

QATAR UNIVERSITY

COLLEGE OF ENGINEERING

TRADITIONAL MARKETPLACES IN CONTEXT: A COMPARATIVE STUDY  
OF SOUQ WAQIF IN DOHA, QATAR, AND SOUQ MUTRAH IN MUSCAT, OMAN.

BY

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A Thesis Submitted to  
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## ABSTRACT

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Title: Traditional Arabian Marketplaces in Context: A Comparative Study of Souq Waqif in Doha, Qatar and Souq Mutrah in Muscat, Oman

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This study presents a comparison of form and function for two traditional markets within their metropolitan regions on the Arabian Peninsula: Souq Waqif in Doha, State of Qatar, and Souq Mutrah in Muscat, Sultanate of Oman. Rapid urbanization and globalization characterize both cities over the previous half-century. Doha and Muscat possess strong similarities in terms of historical origin as coastal settlements. A clear contrast is topography. Flat terrain characterizes Doha. Mountainous terrain characterizes Muscat. The study will explore the dynamic relationship between urban morphology, land use, and social function to better understand the nature and impact of urban changes on the use and experience of these souqs as public spaces today. The research applies several representational techniques common to morphological research including space syntax. The findings reveal the complex nature of these souqs as traditional markets. Understanding better their form and function in their urban context is an important first step for enhancing them in the future.

**Keywords: form, function, morphology, souq, use**

## DEDICATION

*To my two loved ones*

*My country Palestine & my grand-mother,*

*Nadia Imseeh*

*For her unconditional faith, love, and advice.*



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## Chapter 1: Introduction

From the ancient Greek agora, Roman forums, and Middle Eastern souqs to contemporary shopping malls, market places have been an important center of trade, commerce, entertainment, and social interaction. The Middle East and North Africa (MENA<sup>1</sup>) region and the Arabian Peninsula<sup>2</sup> have developed over the years with markets as focal points in the physical structure of their cities (**Figure 1**). For instance, the city of Doha in Qatar was founded along Souq Waqif in proximity to the dry river bed, known as *Wadi Musheireb*. With economic prosperity, the city continued to grow around the souq. More than 200 years old, Souq Mutrah in Oman, is another example of such a souq. Both these souqs have a seeming maze of pathways leading in and out of each other with a variety of goods and services attracting different types of users.

With rapid urbanization in the Middle East and especially more recent economic development in the Arabian Peninsula and Gulf Cooperation Council (GCC) countries, people are leaving the old city centers and neglecting the traditional marketplaces. The formal retail sector offers quality products at competitive prices with an effective distribution system and modern payment methods, which has been a significant factor in the decline of these souqs (Al-Maimani, 2013). With the introduction of large-scale supermarkets and shopping malls, socio-economic changes in the formal retail sector were driving forces affecting these souqs due to vigorous competition. These drastic changes have led to the neglect of these souqs, which

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<sup>1</sup> MENA is an acronym for an extensive region stretching east-to-west from Iran to Morocco across the Greater Middle East, which is roughly synonymous with the Arab World. The MENA has no standardized definition. Different organizations define the region as consisting of different territories. The following is a list of commonly included countries: Algeria, Bahrain, Egypt, Iran, Iraq, Palestine, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates (UAE), and Yemen. Other countries sometimes counted as part of MENA include Turkey, Cyprus, Northern Cyprus, Sudan, Mauritania, Somalia, and Chad.

<sup>2</sup> Countries located in the Arabian Peninsula are: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, and Yemen which are often referred to as the Arabian Gulf countries or GCC.

contributed to the decline of Souq Waqif in 2003. It has left Souq Mutrah exposed to gradual deterioration of its physical structures. The phenomena of globalization, rapid urbanization, rising rents in historical centers, and changing shopping habits together have affected these traditional souqs (Haggag, 2004). These circumstances offer a contrast with growing interest in the inherent value of public space in general and the preservation of such traditional areas in Arab cultures. This is reflected in the diverse literature available on topic of public spaces and markets (Gehl, 2010; Kostof, 1992; A. Salama & F. Wiedmann, 2013).

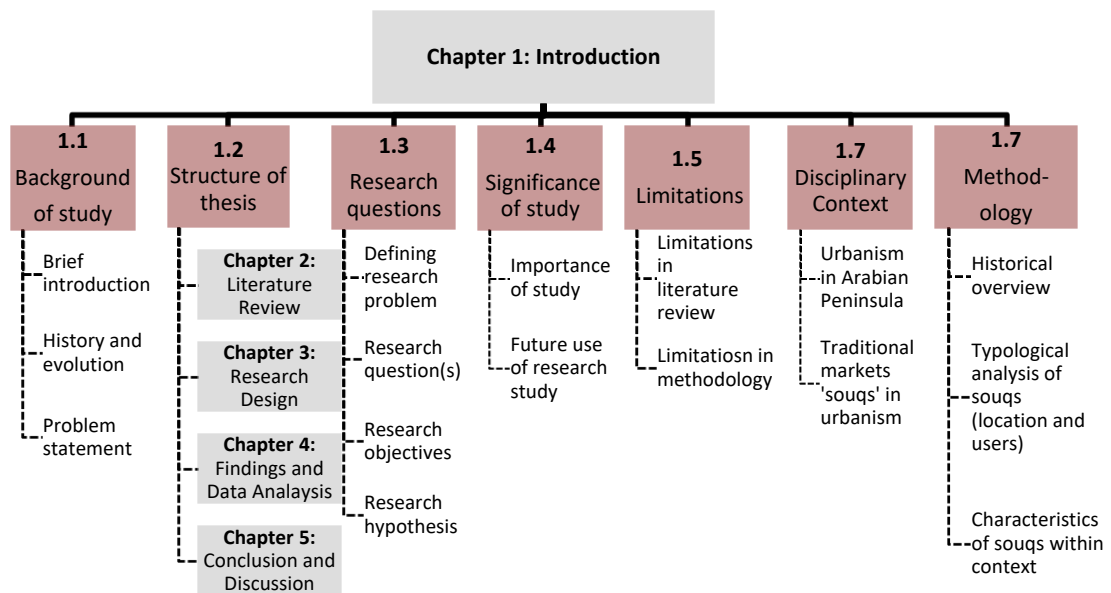


**Figure 1.** Map of the MENA region in grey with the Arabian Peninsula highlighted in yellow. (RCREEE, 2019- edited by author).

This introduction chapter contains seven sections, as summarized in **Figure 2**. The first section introduces the evolution of marketplaces and traditional souqs within the MENA region, focusing on the Arabian Peninsula and GCC countries. The second



section reviews the research problem, raised questions, objectives, and the expected results of the study. The third and fourth sections highlight the significance and limitations of the study. The chapter concludes with an overall description of the disciplinary context, methodology, and concludes with an outline for the structure of the thesis.



**Figure 2.** Summary of the introduction structure (chapter 1) for the thesis.

## 1.1 Background of Study

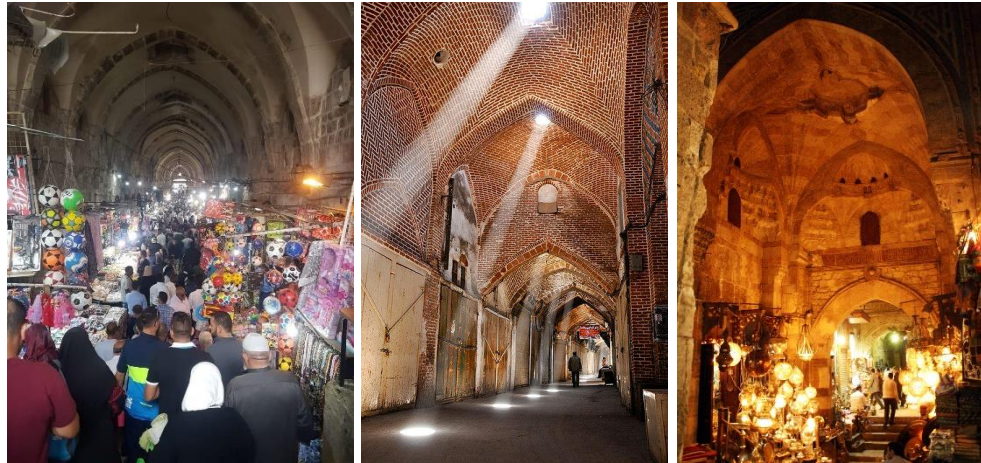
Traditional marketplaces, usually referred to as *souq* "سوق" in Arabic-speaking countries, date back to at least the 6<sup>th</sup> century BCE (Gharipour, 2012). Initially, souqs were placed outside the city walls in the MENA region, but as cities became more populated, souqs shifted to city centers to become important socio-economic and

cultural focal points. The souq can be described as a pedestrian market with arcades, plazas, and numerous shops where people regularly gather to socialize, walk, and purchase and sale of different goods.

In general, a *souq* is an Arabic word that indicates any publicly accessible market place involving commerce, including a street, covered, open, indoor, and temporary markets (such as in a park or schoolyards).<sup>3</sup> Generally, there is no single, agreed definition of the term ‘traditional market.’ The term *souq* goes by many alternatives in different parts of the world. It is mostly used in Arabic-speaking countries of the MENA region. However, in northern Morocco, the Spanish corruption *socco* is often used as well as the equivalent Persian term *bazaar*. The word *bazaar* is also commonly used to indicate a specific part of a larger souq, which is mostly covered, particularly vaulted areas that specializes in selling one kind of goods like the ‘Spice Bazaar’ and the ‘Textile Bazaar’ in Jerusalem, Palestine seen in **Figure 3**.

