Morphology8* (1), 3-12.

Hunter, A. (1979). The urban neighborhood: Its analytical and social contexts. *Urban Affairs Quarterly*, *14*(3), 267-288.

Italian Consult (1976).National report: a document for the government of the Libyan Arab Republic. Rome.

Jacobs, J. (1961, (1993 edition). *The Death and Life of Great American Cities*. New York: Modern Library.

Jencks, C. (1991). *The language of Post Modern Architecture*.6th edition. London: Rizzoli Publications.

Jiang, B., and Liu, C. (2009). Street-based topological representations and analyses for predicting traffic flow in GIS. *International Journal of Geographic Information Science, 23* (9), 1119-1137.

Jiang.B., and Claramunt, C. (2002). Research Article Integration of Space Syntax into GIS: New Perspectives of Urban Morphology. *Transactions in GIS*, 6(3), 295-309.

Kahera, A., and Benmira, O. (1998). Damages in Islamic law: Magharibi Muftis and the built environment (9th-15th C.E). *Islamic Law and Society, 5*(2), 131-164.

Kezeiri, S. (1984).*Aspects of Change and Development in the Small Towns of Libya*. Unpublished PhD thesis. University of Durham, UK.

Komorowski, B. (2006). The Death and Life of Local Building Traditions: Typo-Morphological Analysis as a Basis for Urban Design in Montreal. Supervised Research Project. School of Urban Planning McGill University.

Komossa, S. (2009). Towards new architectural and urban models: the Dutch urban block, public domain and city economy. *The 4th International Conference of the International Forum on Urbanism (IFOU)*:Proceedings of a conference, (pp. 929-944).

Krier.R. (1988).*Architecture Composition*. New York: Rozzoli.

Krier, R (1990). *Urban Space* .London: Rizzoli International Publications.

Kropf, K. (2006). Against the perimeter block: A morphological critique. *Urban Design, Winter* (97), 12-13.

Kropf, K. (2008). Techniques. Urban Design: The Joy of Streets, quarterly, (105).

Lafrenz, J. (1988). The Metrological Analysis of Early Modern Planned Towns. In D. Denecke, G. Shaw (Eds.), *Urban Historical Geography: Recent Progress in Britain and Germany*. (pp. 273-84). Cambridge: Cambridge University Press.

Larkham, P. (2005). Understanding urban form?.*Urban Design: Urban Morphology (Quarterly),* (93), (pp. 22-24).

Lavin, S. (1992).Quatremère de Quincy and the invention of a modern language of architecture. Cambridge, England: MIT press.

Leibbrand, K. (1970). *Transportation and town planning*. London, England: Leonard Hill.

Leventhal, T., and Brooks-Gunn, J. (2000). The neighborhoods they live in: The effects of neighborhood residence upon child and adolescent outcomes. *Psychological Bulletin, 126*, 309-337.

Ley, D. (1985).Cultural/humanistic geography. *Progress in Human Geography, 9*(3), 415-423.

Libyana.org, Retrieved from: http://www.libyana.org/art/. Accessed in 2009

Libyana.org, Retrieved from: http://www.libyana.org/cities/benghazi/street.htm. Accessed in 2009

Lillebye, E. (2001). The architectural significance of the street as a functional and social arena, in C. Jefferson, J. Rowe, and C. Brebbia (eds) *The Sustainable Street. The Environmental, Human and Economic Aspects of Street Design and Management*. Southampton and Boston: Wessex Institute of Technology Press.

Lockerbie, J. (2005). *The old buildings of Qatar*. Retrieved from http://catnaps.org/islamic/islaqatold.html.

Lockerbie, J. (2010) Islamic Urban design.http:// catnaps.org/Islamic/design, 2010.

Low, S. (1997). Urban Fear: Building Fortress America. *City and Society Annual Review*. (pp. 52-72).

Madanipour, Ali. (2003). Public and Private Spaces of the City. New York: Routledge.

