Street quality, life and centrality in Tripoli

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I

This chapter contributes to the debate on the role of urban form, and public space in particular, in meeting societal needs, a topic that has gained a growing attention in the discipline of urban design[7] as well as in the wider debate on urban management and regeneration across the world[20]. In the UK, this debate has recently gained momentum in the context of the reconsideration of social and economic potential of high streets in secondary urban and per-urban centres[32, 35]. In the Islamic urban context, this debate touches on the overarching cultural conflict between global trends of westernization and the preservation of local identity in the 'home environment'[1, 2]. In this sense, the Islamic vs. Western dichotomy can be reinterpreted more appropriately as a deeper trans-cultural conflict between Traditional and Modern, which operates equally in the Western and – increasingly – the Islamic context, and indeed in other regions of the developing Global South. Accordingly, traditional urban and street structures are under a new wave of attention in consideration of their ability to 'make places' that better react to external challenges and are resilient – or adaptable - over time. This adaptability is bound in a higher capacity to support community identity, equity, accessibility to urban resources and quality of life. This shift has been defined as a 'counter-revolution' after the modernist age, or 'one of the most significant reversals in urban design history'[34].

Elsewhere in this book, discussions regarding the ability of local high streets to adapt to change take account of how the high street sits within the wider street network. In a similar fashion we compare the street built form and network characteristics for three sample high streets across central Tripoli, although in this instance we focus in to the scale of the street characteristics themselves, considering whether differing spatial/morphological starting points have influenced the subsequent adaptation of the street. Our paper looks into how urban areas which were generated under clearly different historical conditions have inherited spatial configurations which exhibit not only a peculiar environmental quality, but also, and accordingly, peculiar patterns of social activities and behaviours.

The three cases are taken into consideration in this paper span across a period of time long enough to cover pre-modern as well as post-war modern developments. By so doing, we explore how the radical shift in city production which has accompanied modernisation across this period has contributed to societal impacts whose signature is recognisable all over the world, including developed Countries.

Centrality, a product of the street network's configuration, has been identified as a significant driver of the ability of cities to support the development of diversity and intensity of city uses and users over time, thus reinforcing self-surveillance and community capacity. A fundamental feature in urban geography and urban systems analysis, centrality has been developed as an urban design modelling tool by Hiller[5] since the mid-1980s. More recent, Porta et al [44] explored the same subject drawing from studies in the physics of complex networks and ultimately from the ground of post-war structural sociology. The two models, respectively Space Syntax and Multiple Centrality Assessment, share the same philosophy and serve the same purposes within the field of Urban Design. However, while the former is grounded on a representation of the street system based on visibility (the axial character of sightlines) and step-distance measurements, the later utilises a conventional street centrality representation and metric measurements, which is conducive to a proper "weighted" spatial network environment[46]. In addition, centrality is just one side of the coin: local aspects related to the architecture of the street front, namely diversity, permeability and transparency of the building façade, have been extensively acknowledged as crucial components of street safety and sociability[3, 29, 38, 50]. Since the early 60's a coherent tradition of studies has dealt with the observation and measurement of social life in cities, to inform policies of urban regeneration and design[47, 48, 50]. Notably Bill Hillier[23] has fixed 'street constitution' as a measurable element regarding the intervisibility of building entrances with street users. This conception is an important aspect of our own study.

In this study we explore the relationship between street front quality and social life in streets characterised by different degree of centrality in the contemporary city centre of Tripoli, Libya. In section II we briefly present the method of research for the measurements of street centrality, street front quality and street life. In section III we present the three case studies, and the selection criteria utilized. In section IV we present our findings and subsequently in section V we sum up the potentials of street centrality and quality within the city centre of

Tripoli their contribution to the street life in order to develop a more sustainable planning framework conducive to a different and more historically aware urban future in Libya.

II

This chapter investigates three character areas of Tripoli city centre identified according to the distinctive historical origin of their urban form: the Old Town, the Italian Quarter and the Garden City. Such different historical origins are largely still reflected in the structure and character of their current urban form, which is illustrated in section III. Within each of the three character areas, streets are classified on the basis of their degree of centrality in the broader urban network. Secondly, one 400x400m edged squared sample is extracted in each character area such that the centre of the sample lies on a highly central street; the three 400x400m case studies are therefore identified. Thirdly, we measure the street front quality of all streets in each case. Finally, a direct survey of human activities is conducted on a sample of 25 streets over the three case studies.

Measuring street centrality

Since the mid-Eighties street centrality has continuously grown as a subject of studies in urban design[5, 21, 34, 45] and the science of complex networks[4]. Central streets are identified as significant features in the evolution of the urban fabric[9, 33], directly affecting in many ways its liveability[28, 29, 31].

Multiple Centrality Assessment (MCA) is a computer-operated procedure that allows for the computing and mapping of the centrality of networks of streets and spaces in general. It applies a set of methods drawn from research into the physics of complex networks in nature, society, culture and technology. MCA has re-interpreted urban street systems as a special class of complex networks, where centrality goes beyond proximity, dealing with how people experience and navigate the system of streets and intersections. Centrality can be measured according to different indices (the main three being 'straightness', 'closeness' and 'betweenness'); in this research we have only utilized betweenness centrality (which is identical to the measure of 'choice' used in space syntax, see appendix). Boyd[6] states that places with higher betweenness are more likely to be liveable and become the scene of intense social relationships, as the number of incoming and outgoing connections is higher.

Therefore, routes with high 'betweenness' have the potential to support the active presence of people and the resultant urban economy[44].