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<sup>3</sup> Words in the Arabic language tend to be more expansive. We attempt to explain these terms in English, but the thesis will tend to use the Arabic word (e.g., souq)



**Figure 3.** Vaulted bazaars. **(left)** Souq Market, Jerusalem, Palestine, **(middle)** Bazar of Tabriz, Iran ( B. Moghaddam, 2012), and **(right)** Khan Al-Khalili in Egypt (Wikipedia, 2019).

‘Islamic Souqs’ are also used to refer to souqs of the same characteristics and features existing only in Islamic cities and were built or took their final shape during the Islamic rule when religion had a strong influence on many aspects of life (Awad, 1989). Typically, the Friday mosque<sup>4</sup> is considered the heart of the Islamic city (cities that have had Muslim conquests), with the adjacent souq operating as a backbone spine supporting people’s activities. In general, this well-developed institution forms a unique urban design element found primarily in Islamic cities as a feature that distinguishes them from other cities throughout the world. In any case, Lewcock described these souqs as ‘if you have seen one souq, you have seen them all’ as an initial impression (Lewcock, 1978). In a social sense, the main thing is that a souq is a market even though the physical characteristics of that market in different parts of the world will tend to be specific to their settlements.

Within rapidly changing urban environments, these markets have increasingly

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<sup>4</sup> The Friday prayer holds a religious significance as the Qur’an invokes the importance of Friday as a sacred day for worship. People gather and pray together in the main mosque.

become important. Today, the MENA region's souqs are seemingly more diverse than ever before. Some are the main streets of colorful clothes and fabrics, distinctive smells of food and perfumes, artifacts and furniture, casual chatting, and loud greetings, all set within the historical context of the market. Many souqs are ethnically diverse, often given additional character by the identification of specific areas and shops with named ethnic/religious groups and further enhanced by the mixed presence of residents and international tourists like the Christian and Muslim Quarters in Old City of Jerusalem (**Figure 4**). However, some markets appear to have diminished with seemingly little prospect of re-birth due to the pressures of globalization and rapid urbanization. It seems that those markets embracing change and taking on new uses such as restaurants, crafts, and souvenirs are the ones most likely to survive and even thrive, especially by catering to international tourism.



**Figure 4.** Christian Quarter market in Old City Jerusalem, Palestine. (Author, 2019; right: Lutifa Rabbani Foundation, 2018).

The spaces within souqs serve a diverse need for economic exchange, social interactions, and facilitate unexpected encounters and communal life among a wide

range of users of different cultural and socio-economic backgrounds. Social value can be created through a sense of belonging that supports community cohesion and enhances the quality of the space via interaction and random encounters in public space (Gehl, 2010). Because of this, souqs are complex physical and cultural mechanisms in the everyday life of the settlement.

Historically, local economic demand and supply drove traditional markets for the convenience of selling and distributing produce. The effects of globalization, market demand, and the evolutionary process of the socio-cultural characteristics in Middle Eastern societies are significant trends contributing to the transformation of spatial form in traditional souqs.

The Middle East and especially the GCC states have been undergoing a rapid transition from traditional economies and societies to states of modern development, especially over the past half-century. These states have experienced tremendous urban population growth. All GCC countries are on the coast, which explains why they are often referred to as *Al-Khaleej*, meaning ‘gulf’ in Arabic. Oil revenues have dominated the economy in most aspects of their social life since the late 1960s and early 1970s. This high rate of growth has led to a large influx of immigration as well as natural increases due to increasing life expectancy arising from investments in educational facilities, health, and welfare. The accessibility of the old fabric might have been affected by urban expansion to one degree or another.

This study utilizes a morphological analysis of two souqs within the metropolitan region of two capitals of GCC states – Souq Waqif of Doha and Souq Mutrah in Muscat (**Figure 5**) – in an attempt to develop a better understanding about how their characteristics and their morphological relationship to the surrounding urban fabric of the city might have been affected by this expansion.



**Figure 5.** Internal and aerial views of the **(top)** Souq Mutrah in Oman and **(bottom)** Souq Waqif in Doha. (Author,2019; bottom right: P. Jodidio & Halbe, 2015).

## 1.2 Organization and Structure of the study

In this comparative study we will analyze **(Figure 6)**:

- Urbanism in the Arabian Peninsula and specifically the Gulf Region.
- Growth of the capital cities Doha and Muscat.
- Historical background, origins, and evolution of the two case-study souqs
- Morphological characteristics of the two souqs.
- How the two souqs compare as Middle Eastern markets in how they relate to their immediate and metropolitan context.
- Site evaluative assessment and generated data like maps, land use surveys, figure-ground, and many others including space syntax analysis of the urban



spatial network.

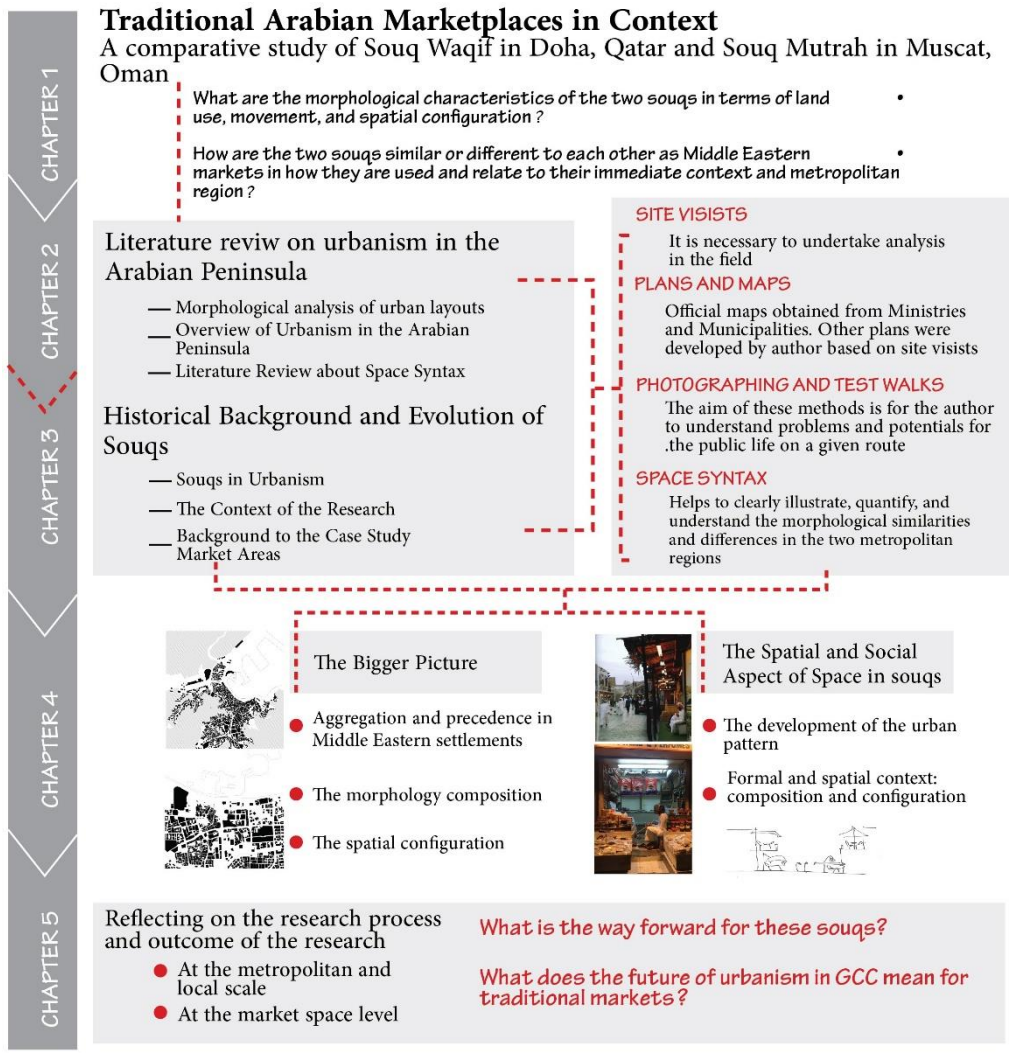
The structure of the thesis is as follows:

**Chapter 2**, “Literature Review,” consists of two sections of literature review:

1) Explores urbanism in the Middle East and specifically the Arabian Peninsula and the use of space syntax in morphological research with specific emphasis on the Middle Eastern region; and, 2) reviews the historical background and general evolution of traditional marketplaces with a particular focus on the urban and physical setting of the two case studies of Souq Waqif and Souq Mutrah within Doha in Qatar, and Mutrah in Muscat, respectively.

**Chapter 3**, “Research Design,” addresses the research methodology and the approach of collecting and analyzing the data in detail. It includes the scope of research focusing on the different strategies used for in-depth analysis of spatial structure and use of the two souqs as well as various methods for collecting data, including site visits, observations, space syntax analysis, photographs, maps, and plans.

**Chapter 4**, “Findings and Data Analysis,” presents the process of aggregation and precedence in Middle Eastern settlements form in giving rise to the formal composition and spatial configuration of Doha and Muscat. It continues with typology analysis to understand the historical development and analyze the formal composition and spatial configuration of the two souqs (Major, Fadli, Tannous, & Mirincheva, 2018; Marshal, 2005).