Maitland, B. (1984). Towards a minimal theory of urban structure. In D. Gosling and B. Maitland (Eds.), *Concepts of urban design* (pp. 153-155). London: Academy Eds.

Maitland, B. (1985). *Shopping malls: planning and design*. London: Construction press.

Marshall, S. (2005). *Streets and Patterns*. NY USA: Spon Press.

McKoy, D., Vincent, J., and Makarewicz, C. (2008).Integrating Infrastructure Planning: The Role of Schools. *Access*, *Fall* (33), 18-26

Mehaffy, M., Porta, S., Rofè, Y., and Salingaros, N. (2010). Urban nuclei and the geometry of streets: the 'emergent neighborhoods' model. *Urban Design International*, *15* (1), 22-46.

Miller, J. and Shaw, S. (2001). Geographic Information Systems for Transportation (GIS-T): Principles and Application. Oxford: Oxford University Press.

Mineta Transportation Institute, Retrieved from: http. Accessed in 2012.

Moneo, R. (1978). On Typology. *Oppositions 13*, pp. 22-45.NY :MIT Press.

Moneo, R., Scully, V., Arnell, P. , and Rossi, A. (1985). *Aldo Rossi: Buildings and Projects*. New York: Rizzoli International.

Montgomery, J. (1990). Cities and the art of cultural planning, *Planning Practice and Research,5*(3), 17–24.

Morello, E., and Ratti, C. (2009) .A Digital Image of the City: 3-D isovists in Lynch's Urban Analysis., *Environment and Planning B: Planning and Design*, *36*, 837-853.

Moudon, A.V. (1986). Built for Change: Neighbourhood Architecture in San Francisco. Cambridge, Massachusetts: MIT Press.

Moudon, A.V. (1992). A Catholic Approach to What Urban Designers Should Know. *Journal of Planning Literature, 6*(4), 331-349.

Moudon, A.V. (1994). Getting to Know the Built Landscape: Typo morphology. In k. Franck, and L. Schneekloth (Eds.), *Ordering Space in architecture and design,* (pp. 289-311). New York: Van Norstrand Reinhold.

Moudon, A.V. (1997). Urban morphology as an emerging interdisciplinary field. *Urban Morphology, 1*(1), 3-10.

Mukfas, S. (1986). Transport problem in the Arabic city and the search for solutions, a study about Qusantina City, Algeria. In Organization of Arabic Cities, *8th conference on the urban growth in the Arabian city: problem and solution: proceeding of a conference.* Riyadh, Saudi Arabia.

Museum of Art and Archaeology, University of Oxford. Accessed in 2011 from ASHMOLEAN: www.ashmolean.org

Ngab, A. (2007). Libya-The construction industry-an over view. *CBM-CI International Workshop, Karachi, Pakistan* (pp. 201-209)

O'Brien, D., and Ayidiya, S. (1991). Neighbourhood community and life satisfaction. *Journal of the Community Development Society*, *22*(1), 21-37.

Oea newspaper.(2007). Unemployment in Libya. Accessed in 2009 from www.oealibya.com

Olson, P. (1982). Urban neighbourhood research: its development and current focus. *Urban Affairs Quarterly*, *17*(4), 491-518.

O'Meara, S. (2007). Space and Muslim Urban Life: At the Limits of the Labyrinth of Fez, Culture and Civilization in the Middle East. New York: Routledge.

Orford, S., Dorling, D., Mitchell, R., Shaw, M. and Davey-Smith, G. (2002). Life and death of the people of London: a historical GIS of Charles Booth's inquiry, *Health and Place, 8*, 25-35.

Osmani, M. (1988).Physical form and Spatial Structure of Colonial Cities in Algeria. Unpublished MPhil Thesis, Joint Centre for Urban Design, Oxford Brooks University, Oxford.