Measuring street front quality

Gordon Cullen[10] is one of the earliest scholars in recent times to alert people to the idea that the actual physical character and quality of ordinary public space is not only an element of aesthetic appreciation for limited intellectual elite, but rather is linked to fundamental aspects of collective behaviours in the everyday life of all citizens. In the same year Jane Jacobs [29] turned a page in city planning by highlighting the economic and strategic relevance of urban form for the prosperity of local communities and ultimately the city as a whole. Building on these foundations, research on urban sustainability as influenced by the structure and form of public spaces conducive to 'place making' has informed a vast international movement, looking for a new 'Urban Renaissance'[13]. Now more than ever has this approach been regarded so highly relevant to the urban agenda managing both developed and developing Countries, and consequently delivering more resilient and prosperous cities in the age of urbanization[20].

The space between the building façade and the public right-of-way is an essential part of the image and the character of a street, and is dependent on the positive interaction between ground floor uses and the public pavement. Urban street fronts have to be integrated with their surrounding context in order to enhance the quality of streetscapes, where the relationship between a street and its buildings plays a major role in fulfilling and achieving this task. Rich, open and detailed building frontages are exciting and interesting for walkers, as they provide places where walkers can enjoy looking, touching and standing [25]. However, the extent to which these qualities of the street fronts actually correspond to the social success of places remains largely a matter of personal subjectivity than established evidence-based knowledge. There is a clear need to extend the available ground of evidence with regards to issues like, for example, whether acknowledged patterns of this relation would be culturally and geographically specific.

In this chapter, within the three selected case studies, Main Streets (high centrality), Connecting Streets (medium centrality) and Cul-de-sacs (low centrality) are our focus. Street fronts are identified and their metric lengths are measured. A quantitative analysis of the

distribution of street fronts across the three types is undertaken in order to provide insight into the impact of different street network models on the structure of the urban form.

In each case study, a quality mark is attributed directly on the field, by visual survey, to the façade (at the ground floor only) both sides of the street. The research team inspects 50m of street at a time, according to five indicators: number of visible units accessible from the street (S), visible diversity of function (F), openness to the public street (O), level of maintenance (M), level of details and quality of materials (D). Scores re assigned separately for the five indicators, ranging from 1 (lowest) to 7 (highest); street fronts not aligned by any building are attributed a value of 1 (lowest) across all indicators. The subjective nature of this process was mitigated by the preliminary discussion with the field surveyor who was additionally provided with a handbook that includes a comprehensive atlas of exemplar cases in every category of quality for all types of street. Following Gehl [26, 27] and Hershberger [22], the total of values attributed to a homogeneous single street section for all 5 indicators generates a compound index of quality that we term Street Front Quality. This index ranges from a minimum of 5 (all five indicators are equal to 1) to a maximum of 35 (all are equal to 7), and is classified in a 6 grades scale from 'Unattractive' (values from 5 to 10) to 'Exciting' (values from 31 to 35). The Street Front Quality of a homogeneous single street section is then weighted by the section length to determine the quality amount of whole streets (calculated on both sides) and ultimately for classes of streets, for example all main streets. The idea of an 'amount' of quality that constitutes the contribution of whole streets to the overall quality of the place, independently from exceptional landmark buildings, comes from the tradition of evaluative image assessment proposed by Gehl [25, 26, 27] and Nasar [37]. In the following sections we define and discuss the indicators used to assess the quality of street fronts, and provide a short link to their research background.

According to Gehl [16] street frontages become more interesting and attractive when they exhibit a relatively high number of units with many entrances. More doors mean more visibility and likely interaction between street and internal space [17]. In addition, the number of units visible at eye level contributes to the density of activities taking place on the street and gives a good proxy of the 'granularity' of the streetscape (and the urban fabric alike). Thus, through visual contact and flexible accessibility, the attractiveness of a place is increased [24].

Number of Units (S) is defined as: the number of Units that are visible and accessible from the street. A Unit is defined as a functionally homogeneous and autonomous part of the building that is accessible from the street, for example a residential apartment, a shop, or an independent storage space. Scores are assigned as follows:

Mark	1	2	3	5	7
Num. of Units in 100m	0 Units	1-9 Units	10-14 Units	15-19 Units	≥ 20 Units

Since Jacobs [29] stressed the importance of diversity as a contributor to successful place-making, this factor has been extensively explored at various scales. At the street scale, diversity of land uses, particularly at the ground floor, significantly influences the ability of a place to attract a diverse population of city users and permanent inhabitants; thus, expanding social control and enhancing dynamics of synergy and innovation between people and ventures. Because of the varied nature of mixed-use environments, people tend to participate in community life by socialising at the edges of the pavement instead of just passing through to reach their destinations [30]. In short, following Potschin [39], enhancing the mixture of land-uses at street level improves the quality of city life.

Diversity of Functions (F) is defined as: the number of different land uses that are visible from the street. Scores are assigned as follows:

Mark	1	2	3	5	7
Num. of Uses in 100m	1 Use	2 Uses	3-4 Uses	5-6 Uses	≥ 7 Uses

The 'transparency' of street edge is regarded to be conducive to more social interactions in the public space. An appropriate amount of physical and visual openness connecting the inner space of buildings and the public realm contributes to a thriving social life and safer outdoor spaces. The visual contact between indoor and outdoor spaces also favours the ability to navigate the street network and enriches the movement behaviour in transitional spaces [8, 18].