**Figure 6.** Summary of the organization of the thesis.



### **1.3 Developing Hypothesis and Research Questions**

This thesis explores traditional souqs to better understand the impact of urban changes on their use today. It is a comparative study of souq waqif in Doha and souq Mutrah in Oman. Both souqs have similar origins as coastal settlements and historical center of the city. A major difference is the topographical characteristics which affects these aspects in one way or another. The combination of these factors made them interesting for comparison.

Given the commonalities and differences of the two case-study souqs the conjecture of the thesis is studying how these souqs sit and relate to their larger urban context is necessary to objectively comprehend their use and importance in each city. Moreover, despite these similarities, we argue that general conditions on the ground led each city to pursue different spatial strategies during urban growth.

With the continuous change of everyday life, purpose, character, and operation for these traditional markets, this thesis will explore the dynamic relationship between market use, morphology, and their socio-economic aspects to better understand the nature and impact of urban changes on the use and experience of these public spaces today. The methods employed in this study sought to compare the degrees of accessibility through the evaluation of streets and the street network in qualitative and quantitative terms. The quantitative analysis is through the construction of the axial maps of the two souqs within their city context using space syntax. This was supported by visual and statistical analysis using space syntax measurements. The research design evaluates the accessibility of the markets in correspondence with aspects of human movement and use. The models of both souqs and their urban/metropolitan regions will be compared and contrasted to demonstrate the morphological and functional relationships of each market to the surrounding urban context.

This work aims to provide a characterization of the souqs and their urban fabric using the streets network as input data. The structural properties of the street network generates several effects such as continuity, separation, centrality, proximity, and connectivity into the pattern of urban space (Hillier, 1999a, 1999b; Hillier et al., 1996; Major, 2018)

The thesis aims to study the growth of the cities in respect of the two souqs in their degree of accessibility to their urban context and the current situation of the two souqs in terms of spatial context, land use, public spaces, and social variables. It also aims to demonstrate the spatial structure of the route network in these souqs within the urban fabric as defined by open spaces and buildings. Buildings shape the street network and urban layout, which structures city space in delineating homogeneous and disparate urban areas. Analyzing the spatial structure of the street network using space syntax can be very useful because it produces spatial data about the socio-economic dynamics of urban morphology and enriches our standing of cities.

The main questions for this research study are:

- **What are the morphological characteristics of the two souqs in terms of land use, movement, and spatial configuration?**
- **How are the two souqs similar or different to each other as Middle Eastern markets in how they are used and relate to their immediate context and metropolitan region?**

The research investigates the historical development of these traditional markets in Doha and Muscat, their urban public environment, and the current situation of these marketplaces in terms of the urban context and use to answer these questions.

The goals of the research are:

- To understand both souqs as urban places beyond mere differences of architectural style. In this sense, a key goal of this research is to better understand how these markets fit and operate within their urban context at various scales from the immediate surroundings to the entire metropolitan region. This requires a better understanding of the urban spatial network in metropolitan Doha and Muscat as a whole.
- To understand the urban environment of Souq Waqif and Souq Mutrah as vital public places in the history, function, and evolution of Doha and Muscat, respectively.

Although Souq Waqif and Souq Mutrah might appear very similar, they are quite different in their evolutionary transformation over the years in several ways. The morphological characteristics of both souqs play a fundamental role in their historical development and contemporary nature as distinctive social-economic and cultural places in each city.

#### **1.4 Significance of Study**

Many souqs are experiencing a decline in several Arab cities as urban commercial activities and development shifts to new city centers outside of the older areas in such cities and, specifically, to indoor shopping malls. This shift creates a threat to traditional souqs, which can lead to negligence and degradation. This makes it important that these souqs are better understood to effectively evaluate their future status.

This study will be specifically useful to the municipalities of Doha and Muscat

and, generally, to other marketplaces in cities with similar urban features in the Arab world. The findings of the study can be used as guidelines for recommendations to aid in the overall development of cities and improvement in the quality of the urban environment for these traditional souqs and their immediate surroundings. It can also serve as a reference point for designers and developers involved in commercial projects in similar areas of the GCC and larger Middle Eastern region.

### **1.5 Limitations of Study**

Time and resources have limited the scope of the research in this thesis. Multiple methods of observation were undertaken within a limited time to compare the two souqs under similar circumstances. The limitation includes time constraints, lack of resources, map accuracy, and restraints associated with qualitative observations. The limitations of the study will be more fully explained in Chapter 3.

### **1.6 The Disciplinary Context**

This study is multidisciplinary, incorporating different fields, including urban studies, architecture, history, and other integrated social sciences. However, this research is specific in its disciplinary context with issues related to the built environment and urbanism within the MENA region and especially GCC countries and traditional markets.

As souqs developed over a long time with an essential role in urban history, the next chapter (chapter 2: Literature Review) offers a brief historical review of the development and evolution of souqs. It is also essential to understand and analyze the main characteristics of Arabian souqs, in general, to be able to assess the two case

study souqs in this research study. This importance is due to the following:

- (1) The lack of detailed historical maps and written information about the studied souqs.
- (2) Souq Waqif and Souq Mutrah are relatively small compared to other large souqs in Middle Eastern, GCC countries, and neighboring cities.
- (3) Many changes took place in Souq Waqif in terms of the urban fabric and building footprint throughout time, e.g., changes caused by fire damage, renovation, and parking spaces.
- (4) Many previous research and studies have been done on Arabian and Persian souqs in countries like Jerusalem, Syria, Bahrain, Iran, and other Middle Eastern and neighboring Islamic cities. The study draws on this previous research to provide a context about the current state of knowledge for this study.

Understanding these souqs will allow for more in-depth knowledge and analysis of marketplaces, which can help to establish urban design guidelines and successfully contribute to the long-term vitality of these traditional places in Middle Eastern settlements. This includes location, socio-economic aspects, spatial and functional activities, architectural characters, and significant components of these souqs.

## **1.7 Methodology of Study**

The methodology aims to identify key concepts and themes that would be useful for understanding these souqs, the nature of the users, and the way the souqs are currently operating within their immediate context and metropolitan region (**Table 1**). The holistic approach to the literature review is an interdisciplinary perspective to

explore the multi-dimensional aspects of the evolution of souqs, social experience, the public spaces, and their characteristics. Historical overview of the development of the two souqs aims to examine how the traditional market evolved and who they have served over time. This overview provides a sense of these souqs' significance in the life of the city.

The methodology for studying the souqs does not only review the written literature review but also offers qualitative descriptions of available historical photographs. This photographic evidence was utilized to help pull together the story of the souqs. The thesis controls for axial size (i.e., number of streets represented as axial lines) in the space syntax modeling of the metropolitan regions for the sake of comparability based on previous methodology (Major, 2015, 2018). The study argues that this led to distinct strategies for spatial structure in resolving the paradox of Hillier's principles of centrality and linearity during urban growth, which is explained in more detail as historical evolution is complemented with reconstruction of the growth and development processes of both the cities and their market. Space syntax helps to better understand these morphological differences and address a gap in our knowledge about Arabian cities.

**Table 1.** Author’s summary of the research design.

Research strategy	Expected results
<b>Historical overview</b>	<ul style="list-style-type: none"> <li>• Souqs are evolving and responding to changing user preferences.</li> <li>• Souqs face challenges such as new retails trends</li> </ul>
<b>Typological analysis of souqs (locations, types of products, users, and time of operation)</b>	<ul style="list-style-type: none"> <li>• Both souqs have many similar characteristics of place (in terms of climate and culture) types of products, users, and time of service but also some key differences,</li> </ul>
<b>Souq’s context and geographical understanding.</b>	<ul style="list-style-type: none"> <li>• Both souqs are flat; however, the city of Muscat is mountainous, whereas Doha is flat, and this had a substantial impact on their eventual evolution as urban places.</li> </ul>