Otman,W. and Karlberg E. (2007) The Libyan economy: economic diversification and international repositioning. Berlin, Heidelberg : Springer-Verlag

Panerai, P. , Castex, J., Depaule, J., and Sameullls, I. (2004). *Urban forms: The death and life of the urban block*. Oxford, UK: Architectural Press.

Pinho, P. , and Oliveira, V. (2005). The implementation of municipal master plans and the on-going evaluation process. *Association of European Schools of Planning (AESOP)*: Proceedings of a conference. Vienna, Austria.

Pinho, P. ,and Oliveira, V. (2009). Cartographic analysis in urban morphology. *Environment and Planning B: Planning and Design 36*(1), 107-127.

Pitts, A. (2004). Planning and Design Strategy for Sustainably and Profit: Pragmatic Sustainability Design on Building and Urban Scales. Oxford: Architecture Press.

Porta, S., Crucitti, P. , and Latora, V. (2006).The network analysis of urban streets: a primal approach. *Environment and Planning B: Planning and Design, 33*(5), 705-725.

Porta, S., and Latora, V. (2008). Centrality and cities: multiple centrality assessment as a tool for urban analysis and design. In: *New urbanism and beyond*, (pp. 140-145).New York: Rizzoli International.

Porta, S., Crucitti, P. , and Latora, V. (2008). Multiple centrality assessment in Parma: a network analysis of paths and open spaces. *Urban Design International*, *13* (1), 41-50.

Porta, S., Latora, V., Wang, F., Strano, E., Cardillo, A., Scellato, S., Iacoviello, V., and Messora, R. (2009).Street centrality and densities of retail and services in Bologna, Italy. *Environment and Planning B: Planning and Design, 36*(3), 450-465.

Porta, S., and Romice, O. (2010). Plot-Based Urbanism: Towards Time-Consciousness in Place-Making. Working Paper. University of Strathclyde.

Porter, W. (1980). Architecture in Islam: The Search for Form. In Places of Public Gathering in Islam Linda Safran (ed.), Seminar Five in the series Architectural Transformations in the Islamic World.: Proceedings of a conference, Amman, Jordan (pp. 1-4).Philadelphia: Aga Khan Award for Architecture.

Quatrèmère de Quincy, A-C.(1825). Type. *Encyclopédie Méthodique*. In *Dictionnaire d'architecture*, Vol. *3*.Translated by Vidler, A. (Spring 1977).Type by Quatremere de Quincy, *A journal for ideas and criticism in Architecture*, Oppositions *8*, 147-150.MIT press.

Ramsar Convention on Wetlands, Retrieved from: www.ramsar.org. Accessed in 2010.

Reichlin, B. (1985). Type and Traditional of the Modern. *Casabella, 509-510*, 32-39.

Reuters Africa. (2009). Libya's jobless rate at 20.7 percent: report. Retrieved from http://www.reuters.com/article/2009/03/02/ozabs-libya-economy-jobless-idAFJOE52106820090302

Reuters. (2010). Libya suspends pro-reform newspaper. Retrieved from http://www.reuters.com/article/2010/11/04/ozatp-libya-newspaper-idAFJOE6A30EP20101104

Rossi, A. (1984). *Architecture of the City*. Cambridge, MA: MIT Press.

Rowe, C., and Koetter, R. (1984).*Collage City*. Cambridge, MA; London, England: MIT Press.

Russo, P. (2004). Welfare in Mediterranean Countries: Great Arab Socialist Libyan Jamahiriya. Centre of Administrative Innovation in the Euro-Mediterranean Region, Italy.

Sabit, M.T. (2004). The Concept and Objective of Waqf. *Shariah Law Reports, 1*.

Salasal, S. (1998). The Concept of Land Ownership: Islamic Perspective. *Geo Information Bulletin, 2* (2), 285-304.

Saleh, M. (1998).The Impact of Islamic and Customary Laws on Urban Form Development in Southwest Saudi Arabia. *Habitat International, 22* (4), 537–556.