Openness (O) is defined as: the percentage of windows (or shop windows) that are visible from the street, measured in metric length against the total length of the homogeneous street

section. It should be noted that if windows are concealed from the street by, for example, walls or hedges or any other visual barrier, they are not taken into account. Scores are assigned as follows:

Mark	1	2	3	5	7
Num. of Uses in 100m	0-19%	20-39%	40-59%	60-79%	≥ 80%

The conditions of preservation and maintenance of buildings, the cleanliness and sense of care that they convey to the visitor and the resident alike, has been identified as a mostly significant factor in both revealing and generating appreciation of place, sense of belonging and street livability [11, 14, 40, 43]. The visual measure of maintenance plays a pivotal role in shaping the patterns of integration between the spatial and social dimension of places [19].

Maintenance (M) is defined as: the level of maintenance of the facades' structures, materials and finish. Scores are assigned as follows:

Mark	1	2	3	5	7
Level of Maintenance	Very bad	Bad	Average	Good	Very good

The quality of street fronts is essentially related to the process of visual perception, which deals with the visual stimuli generated by the the articulation, detailing and finishing of its architectural elements. It is also the result of physiological processes based on biological principles inherent to human beings [49]. Visual perception is dominant when compared to other senses like hearing, smell, and touch [25]. The pattern, rhythm and proportion of elevations confer a degree of harmony to the edges of the public domain, where their materials, colours and details play a part in increasing and enriching the quality of the enclosed public space. Buildings may enrich the quality of the built environment by providing appropriate views as a part of the closest level to the pedestrians [12 24 28].

Details and Materials (D) is defined as: the level of quality and intensity of architectural details and building materials. Scores are assigned as follows:

Mark	1	2	3	5	7
Level of Detail	Very poor	Poor	Average	Rich	Very rich

Measuring street life

In the street life survey we first simplify the Street Front Quality classification into: 'Good', 'Average' and 'Poor'. The 'Good' category includes all streets whose Street Front Quality was either 'Exciting', 'Attractive' or 'Pleasant'; the 'Average' includes those previously classified as 'Average'; and the 'Poor' includes those previously classified as 'dull' or 'unattractive'. We then conduct a survey of human activities in a total of twenty-five streets in the three selected cases: in Old Town and Italian Quarter we pick up three 'good' (one Main Street, one Connector and one Cul-de-sac), three 'average' (same) and three 'poor' (same) streets (nine streets in each case), whilst in Garden City we can only identify two 'good' (one Main Street and one Connector), two 'average' (one Mains Street and one Connector) and three bad (one Main Street, one Connector and one Cul-de-sac) streets (seven streets) because no 'good'/'average' streets are present in Garden City's Cul-de-sacs. In every selected street the survey is conducted visually by establishing a survey point roughly in the middle of the street ('gate') and then proceeding in two different ways: walking activities are surveyed just by counting how many people pass through the gate in one hour in both directions; sitting and standing activities are surveyed by locating six researchers at strategic points along two successive sections of the street of 25m of length before the gate, as well as along two other sections after the gate, undertaking the counting together at the same time for one hour. Surveys are produced at both *peak time,* between 11:00-14:00 and 18:00-20:00, and *off-peak time*, between 08:00-10, 15:00-17:00 and 21:00-23:00.

The survey accounts for the number of people engaged in activities of walking, standing and sitting, also distinguishing the nature of those activities based on Jan Gehl [16] terminology which are: *necessary*, *optional* or *social*. On one hand, *necessary activities* are undertaken individually by necessity in a certain space, typically including, for example, walking to the next rail station, shopping in a large store, or fixing a lamppost. On the other hand, *optional activities* include all those undertaken individually by choice in a specific place, for example having a nice rest on a bench, indulging in conversation with friends over a coffee, reading in a park, strolling around, and walking the dog. Finally, *social activities* are those that are undertaken in a way that implies a significant amount of contact and exchange with others, either

in pair, trio or larger group. The quality of the public space has been found to exert a high impact on optional activities, while having a minor role on *necessary* activities, which by definition would be conducted in that place anyway by necessity[15 25 26 50 51].

Walking is measured as: the number of people passing through the survey 'gate', measured in people/hour.
Standing is measured as: the number of people standing within the 100m street stroke centred on the 'gate', measured in people/hour.
Sitting is measured as: the number of people sitting within the 100m street stroke centred on the 'gate', measured in people/hour.

III

Tripoli's districts

Tripoli's city centre is made of three distinct parts (Figure 5.1). The Old Town, originally established under the Roman Empire in 111B.C. and later transformed into an Islamic city after the Arab Muslims came to Libya in 642 CE, is located at the heart of the city and is characterised by the strong impact of Islamic spatial, organisational and formal principles. The Italian Quarter, developed after Italy invaded Libya in 1911, is located south and east of the Old Town and dominates most of the city centre with a colonial urban form and organisational distributional pattern. Finally the Garden City, which was developed during the British military domination after World War II according to principles reminiscent of Ebenezer Howard's concept, sets at the first southern fringe of the city centre.

- FIGURE 5.1 ABOUT HERE -

The three character areas in Tripoli's city centre: Old Town ,Italian Quarter and Garden City [41]

The Old Town is the main part of the city centre of Tripoli (Figure 5.2a). This traditional urban fabric has witnessed the passage of several human civilisations over time, such as the Phoenician, Roman, Carthaginian and Muslim, who earned the city the hallmark of its special physical characteristics. For hundreds of years, the town had evolved incrementally to contain many residential sectors with one single commercial area that still functions today as a commercial hub not only at the urban scale but for the whole western region of Libya. The Old Town is a typical traditional Islamic city where a large mixture of homogenous low-rise courtyard buildings forms a hierarchical network of main streets, alleyways or connecting

streets and cul-de-sacs. Here the main commercial activities take place within one central area: local non-residential land uses such as masjids (local mosques), shops and bakeries generally sit along the most central thoroughfares and alleyways, while land uses with lower movement sensitivity such as private houses are located on less central streets or cul-de-sacs. Old Town is characterized by a modified orthogonal street layout, which is inherited from the ancient Roman routes organised around key locations and attractions. The traditional built environment is built at a pedestrian scale, which results in an extremely dense townscape with a high degree of complexity.