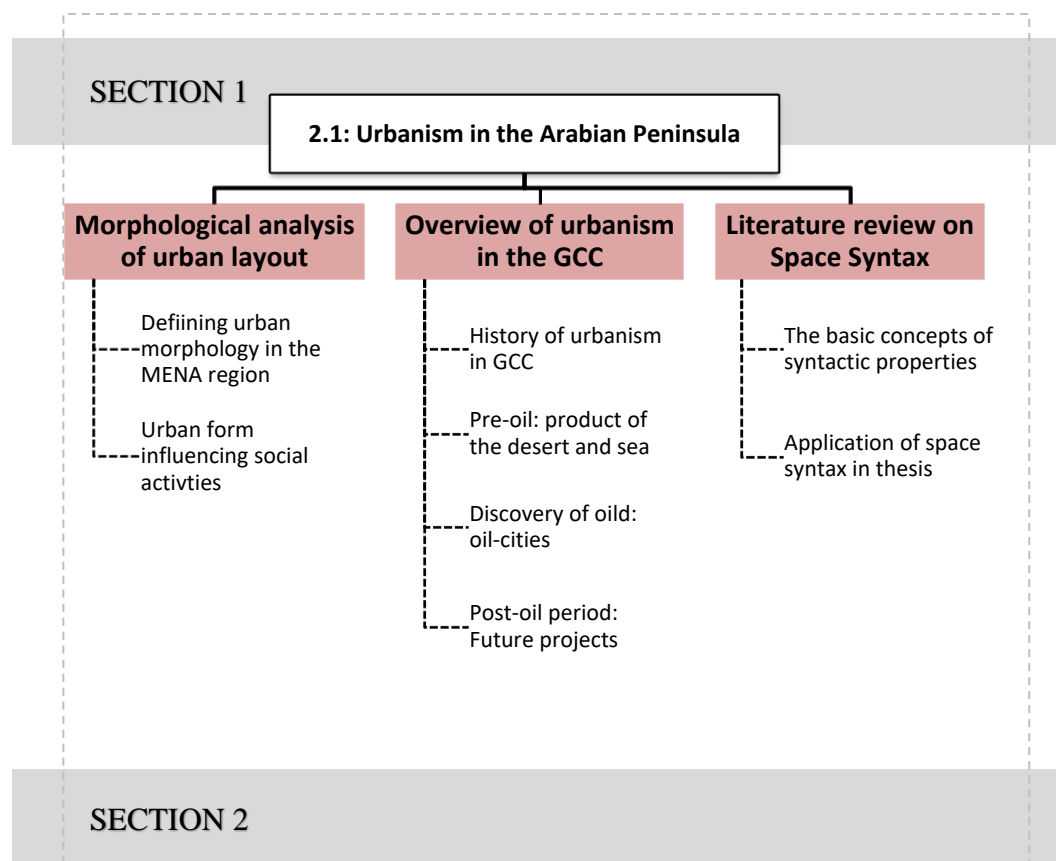
## Chapter 2: Literature review

The literature review of the study continues through the chapter in two sections: (2.1) Urbanism in the Arabian Peninsula and Gulf Region and (2.2) Historical Background and Evolution of Souqs as summarized in **Figure 7**.

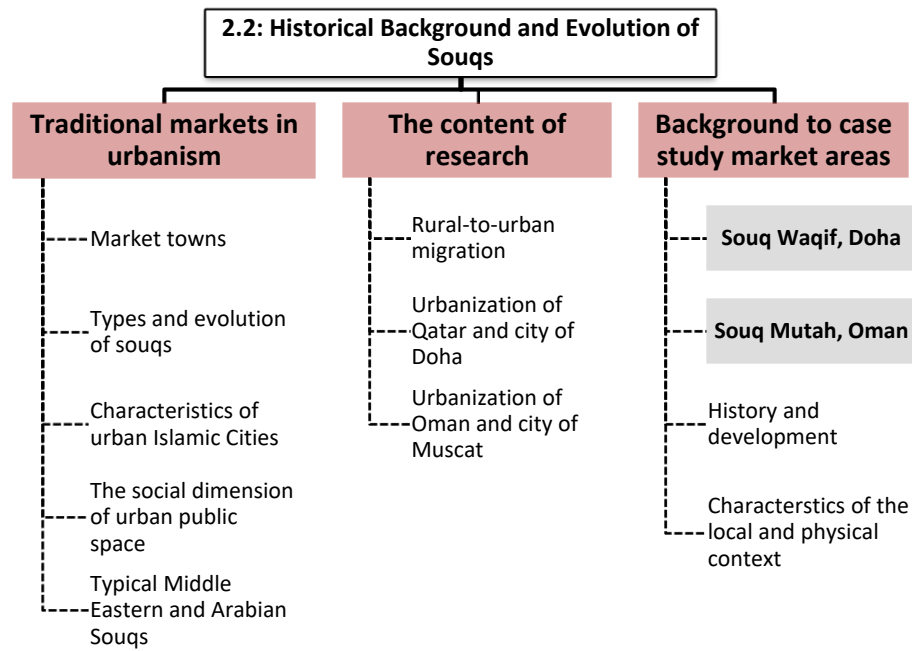
**Section 2.1** consists of three main parts. The first part provides a morphological analysis of the urban layouts. The second part offers a general overview of the development and urbanism in the Arabian Peninsula and the Gulf region specific to the three main phases that manifest the overall urban growth of its cities; The pre-oil settlements as a product of a simpler economy and tribal traditions, the current situation arising from the discovery and production of oil and natural gas, and the future visions and frameworks that characterize the post oil-city. The third and final part offers a general view of the application of space syntax as a part of the

methodology adopted in this study.

**Section 2.2** consists of three main parts. The first part touches on the traditional markets in urban settlements with emphasis on the Middle East and the Arabian Peninsula. The second part focuses on the context of the research and cities of the two chosen markets in this thesis: Doha in the State of Qatar and the city of Muscat in the Sultanate of Oman. The final part continues to trace the original nature and successive transformations of the souqs by identifying historical, architectural, and urban aspects incorporated in the current physical form of the two case study souqs.







**Figure 7.** Summary of the structure of the literature review of the study.

## 2.1 Urbanism in the Arabian Peninsula

The MENA region constitutes approximately 381 million people across nearly 8.9 million square kilometers or 6% of the total population and land area in the world (Source: World Bank). It has approximately 57% of the world reserves for petroleum, and 41% of natural gas, mostly concentrated in the Gulf States in the Arabian Peninsula (Source: US Department of Energy). This makes the region a vital source of global stability as well as rapid urbanization and globalization over the last half-century.

Covering about 3.2 million km<sup>2</sup>, the Arabian Peninsula consists of six countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) (**Figure 8**). The Red Sea binds it to the west and southwest, the Persian Gulf

to the northwest, the Levant<sup>5</sup> to the north, and the Indian Ocean to the southwest. Geographically, the terrain of the Arabian Peninsula consists of a large central plateau, a variety of desert, coastlands, and beaches, lush oasis, and stretches of mountains. A large variety of geographic variance distinguishes the region, ranging from the central plateau to the stony desert in the north, sand dunes to the east, and the coastlands that are resplendent with coral reefs in the Red Seas. With the discovery of oil and natural gas in the 1960s and 1970s, the Arabian Peninsula has been undergoing transitions from the traditional economies and societies to states of modern development over the past half-century.



**Figure 8.** A map showing GCC countries (VectorStock, 2019 – edited by author).

These states have experienced sizeable urban population growth, demographic changes, infrastructure development, and widespread changes to the built

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<sup>5</sup> Levant is a term referring to a large area in the Eastern Mediterranean, primarily in Western Asia. The countries included changed overtime. Countries of the Levant in 20<sup>th</sup> century used are Cyprus, Jordan, Lebanon, Palestine, and Syria.

environment. The newly-formed nation-state, land speculation, and political/economic competition for the regional leadership were potent instruments in dictating the rapid urbanization of this spectacular urban growth (Benkari, 2017). The literature review addresses the different aspects and pace of urbanization in the GCC countries. This chapter aims to analyze the contextual background of the urbanism in the Arabian Peninsula while focusing on the two countries chosen as a case study for this thesis: The State of Qatar and Sultanate of Oman

### **2.1.1 Morphological analysis of urban layouts**

Urban morphology is the study of urban form focusing on the formation and transformation of physical cities over time, their spatial patterns at different scales, and the physical characteristics that inform appropriate urban interventions to promote sustainable urban development (F. Chen, 2014). It is one of the essential physical descriptions of human settlements and the process of their formation and transformation over time (Ahmadi, Chi Ani, Farkisch, & Surat, 2012). It studies components of the urban tissue that defines specific elements such as streets, squares, and other public spaces. Morphological studies seek to understand the shape, form, arrangement, spatial structure, and character of settlements by identifying the patterns of its components and the process of its development. It involves analyzing physical and spatial structures at different scales with consideration of land use, building footprint, plot patterns/size, and street networks (Kankol, 2015). The study analyzes the physical form of Doha and Muscat by utilizing multiple cartographic sources showing building footprints and street networks, including historical maps.

#### ***Defining Urban Morphology in Middle Eastern Cities (MENA region)***

Ancient Middle Eastern cities are composed of a multifunctional core,

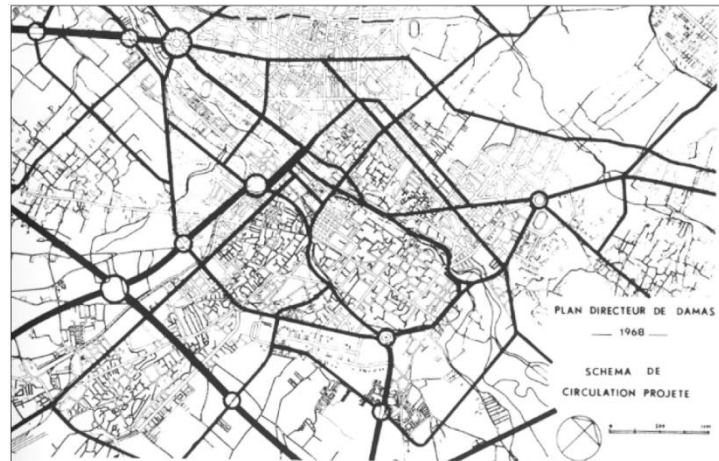
different layers of interconnected souqs, narrow streets, and short courtyard houses with organized surrounding areas that lead to religious, educational, and other civic facilities. The grand mosque often becomes the center structure of the city, surrounded by the souqs that become the primary access to the central complex (Kiet, 2011). Other open spaces are created markets along the entry gates. These cities have been labeled as inward cities because they often seem closed and private (Lynch, 1960). The tree-shaped network starts with the main paths that often lead to smaller local streets, then narrow impasses (blind alley) and, finally, to the private entrances of dwellings. This street network is surrounded by shops, gardens, and residential units. A network of narrow winding pathways consisting of public, private, and semi-private streets, which connect the neighborhood centers to the central place (Ahmadi, Chi-Ani, Farkisch, & Surat, 2012). The old town of Nablus in Palestine – and especially the Qaisariya quarter in **Figure 9** – provides a typical example of an Arabic-Islamic city in its urban morphology and built environment.