Schoenberg, P. , and Rosenbaum, C. .*Neighborhoods that work: Sources for viability in the inner city*. New Brunswick, N.J.: Rutgers University Press.

Seungkoo, J. (2003). Aldo Rossi: Architecture and Memory. *Journal of Asian Architecture and Building Engineering, 2*(1), 231-237.

Siksna, A. (1997). The effects of block size and form in North American and Australian city centres. *Urban Morphology, 1*, 19-33.

Sima, Y., and Zhang, D. (2009).Comparative Precedents on the Study of Urban Morphology. In D. Koch, L. Marcus and J. Steen (Eds.), *7th International Space Syntax Symposium: Proceedings of conference, 103* (pp. 1-8). Stockholm: KTH.

Social Disadvantage Research Centre (2001).*Measures of Deprivation in Northern Ireland*. Oxford: University of Oxford.

Sola-Morales, M. (2004).In Cities and urban corners. In M. Sola-Morales (Ed.), *Cities, Corners* (pp. 131-134). Barcelona: Forum Barcelona/ Lunwerg Editors.

Talen, E., and Shah, S. (2007). Neighbourhood Evaluation Using GIS: An Exploratory Study. *Environment and Behavior , 39* (5), 583-615.

Taylor, R. (1997). Social Order and Disorder of Street Blocks and Neighborhoods: Ecology, Microecology, and the Systemic Model of Social Disorganization. *Journal of Research in Crime and Delinquency, 34* (1), 113-155.

Teitz, M. (1968).Toward a theory of urban public facility location. *Papers of the Regional Science Association, 21*(1), 35-51.

Teller, J. (2003). A spherical metric for the field-oriented analysis of complex urban open spaces. *Environment and Planning B: Planning and Design, 30*(3), (339–356).

Temehu.com, Retrieved from: http. Accessed in 2009.

The European Physical journal (2004), Virtual Round table on ten leading questions for network research, 38, (pp. 143-145).

Tibbalds, F. (1992).Making people-friendly towns: improving the public environment in towns and cities. Harlow: Longman.
UNESCO World Heritage Site. Retrieved from:
http://www.temehu.com/Cities_sites/Ghadames.htm Accessed in 2010.

Tourslibya.com, Retrieved from:
http://tourslibyacom.rezgo.com/details/26826/Ancient-Cities-of-Libya. Accessed in 2009.

UN Habitat (2006). State of the World's Cities 2006/7:The Millennium Development Goals and Urban Sustainability. London: UN Habitat.

Unger, G., and Wandersman, A. (1982). Neighboring in an urban environment. *American Journal of Community Psychology*, *10* (5), 493-509.

United Nations Economic Commission for Africa (1966).*UN Monograph for Seminar on housing statistics and programmes*. New York: UN.

United Nations Economic and Social Council.(2006). *Crystal Reports – Country Profile*. Retrieved from
http://www.un.org/esa/population/publications/countryprofile/libya.pdf

United Nations Mission for Housing in Libya (1969).*Report of the Housing Design Adviser*. Tripoli: UN.

Urban Planning Authority in Libya. (2010). UPA, Retrieved from http://upa.org.ly/ar/news-18.html

Vallas, L. (1973). *Claude Debussy His Life and Works*. New York: Dover Publications.

Vaughan, L., Clark, D, Sahbaz, O., and Haklay, M. (2005). Space and exclusion: does urban morphology play a part in social deprivation? *AREA, 37* (4), 402-412.

virtualtourist.com, Retrieved from: http://www.virtualtourist.com/travel/Africa/Libya/Baladiyat_Banghazi/Benghazi-2062333/Things_To_Do-Benghazi-TG-C-1.html.Accessed in 2009.

Vivek, N. (1990). Urban Morphology and the Concept of "Type": a thematic and comparative study of the urban fabric. School of Architecture, Centre for Environmental Planning and Technology.

Wang, F., Antipova, A., and Porta, S. (2011). Street centrality and land use intensity in Baton Rouge, Louisiana. *Journal of Transport Geography, 19* (2), 285–293.