- FIGURE 5.2a ABOUT HERE -

Views of the Old Town [41]

The Italian Quarter largely owes its spatial structure to the metropolitan masterplan that was designed by Italian architects during the colonial period in the early-20s and 30s of the twentieth century (Figure 5.2b). It is regarded as the most prominent area of Tripoli city centre today, accommodating a large variety of services such as public institutes, banks, commercial stores and leisure facilities. Accordingly, a mixed land use is dominant in the area: here the residential units are normally accommodated at the upper floors, while the ground floor is occupied by commercial and leisure activities directly facing the main streets. Purely residential or manufacture activities are located along less central streets. Streets and squares in Italian Quarter are more active than those in Old Town: commercial activities are located at the ground floor on both sides of the street and some are sheltered by arcades. Italian Quarter derives from the masterplan proposed by the Italian engineer Luigi Luiggi a few months after the military invasion in 1911[36]. Essentially, the quarter was designed as a compromise in order to accommodate the needs of pedestrians and vehicles alike. Its street network structure accommodates the most accessible thoroughfares within the city centre of Tripoli, achieving a successful usable network. Since most of the properties on the ground floor are occupied by commercial functions, the shops are equipped with large windows that create a strong relationship between buildings and public streets.

- FIGURE 5.2b ABOUT HERE -

Views of the Italian Quarter [41]

The British Garden City, which was designed and built during the 1940s, provided new types of single family houses as an alternative to the urban residential blocks of Italian Quarter and courtyard houses of Old Town (Figure 5.2c). The urban fabric of the Garden City is a purely quiet residential environment with the majority of plots interfacing with the street through blank walls or fenced frames that conceal the private yards from the passers-by. Streets in this neighbourhood are mainly for motorized movement, and their size is fairly different from that of both Old Town and Italian Quarter. In Garden City, the large mono-functional residential areas are served by commercial hubs located at the edge of the neighbourhood. This is ultimately conducive to car-dependent layouts that enforce people to travel by automobile to reach shops, services and mosques. Although the subdivision of the block is similar to that of Old Town, in that each plot is occupied by one distinct single-family unit, the relationship between indoor and outdoor spaces is reversed as buildings lie isolated within the plot and entirely separated from the street. This model lowers the compactness of the fabric, and the traditional identity that characterises both Old Town and Italian Quarter are lost in Garden City.

- FIGURE 5.2c ABOUT HERE -

Views of the British Garden City [41]

Three character areas sampled

Because we want to explore the patterns of relations between social life and urban form in places that are characterised by clearly different morphological features, we identified three distinctive portions in each of the three character areas that are comparable in terms of general structure. Of the three elements under scrutiny in this research - street centrality, street front quality and street life - we want in particular to determine whether the latter two are related to each other and whether this relation varies according to the centrality of the streets. As a consequence it is important that the case studies exhibit a reasonable variety of central streets, with the presence of streets falling into all classes of centrality. An MCA study of the whole city centre of Tripoli informs our choice of the case studies; the resulting MCA map (Figure 5.3) clearly shows the structure of major urban streets, alternated to mid-range central streets and a 'background' set of minor local streets.

- FIGURE 5.3 ABOUT HERE -

The MCA analysis of street centrality over Tripoli city centre.
Values of *betweenness centrality* are visualized ranging from very high (red) to very low (blue) [41]

With reference to this MCA map, we identify as case studies three areas of 400m centred on streets of the highest centrality and sitting in each of the three character areas (Figure 5.4).

- FIGURE 5.4 ABOUT HERE -

The three case studies are 400x400m areas centred on highly central streets in the three characters areas: Old Town (1), Italian Quarter (2) and Garden City (3).

The classification of street centrality in the three cases is reduced to only three classes (Figure 5.5): highly central streets, named 'Main Streets'; streets of medium centrality, named 'Connectors'; and finally streets of low centrality, named 'Cul-de-sacs'.

- FIGURE 5.5 ABOUT HERE -

Street centrality in the three case studies (left: Old Town, middle: Italian Quarter and right: Garden City) according to the simplified classification of centrality: Main Streets in red; Connectors in green; and Cul-de-sacs in blue.

IV

Streets and Street Centrality

On the basis of the classification of streets in Main Streets, Connectors and Cul-de-sacs, the total length of the street fronts per type is then calculated in the three case studies, revealing profound differences between them (Table 5.1):

Neighbourhood	Main Streets	Connecting Streets	Cul-de-sacs	Total Street Length
The Old Town	5,326m	3,146m	3,356m	11,828m
	45.0%	26.6%	28.4%	100%
The Italian Quarter	5,387m	2,209m	344m	7,940m
	67.8%	27.8%	4.4%	100%
The Garden City	2,858m	3,798m	5 m	6,709m
	42.6%	56.6%	0.8%	100%

Table 5.1: Old Town, Italian Quarter and Garden City: overall street front length according to the street type.

First, we find almost twice as much streets in Old Town as in Garden City (with Italian Quarter roughly in between) in the same land area of 400x400m. This difference in the urban model is taken into account in the following.

Second, notwithstanding the relative difference in the total amount of streets, Old Town and Italian Quarter exhibit in absolute numbers a very similar amount of Main Streets, with indeed Italian Quarter having slightly more, but whilst the Italian Quarter has many fewer streets than the Old Town, a much larger rate of them is highly central.