**Figure 9.** (left) Plan of Nablus' old town in Palestine; (right) Plan of Qaisariya quarter in Nablus, Palestine, showing the *hosh* system. (Correia & Taher, 2015).

While the cross-axis (*cardo* and *decumanus*) from the Roman street layout remains as the main structure for public circulation within the quarter, connecting it to the rest of the old town, each fourth sector was characterized by a dead-end *hosh* (حوش) or cul-de-sac courtyard to establish another degree of urban distribution. Catering private houses, *hosh* act as their extensions or semi-private lanes, shared by neighbors whose houses are accessible only by the very same cul-de-sac. In terms of urban design, the result seems confusing to external eyes, but order prevails within this configuration (Correia & Taher, 2015; Major, Tannous, & Mirincheva, 2019) . From the household to the *hosh* alley, from the alley to a quarter's public canal, and along the canal to the main commercial artery. These cities possess various degrees of access and privacy from the private to the semi-private/semi-public to the public.

With industrialization in the 19<sup>th</sup> century followed by the Modern Movement, many older Arab capitals as Damascus, Cairo, and Baghdad established new 'western' style municipalities that contributed in urban transformation. For example, in the 1968 Master Plan for the city of Damascus in Syria (Kiet, 2011). Another significant transformation of an Islamic City occurred in Cairo based on the adaptation of the French model influenced by the schemes of Haussmann after a visit to Paris in 1967 for the World Fair (Lapidus, 1969) (**Figure 10**).



**Figure 10.** (top) Master plan of Damascus, Syrian in 1968 influenced by western-style circulation planning (Kiet, 2011). (bottom) Satellite Image of Cairo, 2019 (Google Earth, 2018).

Large-scale urbanization is a relatively recent phenomenon on the Arabian Peninsula compared to the rest of the MENA region and the world in general, even though there is a long record of settlements, perhaps dating back at least 5,000 years in the past (**Table 2** and **3**). Significant changes to the urban fabric of the largest, most-rapidly urbanizing cities on the Arabian Peninsula over the last half-century continue to this day (A. H. Mahmoud & R. H. Omar, 2015; A. M. Salama & F. Wiedmann, 2013; F. Scholz, 2014).

**Table 2.** A table of the oldest, continually-inhabited settlements and largest cities today on the Arabian peninsula with an estimated population based on various sources (compiled by Tannous and Major, 2019).

Settlement	Location	Founded (approximate)	Population (estimated)	Age (years)
Jubail	Saudi Arabia	c. 5000 BCE <sup>1</sup>	+/- 800,000 <sup>2</sup>	+7000
Ras Al Khaimah	U.A.E.	c. 5000 BCE <sup>1</sup> (c. 3000 BCE)	+/- 345,000 <sup>3</sup>	+7000 (+5000) <sup>1</sup>
Tārūt Island	Saudi Arabia	c. 5000 BCE <sup>1</sup>	+/- 78,000 <sup>4</sup>	+7000
Manama	Bahrain	c. 3000 BCE <sup>1</sup>	+/- 0.5 million <sup>5</sup>	+5000
Ma'rib	Yemen	c. 1500 BCE <sup>6</sup>	+/- 300,00 <sup>7</sup>	+3500
Medina	Saudi Arabia	c. 622 BCE <sup>8</sup>	+/- 2.2 million <sup>9</sup>	+2500
Al-'Ula	Saudi Arabia	c. 500 BCE <sup>10</sup>	+/- 32,000 <sup>4</sup>	+2500
Dibba Al-Hisn	U.A.E.	c. 100 BCE <sup>11</sup>	+/- 12,000 <sup>12</sup>	+2000
City	Location	Founded	Population <sup>1</sup>	Age
Jeddah	Saudi Arabia	c. 550 BCE <sup>2</sup>	+/- 4.3	+2500
Muscat	Oman	c. 550 BCE <sup>3</sup>	+/- 1.5	+2500
Mecca	Saudi Arabia	c. 100 CE <sup>4</sup>	+/- 1.7	+1900
Sana'a	Yemen	c. 530 CE <sup>5</sup>	+/- 1.7 <sup>6</sup>	+1480
Doha	Qatar	1681 CE <sup>7</sup>	+/- 2.4	+335
Abu Dhabi	U.A.E.	1793 CE <sup>8</sup>	+/- 2.8	+250
Dubai	U.A.E.	1787 CE <sup>9</sup>	+/- 2.8	+230
Riyadh	Saudi Arabia	1737 CE <sup>10</sup>	+/- 6.9	+270

#### Ancient Arabian Settlements

<sup>1</sup> There is not any reference to these founding dates for Al Jubail in Saudi Arabia, Ras Al Khaimah in the U.A.E., or Tārūt Island in Saudi Arabia. The common reference date appears derived from archaeological evidence in the region of the Dilmun or Telmun people – an ancient Semitic-speaking polity in Arabia recorded from the 3rd millennium BC onwards – who settled along the coast of the Arabian/Persian Gulf specifically with regards to founding of Manama, Bahrain referenced in Al-Nabi, M.N. (2012) *The History of Land Use and Development in Bahrain* Information Affairs Authority; see also see Smith, S (2013) "Bahrain digs unveil one of oldest civilizations". *BBC News*, 21 May 2013. The Government of Ras Al Khaimah references the age of 5,000 years, <https://www.rak.ae/wps/portal/rak/about/ras-al-khaimah/facts>, retrieved 21 September 2019.

<sup>2</sup> 2011, General Statistics Authority, Kingdom of Saudi Arabia.

<sup>3</sup> 2015, *The Government of Ras Al Khaimah*, <https://www.rak.ae/wps/portal/rak/about/ras-al-khaimah/facts>.

<sup>4</sup> 2010, General Statistics Authority, Kingdom of Saudi Arabia.

<sup>5</sup> 2010 Bahrain Census referenced in Ben Hamouche, M. (2008) *Manama: The Metamorphosis of an Arab Gulf City*. New York/London: Routledge.

<sup>6</sup> The approximate founding date of Ma'rib, Yemen, in 1500 BCE derived from [www.historyfiles.co.uk](http://www.historyfiles.co.uk).

<sup>7</sup> 2012, Central Statistical Organization, Republic of Yemen.

<sup>8</sup> The approximate founding date of Medina, Saudi Arabia in 622 BCE, appears derived from Arabian Peninsula, 1000 B.C.–1 A.D." In *Heilbrunn Timeline of Art History*. New York: The Metropolitan Museum of Art, 2000; <http://www.metmuseum.org/toah/ht/?period=04&region=wap> (October 2000) and Makki, M.S. (1982) *Medina, Saudi Arabia: a geographic analysis of the city and region*. Amersham, Bucks: Avebury.

<sup>9</sup> 2016, General Statistics Authority, Kingdom of Saudi Arabia.

<sup>10</sup> "Al 'Ula: Within the Saudi Arabian desert lies a 2,000-year-old ghost town made of stone and mud," *Atlas Obscura*, <https://www.atlasobscura.com/places/al-ula>, retrieved, 21 September 2019. This founding date of Al 'Ula may be derived from the UNESCO World Heritage Al-Hijr Archaeological Site (Madāin Sālih), <https://whc.unesco.org/en/list/1293>; retrieved 21 September 2019.

<sup>11</sup> The approximate founding date for Dibba Al-Hisn derived from Abed, I., Hellyer, P. (2001) *United Arab Emirates: A New Perspective*. Cape Town, South Africa: Trident Press.

<sup>12</sup> 2015, Statistical Offices of the Emirates, United Arab Emirates.

#### Arabian Cities Today

<sup>1</sup> Estimated population extracted from various sources circa 2015-2018 unless otherwise noted including General Statistics Authority, Kingdom of Saudi Arabia; Ministry of Economy, United Arab Emirates; Qatar Planning and Statistics Authority; Sultanate of Oman, National Centre for Statistics and Information.

<sup>2</sup> Ministry of Hajj and Umrah, Kingdom of Saudi Arabia.

<sup>3</sup> The approximate founding of Muscat, Oman, in 550 BCE derived from Rice, M. (1994) *The Archeology of the Arabian Gulf*. New York/London: Routledge.

<sup>4</sup> The founding date of Mecca, Saudi Arabia, derived from the Roman occupation of Hejaz in 106 CE though there are many scholarly disputes about the true origins of the settlement.

<sup>5</sup> The founding date for Sana'a, Yemen derived from a Syriac account of the settlement as *Auzalites* per Chisholm, H, Ed. (1911) "Sana," *Encyclopædia Britannica*. 24 (11th ed.), Cambridge University Press. pp. 125–126.

<sup>6</sup> 2004, Central Statistical Organisation, Republic of Yemen. Online estimates are indicating the population of Sana'a, Yemen, is 3.9 million people today without an indication of a reliable source.

<sup>7</sup> Founding date of 1681 CE derived from Carmelite Convent records refer to the village of Al Bidda (Doha was a village offshoot of nearby Al Bidda) in Billecoq, X.B. (2010) *Le Qatar Et Les Français*. Paris: Collections Relations Internationales & Culture.