Wansborough, M. and Mageeana, A. (2000).The Role of Urban Design in Cultural Regeneration. *Journal of Urban Design, 5* (2), 181-197.

Warren, D. (1978). Explorations in neighborhood differentiation. *Sociological Quarterly, 19*(2), 310-331.

Warren, R., and Warren, D. (1977).*The Neighborhood Organizer's Handbook*. Notre Dame, IN: University of Notre Dame Press.

Wasserman, S., and Faust, K. (1994). Social Network Analysis: Methods and Applications (Structural Analysis in the Social Sciences). Cambridge, UK: Cambridge University Press.

Waters, N.M. (1999). Transportation GIS: GIS-T. In P. A. Longley, M.F. Goodchild, D.J. Maguire, and D.W. Rhind (eds.), *Geographical information systems: Principles, techniques, management and applications*, (pp. 827–844). New York: Wiley.

Watson, V. (2007).Urban Planning and Twenty-first Century Cities : Can it Meet the Challenge? In A. Garland, M. Massoumi, and B. Ruble (eds) *Global Urban Poverty: Setting the Agenda* (pp. 205-237). Washington DC: Woodrow Wilson International Centre for Scholars.

Wayne, A. and Logan, D. (1989).*American Urban Architecture: Catalysts in the Design of Cities*. 1st ed. London: University of California Press.

Weather and Climate in Libya. (2010). Retrieved from www.Southtravels.com

Webber, M. (1963).Order in diversity, community without propinquity. In L. Wingo Jr. (Ed.), *Cities and space: The future use of urban land* (pp. 23-56). Baltimore: Johns Hopkins University Press.

Webster's College Dictionary (1997). New York: Random House.

White, P. (1976). *Planning for public transport*. (1sted.). London, England: Hutchinson and Co. Ltd.

Whitehand, J., Samuels, I., and Conzen, M.(2009). Conzen, M.R.G. 1960: Alnwick, Northumberland: a study in town-plan analysis, Institute of British Geographers Publication 27. London: George Philip. *Progress in Human Geography*, *33* (6), 859-864.

Whitehand, JWR, and Larkham, J. (1992). Urban landscapes: international perspectives In J.W.R Whithand, and P. J Larkham (Eds,) urban landscape research: achievements and prospectus. London: Routledge.

Whitehand, JWR. (2001). British urban morphology: the Conzenian tradition. *Urban Morphology*, *5*(2), 103-109.

Whitehand, JWR. (2007). Conzenian urban morphology and urban landscapes. In A. Kubat, O. Ertekin, Y. Guney, and E. Eyuboglu (Eds.), *The 6th International Space Syntax Symposium*: *Proceedings of A Conference*, (pp. 1-9). Istanbul: Istanbul Technical University

Whitehand, JWR. (2004). M.R.G Conzen's notes on 'Urban Morphology: Its Nature and Development. In M.P Conzen and Peter Lang (Eds.),*Thinking about Urban Form: Papers on Urban Morphology, 1932-1998* (pp. 269-283). Oxford

Whiting Associates International (1966). Benghazi Master Plan, Final Report. Roma.
Whyte, W. (1980, (2001 edition).The Social Life of Small Urban Spaces. Ann Arbor Michigan: Project for Public Spaces Inc.

Williams, R. (1961). *The Long Revolution*. London: Chatto and Windus.

wikimedia.org, Retrieved from: http://upload.wikimedia.org/wikipedia/commons/a/a6/Street_Wall_Early_Cities.jpg. Accessed in 2009

Zaimeche, S. (2002). Education in Islam: The role of the mosque. *Foundation of Science, Technology and Civilization (FSTC), (June).* Retrieved from http://www.muslimheritage.com/uploads/ACF2C23.pdf

Zukin, S. (1995). *The Cultures of Cities*.UK: Blackwell publishers Inc.