Old Town has by far the most Cul-de-sacs, however these account for just more than one quarter of the total amount of street fronts available. Notably, whilst the traditional Islamic fabric of Old Town presents a high proportion of cul-de-sacs, these do not come at the expenses of main streets, which remain proportionally its backbone and come at the expenses of Connectors, not Main Streets. Conversely, Garden City is the only case where Main Streets do not represent the largest share in the network, a position that is taken over by Connectors.

We can see here that Garden City has a structure of street centrality that is opposite to that of Old Town and Italian Quarter: while the former is dominated by Connectors, the latter are both driven by Main Streets. This is a profound difference in the way the inner structure of the two urban models work, which clearly sets apart the post-war Garden City from the other two studied areas.

Street Front Quality

Street Front Quality is measured on the street fronts of all streets included in the three 400x400m cases (Figure 5.6a, b and c).

- FIGURE 5.6a ABOUT HERE -
Old Town: Street Front Quality map.

Table 5.2 shows that the Italian Quarter follows a similar pattern to the Old Town: the more a street is central the more it is likely to be of 'good' overall quality. However, because the total length of street fronts also follows the same pattern, percentages do not tell the real

story: of the total 'good' (red+orange) *quality* amount on all street fronts, more than 65% comes from Main Streets, with just about 8% from Cul-de-sacs (Figure 5.6a). On the other hand, the relative share of quality amount produced in the 'average' category of quality follows the same pattern of the 'poor', but much less sharply.

- FIGURE 5.6b ABOUT HERE -
Italian Quarter: Street Front Quality map.

Similar to the Old Town, the positive correspondence between street centrality and quality amount recurs in the Italian Quarter too, reinforced by the high presence of Main Streets (Figure 5.6b). Of these, 88.2% are of 'good' quality Cul-de-sacs sit at the bottom of the scale, but their impact is minimal as there are only four short streets of this type.

- FIGURE 5.6c ABOUT HERE -
Garden City: Street Front Quality map.

Garden City has an interconnected and accessible street network. However, as described above, the street network is mainly designed for vehicular movement and most dwellings are concealed from street view by high walls or fences, even on Main Streets (Figure 5.6c).

As already seen, a peculiar feature of the Garden City is that Main Streets are not the largest part of the whole street network, a position taken up by Connectors. Nevertheless, the pattern of positive correspondence observed in both Old Town and Italian Quarter equally and very clearly emerges in Garden City (Table 5.2). Here, Main Streets contribute more than 66% of the 'good' (red + orange) quality amount.

Across the Garden City's sample area there are no streets of 'attractive' quality, while this category counts for around 20% of the streets in the Old Town and 30% of those in Italian Quarter. From the analysis we can notice that Italian Quarter is dominated by 'good' streets that represent over 60% of the total quality amount, while in Old Town they drop to 40% and in Garden City they go down to 26%. The category of quality that prevails in Garden City is certainly the 'average', which counts for the 63% of the total quality amount. The same drops to 46% in Old Town and to about 30% in Italian Quarter.

In short, results suggest that Garden City is an urban model dominated by streets of medium centrality that consequently does not hold a strong potential to develop a robust and resilient system of non-residential activities (retail, services). This weakness is further confirmed by a surprisingly high share of streets in the middle range of quality; this rather middling urban environment typically serves a monoculture of dwellings that is unlikely to develop into anything different in the future.

In this research we observe the combination of two emerging patterns: a) of the overall street network, Main Streets account for the largest proportion of streets sampled in Old Town and Italian Quarter, but not in Garden City; b) accordingly, 'good' quality street fronts (combining 'Attractive' and Pleasant') are a considerable proportion of all street fronts in both Old Town and Italian Quarter (around 40%), but a minor component of Garden City, which is in fact largely dominated by 'average' quality streets (Figure 5.6d and Table 5.3). This combination, that we name 'street structure divide', appears to reveal a very profound difference in the way cities have grown after WWII, when professional theories of urban design that stem from the decades before the turn of the twentieth century, finally because 'bricks and motor', as described elsewhere in the book in the chapter by Rofé. These theories (the Garden City, the Neighbourhood Unit, and subsequently the Radiant City and the New Towns) have shaped the major processes of urbanisation that took place only after WWII. This major shift is clearly evident in Tripoli in the way Garden City departs in its planning approach from the other two cases, both of which are expressions of a more traditional culture of city building: whilst in the Old City case this is an unplanned tradition that has evolved over centuries, whilst in the Italian Quarter, this is an approach that precedes twentieth century planning theories.

As already seen above, Old Town exhibits by far the longest overall street fronts, compared to Italian Quarter and Garden City, so the Old Town has almost double the street frontage length of Garden City, and over a quarter more than the Italian Quarter. This finding is an interesting contrast to the image of the traditional Islamic urban fabric, which focuses on the presence of blank walls. Blank walls and cul-de-sacs, which are traditionally related with privacy in the realm of the extended family hold an important cultural meaning, are not numerically dominant to any extent either in main streets or connectors. They are the product of an extended network of streets that trickle through to the residential areas of the urban

fabric and leave as much room to main streets as in other urban models, in fact almost twice than the low-rise residential garden city type.

- FIGURE 5.6d ABOUT HERE -

Old Town, Italian Quarter and Garden City: overall quality amount.

Finally, measuring the amount of street front by class of quality in absolute rather than just in relative terms is important in cities, because the quality of the street scene is a finite resource that is directly connected with the environmental potential to support activities of social and economic nature in the local space. Of the three studied cases (Figure 5.7), Old Town holds the highest amount of 'poor' streets (Dull and Unattractive), followed by Italian Quarter and then the Garden City, though coupled with a much higher amount at the other end of the scale The most important finding here is the very low presence of 'good' streets in Garden City, a peculiar feature of this urban model.