<sup>8</sup> Estimated date of *Al Bu Falah* subsection (including Al Nahyan family) of *Bani Yas* Bedouin confederation migration to the island of Abu Dhabi.

<sup>9</sup> Approximate date of construction for the Al Fahidi Fort (Today, the Dubai Museum).

<sup>10</sup> Cybriwsky, R.A. (2013) *Capital Cities around the World: An Encyclopedia of Geography, History, and Culture*. Santa Barbara: CA, USA: ABC-CLIO.

**Table 3.** A table of twenty of the oldest, continually-inhabited cities around the world with an estimated 2015 population greater than 1 million people (Major and Al-Nabet, 2018).

<b>Settlement</b>	<b>Location</b>	<b>Occupation Since</b> <i>(approximate)</i> <sup>1</sup>	<b>Founded</b> <i>(approximate)</i>	<b>Population</b> <i>(millions)</i>	<b>Age</b> <i>(years)</i>
<b>Athens</b>	Greece	c. 10-6th Millennium BCE	5-4 <sup>th</sup> Millennium BCE	+/- 3.7	+6000
<b>Gaziantep<sup>1</sup></b>	Turkey	c. 3650 BCE	c. 3650 BCE	+/- 1.5	+5600
<b>Aleppo<sup>2</sup></b>	Syria	c. 3650 BCE	3650 BCE	+/- 1.8	+5600
<b>Beirut</b>	Lebanon	c. 3000 BCE	3000 BCE	+/- 2.0	+5000
<b>Damascus</b>	Syria	c. 6300 BCE	3000 BCE	+/- 1.7	+5000
<b>Jerusalem</b>	Palestine	c. 5000 BCE	2800 BCE	+/- 1.5	+4800
<b>Varanasi</b>	India	1800 BCE	1800 BCE	+/- 1.2	+3,800
<b>Luoyang</b>	China	c. 1600 BCE	c. 1600 BCE	+/- 1.7	+3,600
<b>Lisbon</b>	Portugal	4500-2000 BCE	c. 1200 BCE	+/- 2.8	+3,200
<b>Beijing</b>	China	23 <sup>rd</sup> Millennium BCE	1045 BCE	+/- 21.5	+3,000
<b>Xi'an</b>	China	c. 4700 - 3,600 BCE	1100 BCE	+/- 12.9	+3,000
<b>Tripoli</b>	Libya	c. 700 BCE	700 BCE	+/- 1.1	+2,700
<b>Rome</b>	Italy	c. 12-8th Millennium BCE	753 BCE	+/- 4.3	+2,700
<b>Istanbul</b>	Turkey	c. 6th Millennium BCE	685 BCE	+/- 14.6	+2,700
<b>Benghazi</b>	Libya	c. 525 BCE	525 BCE	+/- 1.1	+2,500
<b>Peshawar</b>	Pakistan	c. 400 BCE	c. 400 BCE	+/- 4.2	+2,400
<b>Alexandria</b>	Egypt	332 BCE	332 BCE	+/- 4.5	+2,300
<b>Seville</b>	Spain	c. 700 BCE	c. 700 BCE	+/- 1.5	+2,200
<b>Paris</b>	France	c. 4200 BCE	52 BCE	+/- 12.4	+2,000
<b>London</b>	UK	c. 4500 BCE	43 CE	+/- 14	2,000

<sup>1</sup> Not necessarily continuous inhabitation.

<sup>2</sup> There is some debate in the literature about the site of the ancient city (*Antiochia ad Taurum*) associated with these two settlements.



### *About streets*

Settlements in Classical Antiquity realized a wide variety of street types from steep rise, small, and zigzag/curved paths to cul-de-sacs and avenues. Streets are more than mere physical distinctions related to capacity and width in the classification of types according to modern planning methods. Streets embody the social and economic life of settlements (Hillier, 1996). The intention in this section is to focus on some persistent themes about the urban streetscape and their regional variations. Streets are complex civic institutions, culture-specific, and not only a mere traffic channel or void within the city's solid mesh. Arabic cities cultivated the recondite twists and intimate scale of the neighborhood cul-de-sac. Both Doha and Muscat display the traditional Islamic patterns of the residential cul-de-sac and sinuous through-streets, boarded by the walls of courtyard centered houses. Juxtaposed to this delicate net are wide, straight streets and the traffic roundabouts typical of the contemporary settlements.

Streets are used as a public thoroughfare and residential meeting ground, linear market, and vehicular tracks. They require delicate compromises between different functions. It is a balancing act complicated by the advent of the automobile and subsequently rejected by Modernist planners insistent on the separation of land uses and pedestrians from high-speed vehicular routes. Over the last half-century, a new generation of designers have attempted to rescue the street from this extreme segregation by recalling earlier forms, while weighing the scale in favor of pedestrians (Gehl, 2010; J Jacobs, 1961; Speck, 2013; Whyte, 1988).

#### **2.1.2 Overview of urbanism in the Gulf Region**

The Arabian Peninsula is mainly a diverse landscape of hot, humid sandy coasts, arid desert, sparse scrubland, stone-strewn plains, and lush oases, as well as

rocky and sometimes fertile mountain highlands and valleys (Ashraf M. Salama & Florian Wiedmann, 2013). In the 1950s, the northwestern coast of the Arabian Peninsula was mostly a barren wilderness. However, in the last quarter-century, a different landscape has emerged. The region now teems with growing cities, some of which are desirable destinations for companies, academic institutions, and tourists from all over the world. The production of oil and natural gas dominate the region's contemporary economy. This has created extraordinary economic growth, which in turn has led to a momentous surge in intensive infrastructure development and the construction of a new environment (Wippel, Bromber, & Krawietz, 2012).

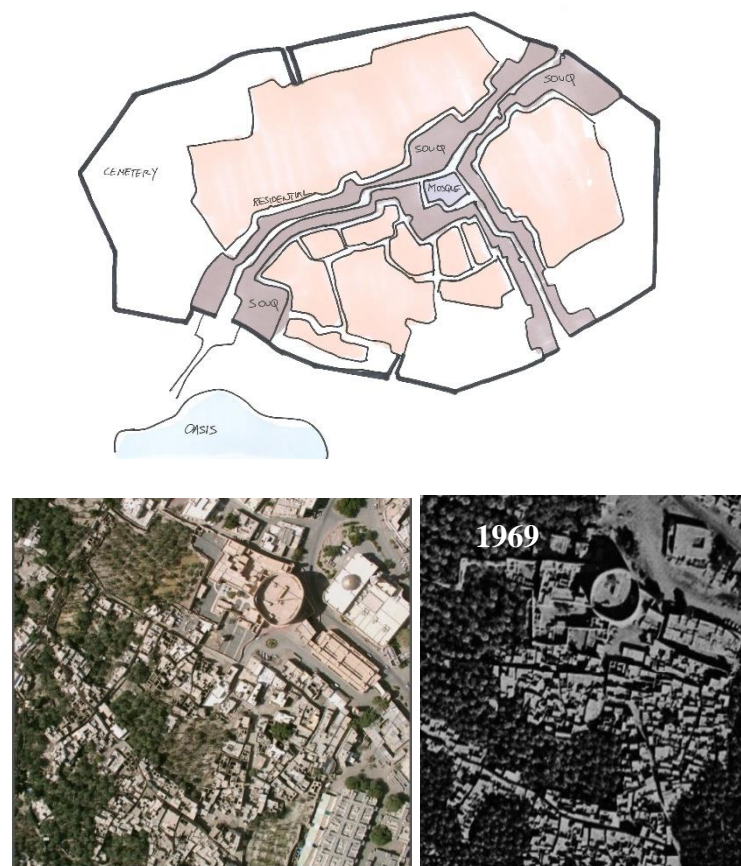
### *Phases of Urbanism in GCC*

The Arabian Peninsula has undergone three significant stages of development that could be summarized in three main periods: pre-oil, oil discovery and rapid growth, and the post-oil period (A. Salama & F. Wiedmann, 2013).

#### *Pre-oil: product of the sea and desert:*

The environmental circumstances and scarcity of water of the Arabian Peninsula have made it one of the least populated regions. Although there were no permanent rivers, the *wadis* or valleys were often a seasonal source of water, originating in the highlands and descending to nearby lowlands due to annual flooding of rainfall. The settlements were constructed of limited available local materials like mud, rock corals, or palm fronds. One example is the construction of wind towers, a traditional and practical Persian architectural feature designed to keep dwellings comfortably cool, introduced by the Persians who migrated to and settled at various harbors along the Gulf coast. The residential settlements were of minimum building height, very private, and gender-segregated as necessities of the Islamic faith. The

Friday mosque is usually the center of these settlements. The size of the Friday mosque was often an indicator of the size of the settlement and population. Besides religious functions, it provides a focal public arena for the community and communal events. Adjacent is the souq, which often extended linearly along a principal street. These settlements were typically placed close to the oasis on land or along the sea coast as shown in **Figure 11**. Coastal cities and settlements characterize all Gulf States. Most of these countries' economy consisted of finishing and pearling or trade along the coast due to their strategic location along the seacoast.



**Figure 11. (top)** A typical structure of an oasis settlement. (Sketch by author based on (A. Salama & F. Wiedmann, 2013); Example of compact arrangement of a desert vernacular architecture near Nizwa, Oman (Edition esefeld & traub, 2008).