The total length of street edges	Attractive	Pleasant	Average	Dull	Unattractive	Total Quality Amount	Average Quality
The Old Town 11,828 m	43277 20.1%	43348 20.1%	99165 46.6%	22257 10.3%	7228 3.4%	215275 100%	18.2
The Italian Quarter 7,940 m	49682 30.6%	50111 30.9%	48364 29.8%	9460 5.8%	4602 2.9%	162219 100%	20.43
The Garden City 6,709 m	0 0%	31301 26.2%	75608 63.4%	10490 8.8%	1896 1.6%	119295 100%	17.78

Table 5.2: Old Town, Italian Quarter and Garden City: quality amount according to street type.

- FIGURE 5.7 ABOUT HERE -

Old Town, Italian Quarter and Garden City: quality amount per class of quality.

Street Life

Due to adverse security conditions in the city of Tripoli at the time of conducting the field survey, Street Life is measured only on a subset of streets, but nevertheless covers all the classes of street centrality available on the ground. Direct observation and counting of

activities was carried out on a total of nine streets each in Old Town and Italian Quarter and seven streets in Garden City.

A striking pattern emerges in Old Town: the more central a street, the more overall human activities take place on it. In addition, within each class of street centrality, the higher the front quality, the more activities were found to take place on it. Walking is the most common activity, which increases (relatively) during off-peak times. There are more people along Main Street and Connectors during peak times than off-peak times. Remarkably, however, Cul-de-sacs reveal an inverse pattern, containing more people during off-peak times than peak times (Tables 5.3 and 5.4).

Optional activities tend to increase with the progression from 'bad' to 'good' street quality, while the contrary applies to necessary activities. This applies throughout the dataset irrespective of the type of activity, the centrality of streets and time of day.

Italian Quarter shows by far a greater amount of street life compared to the other two case studies, especially on Main Streets and Connectors. Like in Old Town, we observe here a pattern of street relevance for understanding the importance of streets in urban life: street life appears to correlate with street centrality on one hand, and on the other, on equally central streets, with street front quality. We name this particular pattern, which applies consistently throughout our cases, the 'street life double rule'. Similarly, walking is the most popular activity, and not too surprisingly street life in general is much higher in peak than in off-peak time. The same pattern noted in Old Town applies to Italian Quarter as well with regards to street life growing in off-peak time; however in Italian Quarter, contrary to Old Town, street life remains relatively low on Cul-de-sacs compared to Main Streets and Connectors.

Optional activities in Italian Quarter tend to follow the same pattern as in Old Town, i.e. they increase in line with the quality of the street. However, there is an exception for sitting in Cul-de-sacs, which in fact follow an opposite pattern that is especially clear in peak time.

The Garden City shows the lowest amount of street life of the three case studies examined in this research: 111 people are detected on Mains Streets in peak time, while the same number is 2,131 in the Italian Quarter and 877 in the Old Town. Remarkably, in the Garden City there is more street life in the off-peak than in the peak time (i.e. the same notion of 'peak time'

gets reversed in Garden City), a unique pattern typical of a purely residential/commuting area (Tables 5.3 and 5.4).

Street Type	Quality	Old Town				Italian Quarter				Garden City				Total			
		Activity	%	%	%	Active	%	%	%	Active	%	%	%	Active .	%	%	%
Main Streets	Good	**877**	28.8	42.0	28.1	**2.131**	24.5	38.5	68.3	**111**	26.1	38.8	3.6	**3.119**	25.7	39.4	100
	Average	**703**	23.1	33.6	25.5	**1.975**	22.7	35.7	71.7	**78**	18.4	27.3	2.8	**2.756**	22.7	34.9	100
	Bad	**510**	16.7	24.4	25.1	**1.426**	16.4	25.8	70.1	**97**	22.8	33.9	4.8	**2.033**	16.7	25.7	100
	Total	**2.090**	68.6	100	26.4	**5.532**	63.7	100	70.0	**286**	67.3	100	3.6	**7.908**	65.0	100	100
Connecting Streets	Good	**342**	11.2	41.7	21.7	**1.177**	13.5	38.3	74.7	**56**	13.2	46.7	3.6	**1.575**	13.0	39.3	100
	Average	**301**	9.9	36.7	21.8	**1.039**	12.0	33.8	75.2	**42**	9.9	35.0	3.0	**1.382**	11.4	34.5	100
	Bad	**178**	5.8	21.7	16.9	**854**	9.8	27.8	81.0	**22**	5.2	18.3	2.1	**1.054**	8.7	26.3	100
	Total	**821**	27.0	100	20.5	**3.070**	35.3	100	76.5	**120**	28.2	100	3.0	**4.011**	33.0	100	100
Cul-de-sacs	Good	**59**	1.9	43.7	60.8	**38**	0.4	44.7	39.2	--	--	--	--	**97**	0.8	40.6	100
	Average	**48**	1.6	35.6	64.9	**26**	0.3	30.6	35.1	--	--	--	--	**74**	0.6	31.0	100
	Bad	**28**	0.9	20.7	41.2	**21**	0.2	24.7	30.9	19	4.5	100	27.9	**68**	0.6	28.5	100
	Total	**135**	4.4	100	56.5	**85**	1.0	100	35.6	19	4.5	100	7.9	**239**	2.0	100	100
Total		**3.046**	100	--	25.1	**8.687**	100	--	71.5	**425**	100	--	3.5	**12.158**	100	100	100

Table 5.3: Old Town, Italian Quarter and Garden City: human activities according to centrality and quality of streets (peak time).