### *Discovery of oil and natural gas: oil cities*

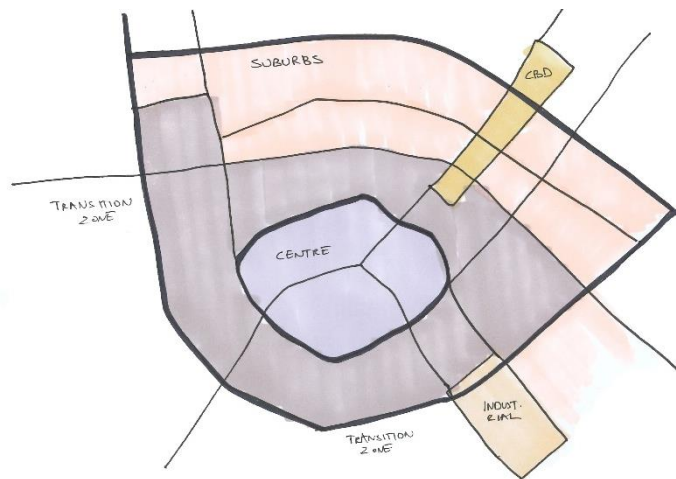
Later in the 1960s and early 1970s, the discovery of oil fields resulted in significant economic, social, and physical changes. Gulf States achieved independence from British governance and established national borders (Davison, 1969). Petroleum revenues led to growing economic prosperity, which fed rapid construction, population growth, and urbanization. The discovery of oil characterized the transformation from small traditional tribal and coastal settlements to wealthy oil-exporting nation-states. This has changed the structure and fabric of these societies within a few decades. The general preference of governments was to focus on the development of their capital cities, which led to an acceleration of urbanization, an influx of expatriate workers, and annual population growth. For example, both the population of capital cities Doha and Dubai grew from a few thousand inhabitants in 1965 to nearly half a million inhabitants in the late 1990s (**Table 4**).

**Table 4.** Population growth of some capital cities of the GCC. (World Population Review- compiled by author)

Capital City	Population Growth		
	1965	1980	1995
Dubai, UAE	43,466	254,361	649,755
<b>Doha, Qatar</b>	66,270	201,279	462,442
Riyadh, Saudi Arabia	155,544	1,054,960	3,034,951
<b>Muscat, Oman</b>	625,009	1,154,377	2,204,277

The population grew in Doha from a few thousand inhabitants in the middle of the 20<sup>th</sup> century to over 340,000 inhabitants in the late 1990s. This led to a change

in the typical morphology of these oil cities. Peripheries and outskirts developments replaced clear boundaries. Industrial areas tend to be placed in the south due to the wind direction. The old city centers were abandoned by the residents and gradually lost their function and attraction as central commercial districts. Generally, these new metropolises consisted of old city centers, contemporary business districts, and suburban outskirts (**Figure 12**).

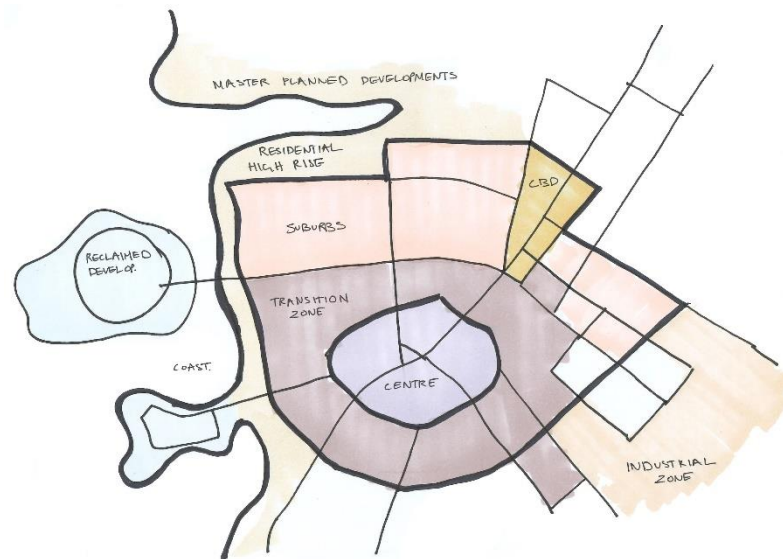


**Figure 12.** A typical structure of an oil city (Drawing by Author after (A. Salama & F. Wiedmann, 2013).

### *Post-oil period: cities within cities*

During the post-oil period, the concern of continuing dependency on and potential decline of oil revenues in the near and far future in some Gulf States led to efforts of diversification for the economy by focusing on sports, education, trading, banking, and tourism (Al-Marri, 2017). Investments in real-estate projects led to the development of human-made islands, suburban districts, and satellite cities within the major cities (A. Salama & F. Wiedmann, 2013) (**Figure 13**). Many of these Gulf

States have created a new city image of high-rise skyscrapers like Sheikh Zayed in Dubai and West Bay in Doha. These changes in the built environment only began at the end of the 20<sup>th</sup> century. Large-scale infrastructural projects (‘mega-projects’) characterize this new urban transformation. The Palm Island in Jumeirah, Amwaj Island in Bahrain, and the Pearl in Qatar are some examples of these large-scale satellite city projects following the trend of developing exclusive, branded properties.



**Figure 13.** (top) Typical structure of a contemporary gulf city (Drawing by Author after (A. Salama & F. Wiedmann, 2013); (left) West Bay in Doha (DWF, 2018) and (right) Sheikh Zayed in Dubai (NAUFAL MQ, 2019).

### **2.1.3 Literature review about Space Syntax**

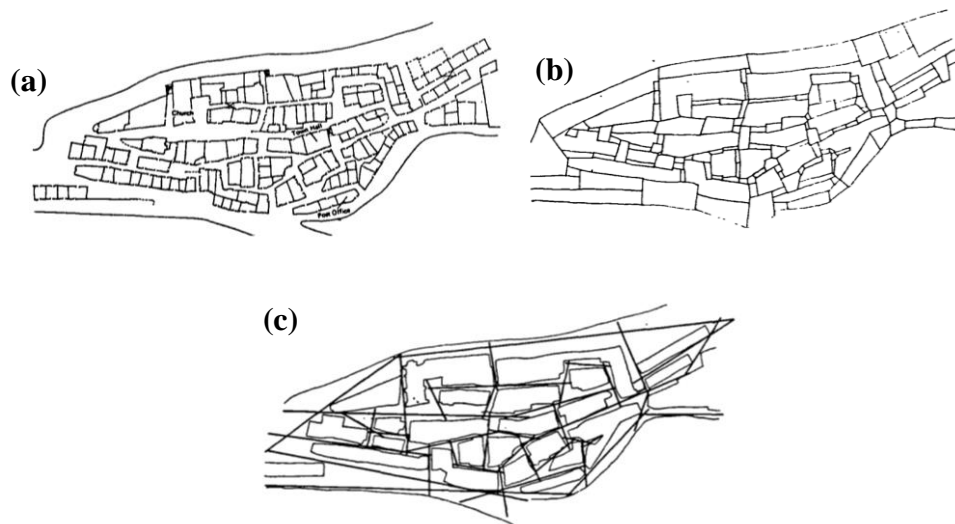
Space syntax is an international research program based on objectively representing the physical characteristics of architectural and urban space and mathematically measuring their relationship using topological graph theory based on network science. Our built environment is both a product of society *and* an influence on society.. Founded in the late 1970s/early 1980s by Bill Hillier, Julienne Hanson, John Peponis, Alan Penn, and several others at University College London, space syntax has developed a set of techniques for the simple representation and mathematical measurement of architectural and urban space over the last 40 years. The international space syntax community composes hundreds of researchers and practitioners in more than 40 countries around the world, especially in Europe, Asia, and North and South America (Major, 2018). The basic representational techniques that are used in space syntax are the axial line (or line of sight), convex space, and visual field. Decades of research have demonstrated the value of the axial map representation in urban space (Hillier, 1996; Hillier & Hanson, 1984; Hillier, Penn, Hanson, Grajewski, & Xu, 1993; Major, 2018; Penn, Hillier, Banister, & Xu, 1998)

Space syntax has done many studies in countries with rapid urbanization processes and characterized them in innovative ways; nevertheless, to complement space syntax with other methodologies can be enriching for the analysis. More general studies of cities in the MENA region tend to focus on the morphological classification of types at the local scale (Ünlü & Baş, 2016, 2017). They tend to lack a metropolitan perspective of cities using network science like space syntax.

#### ***The basic concepts of syntactic properties***

To describe and analyze spatial configuration using space syntax, an axial map

of the open space structure of the urban space is necessary. Firstly, the open spaces are divided into the fewest number of the largest ‘convex spaces.’ A convex space is a space through which no tangent to the boundary can be drawn, which crosses any part of the space. These convex spaces will consist of the least set of fattest ones that cover the whole system of open spaces. For large urban systems such as cities with well-defined streets spaces, it is usually not necessary to draw the convex map before drawing the axial map. You can directly proceed to drawing the axial map based on the open space structure in a plan for the minimum set of lines necessary to cover all the convex spaces as defined by building facades. The procedure for the (a) open space structure, (b) convex space map, and (c) the corresponding axial map is shown graphically in **Figure 14**.