		Old Town			Italian Quarter			Garden City			Total		
		Activity	%	%	Activity	%	%	Activity	%	%	Activity	%	%
Good	Necessary	**501**	39.2	16.4	**1.525**	45.6	17.6	**67**	40.1	15.8	**2.093**	43.7	17.2
	Optional	**129**	10.1	4.2	**725**	21.7	8.3	**39**	23.4	9.2	**893**	18.6	7.3
	Social	**648**	50.7	21.3	**1.096**	32.8	12.6	**61**	36.5	14.4	**1.805**	37.7	14.8
	Total	**1.278**	100	42.0	**3.346**	100	38.5	**167**	100	39.3	**4.791**	100	39.4
Average	Necessary	**458**	43.5	15.0	**1.486**	48.9	17.1	**58**	48.3	13.6	**2.002**	47.5	16.5
	Optional	**96**	9.1	3.2	**615**	20.2	7.1	**24**	20.0	5.6	**735**	17.5	6.0
	Social	**498**	47.3	16.3	**939**	30.9	10.8	**38**	31.7	8.9	**1.475**	35.0	12.1
	Total	**1.052**	100	34.5	**3.040**	100	35.0	**120**	100	28.2	**4.212**	100	34.6
Bad	Necessary	**350**	48.9	11.5	**1.215**	52.8	14.0	**63**	45.7	14.8	**1.628**	51.6	13.4
	Optional	**54**	7.5	1.8	**409**	17.8	4.7	**26**	18.8	6.1	**489**	15.5	4.0
	Social	**312**	43.6	10.2	**677**	29.4	7.8	**49**	35.5	11.5	**1.038**	32.9	8.5
	Total	**716**	100	23.5	**2.301**	100	26.5	**138**	100	32.5	**3.155**	100	25.9
Total		**3.046**	--	100	**8.687**	--	100	**425**	--	100	**12.158**	--	100

Table 5.4: Old Town, Italian Quarter and Garden City: human activities according to type of activity and quality of streets (peak time).

In general, there is clear evidence that the street life double rule applies, though with a minor exception in Main Streets during peak time, where slightly more people are detected on

Comment [LV1]: We have introduced the definition above.

'poor' than on 'good' streets. Walking activities are still prevailing in the Garden City, but the gap between these standing and sitting activities are greatly reduced (Figure 5.6c).

The same pattern observed in the two other case studies applies in Garden City with regards to the optional activities following the quality of the streets and the *necessary* activities following an inverse correspondence with street quality, with a few minor exceptions mainly concentrated in off-peak time.

Whilst further research is required to substantiate if it applies elsewhere, the study has shown a consistent pattern across the three diverse cases: the amount of human activities on the streets increases with the centrality of streets and also with the quality of their frontages. Each of these two aspects been observed and measured in previous studies separately, but we aimed here to provide detailed and comprehensive evidence that suggests these features tend to emerge in combination, across all types of streets, across all types of activities and across the day.

	Good			Average			Bad			Total		
	activity	%	%	activity	%	%	activity	%	%	activity	%	%
Necessary	**2.093**	36.6	43.7	**2.002**	35.0	47.5	**1.628**	28.4	51.6	**5.723**	100	47.1
Optional	**893**	42.2	18.6	**735**	34.7	17.5	**489**	23.1	15.5	**2.117**	100	17.4
Social	**1.805**	41.8	37.7	**1.475**	34.2	35.0	**1.038**	24.0	32.9	**4.318**	100	35.5
Total	**4.791**	39.4	100	**4.212**	34.6	100	**3.155**	25.9	100	**12.158**	100	100

Table 5.5: overall human activities per type of activity and quality of streets (peak time)

In terms of overall human activities (Table 5.5) Italian Quarter clearly stands out as the most 'lively' of the three case studies: more than 70% of all activities concentrate on this case. Old Town takes almost all the rest (25%) and the Garden City only 3.5%. This alone is a very interesting result, which reveals a lot about the different nature and potential for sociability of the three cases. Incidentally, we see that Italian Quarter is also the case with the highest rate of Main Streets, equal to almost the 70% of its street network. This is to say that Italian Quarter is not only provided with an internally interconnected street layout, but also benefits from a central location in the city of Tripoli, which gifts its streets a lot of potential to develop active frontages and, consequently, attractive places for people.

Whatever the reason for its high share of central streets, Italian Quarter case confirms that the more central the streets, the more likely they are to be populated and lively. This is confirmed at the general level, where the figures of the overall distribution of activities in the three cases taken together, are in fact striking (Table 5.5): Main Streets collect 65% of all activities, Connecting Streets 33% and Cul-de-sacs only 2%; in the Old Town alone, this pattern is even sharper.

A second observation (Figure 5.8a, b) suggests that the amount of street life rises with quality of street fronts. Moreover, these percentages are remarkably similar in all three cases.

Finally, while the number of people observed carrying out *necessary* activities decreases with increasing quality, the contrary applies to *optional* and *social* activities. These actually increase with increasing quality. This suggests that the amount of optional and social activities corresponds more closely to the quality of the surrounding environment than *necessary* activities, i.e. those that people undertake under the pressure of need.

An interesting pattern distinguishes Garden City from the other two case studies radically: here we observe more activities in off-peak time than in peak time, quite the opposite than in both Old Town and Italian Quarter. We notice that Garden City also shows the lower amount of activities in general, which sets it far apart from the other two cases, and the lower amount of Main Streets. This clearly confirms the character of the area as a predominantly residential dorm-quarter that gets populated, at a low level, after work hours.

The normal pattern of street life highlighted above (Italian Quarter being the liveliest followed by Old Town and, far behind, Garden City), gets reversed in the Cul-de-sacs of Old Town, which in fact – in off-peak time – are more populated than those of Garden City. This is mainly due to the fact that cul-de-sacs in the traditional built environment are seen as 'private' open spaces 'owned' by surrounding residential units. Especially in off-peak time these spaces become the stage of intense social life, i.e. the 'living room' of their neighbouring units.

- FIGURE 5.8 ABOUT HERE -

Old Town, Italian Quarter and Garden City: human activities and street quality at peak (a) and non-peak (b) time.

V

Discussions regarding the evolution of cities frequently allude to a break in the spatial pattern of cities that dates from the turn of the twentieth century: first, when Garden City ideas started to spread from the UK and second, when European principles of modernism permeated planning ideas in cities around the world. The three areas of Tripoli studied here represent in effect these three shifts in urban design principles, demonstrating how the continuity of built form that existed for centuries was interrupted at these key points in time, represented by the three studied areas, whose differing historical origins are revealed in contrasting physical forms.

This chapter showed how street life corresponded with patterns of streets centrality and street front quality in the three studied areas. The in-depth analysis of these three aspects of streets reveals some interesting patterns that confirm several fundamental assumptions and evidence from previous research mentioned in the opening sections of this piece. This study shows that these assumptions can be applied to the specific cultural and historical context of a Mediterranean Islamic city, and highlights the possibility that there are two patterns of broader importance for urban studies.

Firstly, we observe that while in traditional urban fabrics (Old Town and Italian Quarter) Main Streets are the most common type in the street network and tend to be characterised being of good quality, this is not the case in the modernist fabric of the Garden City. This is, arguably the mark of the historical shift to a profoundly different model of urbanism that intervened after professional theories of urban design took centre stage in the early twentieth century and began to be applied at large scale after WWII. We name this phenomenon 'the street structure divide'.

Secondly, a clear pattern emerges that closely links street life to two aspects of the built fabric: on one hand to the degree of centrality of streets, and on the other to the quality of their building fronts. We name this twofold fundamental link 'the street life double rule'. Social interactions flourish along Main Streets and Connectors, where streets are more accessible and better integrated in the street network. The observations have shown clearly that as centrality increases, city life follows. One might think that this is caused by colonization of western social habits and cultural norms over rapidly disappearing traditional life-styles, but this research suggests the opposite: in Old Town this pattern is in fact even

> **Comment [LV2]:** Why do you need to name it?! Because we feel that this is a phenomenon that needs a 'uniformity' and short denomination to be handled and retained.

> **Comment [LV3]:** Again, why do you need to name this? See above we wrote 'double because street life correlates to two factors (quality + centrality), and it is the combination of both that makes the rule.

sharper, with nearly 70% of street life happening on Main Streets. Moreover, the same pattern links street life with the quality of the street scene. Here again, numbers are very clear: of more than 12,000 people surveyed, 39% were on 'good' streets, 35% on streets of 'average' quality, and 26% on 'poor' streets, with quite the same behaviour emerging across all the three cases.

A third important general pattern emerges according to which *optional* and *social* activities tend to follow the quality of the street fronts, while *necessary* activities follow an inverse behaviour, found in greater numbers as street front quality decrease. This is a confirmation of Jan Gehl's observations [16], where he states that the *good* quality of public spaces is an important factors in settling high levels of *optional* and *social* activities and hold a vital role in improving life in a cities, while an urban environment of poor quality tend to host mostly activities that people need to do there no matter what, and are in this sense compulsory to them. Overall, the traditional Islamic urban fabric appears to share a common structure with the traditional western model; both are heavily based on highly central and densely social Main Streets, with a culturally specific Cul-de-sac structure emerging only at the scale of the residential 'sanctuary area'[42]. Data shows, in this respect, that this traditional model is still capable of supporting the life of contemporary communities: Cul-de-sacs in the traditional Old Town do not only have better quality than those in Italian Quarter, but they also have a better social life.

It is important to highlight that all patterns linking street life with street centrality and street quality revealed in this research are subject to the limitations of the study. First of all, they are typical of three 400x400m areas in the city centre of Tripoli, so they represent a tiny fraction of the capital of Libya; secondly, as extensive as this database is, it leaves behind a number of important factors of demographic, social, environmental, economic and historical nature in general, that certainly should be taken into account when looking at causes and motivations behind our observations. Caution must therefore be exerted before drawing more general conclusions from the local patterns highlighted in this research. That applies first and foremost to the two general patterns we have found in this study. Whether they are general rules of urbanization as a cultural human product is only a suggestion, which we leave to further research to either confirm or disprove.

In addition to the urban design properties of the three sample areas, it is possible to draw conclusions about their characteristics of centrality in broader terms. We have shown how the two more traditionally laid out districts had much higher proportions of streets with high centrality. The results confirmed other studies that have suggested that higher centrality goes hand in hand with greater movement flows and activity levels. It is interesting though to also consider the way in which these three areas have – or have not, in the case of Garden City – adapted to the massive growth of the city of Tripoli around them. Although this study does not account for whether the people observed were local or not, the nature and amount of activities is very clear. Whilst Garden City has retained its original role as a residential quarter of the city, with only marginal non-domestic activity on its boundaries, the other two areas have continued to serve a multifarious role within the city, containing a wide range of activities, especially within streets of good visual quality. This research explores and assesses the three urban structures to re-establish an organic link with the past, not for the sake of nostalgia, but rather in order to direct future developments towards a more careful integration and consideration of that outstanding past. The study seeks certain essential structuring principles that can be revived, adapted and perpetuated, to enhance social life in the contemporary built environment.

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