**Figure 14.** The procedure for modeling an axial map (Hillier & Hanson, 1984).



An axial map represents the least set of the longest and fewest straight lines of sight and access that pass through all convex spaces. Once an axial map is obtained, it can be analyzed as a system of relations. Hillier and Hanson (1984) define the relation of all axial lines in the system as measured by two basic properties of “symmetry-asymmetry” and “distributedness-nondistributedness.” What this means is the degree by which urban space is composed of rings of circulation or sequences that form trees. Today’s software can auto-generate axial maps using shapefiles, but there is still great value in researchers drawing the axial map themselves in the computer to learn more about the urban morphology of the settlement or city.

*Depth:*

An essential concept in the quantitative analysis of space syntax is the measure of depth. “Depth exists wherever it is necessary to go through intervening spaces to get from one space to another” (Hillier and Hanson, 1984; 108) It is measured in steps and corresponds to a topological measure of distance in the graph, which differs from a concept of metric distance in Cartesian terms. Over the last decade, space syntax measures have incorporated metric distance based on the averaging to the center of the block of street segments. This type of analysis is not utilized in this thesis to focus on the purely linear structure in terms of lines of sight and access in morphological characteristics of the souqs and cities.

The measure of relativized mean depth is based on simple connectivity, which is the number of spaces directly connected to a single space. “If you can move or see from one location, space, or street to another without accessing an intermediary one, they are connected” (Major, 2018).

### *Connectivity:*

Connectivity is a simple measure of how many other streets does a single street immediately connect to within the network.

### *Global Integration:*

Global integration is the relativized mean depth of a space in relation to all other spaces in a network based on changes of direction. It represents how integrated/shallow or segregated/deep is a space within the urban network. In this sense, global integration represents where you are in relation to everywhere else in that network. According to the theory of natural movement, spaces with higher levels of integration tend to carry higher levels of movement and, hence, a greater potential to access different varieties of land use (Hillier, 1996; Hillier et al., 1993). Globally integrated spaces tend to play a larger role in the urbanity of a city. These spaces are not only more frequently visited as destinations but also more intelligible for carrying through movement where people are on their way daily from somewhere to somewhere else in the city. It is often useful to limit the radius measurement of integration based on the relativized mean depth from the most globally integrated street in the urban spatial network because it reduces – though not necessarily eliminates completely - the ‘edge effect’ of global integration, i.e., spaces at the edges of the urban spatial network tend towards segregation because of their location on the edge. For example, as we will see in chapter 4, for the case of Doha, the longest, straightest section of Salwa Road has a mean depth of 7.5 in the 2018 metropolitan network. On average, this means that it takes a little over seven changes of direction from this section of Salwa Road to reach everywhere else in Doha so the radius can be set to 8. Integration shows the pattern of ‘to-movement’ in the sense of those streets

that are most likely to be utilized for segments of journeys from anywhere to almost everywhere else in the urban network.

*Local Integration:*

Local integration measures relativized mean depth up to three (3) changes of direction away from an origin space. It is a more immediate measure of the local catchment area of a single space within the network.

*Global Choice:*

Global choice is a measurement of ‘through-movement’ based on giving every street in the urban spatial network represented as an axial line a value of 1, then proportionally sharing that value amongst all its immediate connections. The shared values for every street are then added up to provide a measurement for the degree of importance of that street within the urban spatial network. Global choice tends to highlight the primary routes within the entire urban spatial network. For example, as we shall see in chapter 4, global choice highlights the successive series of orbital ring roads and radial routes from the oldest areas of Doha out to its metropolitan edges. In Muscat, it highlights the major east-west routes and secondary north-south cross-connections between them due to the more linear nature of urban growth in that city over time.

The thesis utilizes these space syntax measurements in its analysis.

*Application of Space Syntax in this thesis*

Researchers and practitioners extensively utilize space syntax to better understand the urban morphology of cities around the world over the last three

decades especially in Europe, the United States, and, most recently, China (Akbar, 1998; Carvalho & Penn, 2004; X. Chen, 2017; Hillier, 1996; Major, 2018). At the same time, there have been many morphological studies using space syntax about the growth and development of individual neighborhoods, settlements, and specific parts of the Middle East North Africa (MENA) region.

Some past morphological studies of the MENA region using space syntax include, but is not necessarily limited to: academic studies of Istanbul and Izmir in Turkey, Cairo in Egypt; the Doha District of Dammam in Saudi Arabia; heritage neighborhoods of Sharjah in Dubai of the United Arab Emirates (U.A.E.) and Sur Lawatyia (e.g., walled city of Lawatyia) in the Mutrah area of Muscat in the Sultanate of Oman; measuring walkability in the urban form of central Tripoli, Libya; several historical/modern neighborhoods and parks in Doha in the State of Qatar; and several settlements in Iran (Abubakar & Aina, 2006; Can & Heath, 2016; Carvalho & Penn, 2004; Ferwati, 2010, 2012; Karimi, 1998; Kubat, Rab, Güney, Özer, & Kaya, 2012; Major et al., 2019; Mohamed, Nes, Salheen, & Khalifa, 2014; Remali & Porta, 2017; Tannous, Major, & Furlan, 2019); and, commercial studies of settlements like Jeddah in Saudi Arabia by Space Syntax Limited (Source: [www.spacesyntax.com](http://www.spacesyntax.com)). Nonetheless, despite this wealth of material, there does not appear to have been any attempt to conduct a more systematic comparison of urban morphology in the MENA region, especially settlement form on the Arabian Peninsula. There seem to be a few reasons for this gap in our knowledge. Most space syntax studies of these settlements tend to focus on research questions specific to each case study. This results in a lack of methodological consistency across the case studies. For example, the research question will help to determine the modeling context and, subsequently, the axial size of each case study. They are not modeled for morphological comparison but, most

usually, evaluation of possible interventions in design and planning terms. Major (2015 and 2018) illustrated that controlling for axial size in space syntax modeling can play a profound role in highlighting striking morphological and metric differences in cities across culture and time. Specifically, in comparing the morphology of American and European urban centers more strongly characterized by either deformed or geometric grids and different types of American urban centers more strongly characterized by either orthogonal or offset grids (Major, 2015, 2018).

The purpose of this study is to begin to address this gap in our knowledge by conducting a morphological comparison of two major Arabian metropolitan regions, Doha and Muscat. Both possess the merits of similar historical origins as coastal settlements on the Arabian and Oman Gulf, respectively. In contrast, the comparison is stark due to drastic differences in the topography of both cities primarily characterized by flat and mountainous terrain, respectively. Despite these similarities, we argue that general conditions on the ground led each city to pursue different spatial strategies during urban growth (A. H. Mahmoud & R. H. Omar, 2015; Hillier, 1996; Major, 2018). These different spatial strategies are necessary due to the inherent advantages and disadvantages of topography for urban development (Major, 2018). Space syntax helps to clearly illustrate, quantify, and understand these morphological similarities and differences. It also helps to highlight the complex nature of these souqs as urban spaces.

## **2.2 Historical Background and Evolution of Souqs**

Market places are vital centers of trade, exchange, and social interaction that have existed since ancient times in various forms starting from the agora in Ancient Greece to the modern shopping malls with global brands. At the beginning of

traditional market development, markets conform to the terrain without permanent buildings. Traditional markets, especially the ones in the cities, have been continually growing since the first emergence of the settlements. There are several definitions of the market suggested by experts. Wiryomartono (2000) defines marketplaces as a meeting place for selling and buying (Wiryomartono, 2000). Janssens and Sezer refine them as flexible spatial and temporal organizations that provide vivid and inclusive public spaces (Sezer & Janssens, 2013). The fact there are so many definitions for markets demonstrates how complex they are to define as physical and socio-economic entities.

### **2.2.1 Souqs in urbanism and within the MENA region**

One of the most consistent explanations for the existence of the city has been trade. Several market theories buttressed discussions of urban origins from Pirenne's *faubourg* to Christaller's central place theory and Jane Jacob's *The Economy of Cities* (Jane Jacobs, 1969; Pirenne, 1948). The simplest example of the environment built on trade is the unwalled town that was born or created exclusively for the exchange of goods (Kostof, 1992). Market towns were, by their nature, small: if they prospered and grew, then they also diversified. Their synonyms are *bourg* in France and *Flecken* or *Marktstadt* in Germany.

In the words of Johannes Cramer, the city at the end of the Middle Ages was ordinarily not physically organized by trades; on the contrary, the majority of trades were arbitrarily distributed over the city space. What is more certain is that during the Middle Ages, especially in northern Europe, the functional specialization of districts was connected to guilds. Members tended to live within the precinct of the guildhall. Guildsmen alone could occupy shops; foreigners and others could trade only in the open marketplace. Guilds are a universal feature of the pre-industrial city. We know

them in Babylonia and Assyria, in Greece and Rome, in Tenochtitlan and the early Hindu cities. Some early Islamic dynasties, like the Umayyads and the Abbasids, have built huge souqs and rented them to the different guilds. Their concerns were the maintenance of monopoly over their economic activities. Trade as an aspect of transportation and movement of people and goods (Cooley, 1893). Hillier tends to confirm Cooley's arguments in discussing the foreground network of cities as characterized by major routes and commercial activities and the background network providing access to non-commercial land uses, most usually residential (Hillier & Vaughan, 2007).

### ***Types and Evolution of Souqs***

The souq is the beating heart of many ancient cities from the Near East to North Africa and traditional urban culture in the Middle East, Arab, and Islamic societies (Zein, 2018). The souqs have deep historical and cultural significance with unique architecture and communal functions. Souqs have always accommodated a large number of activities intrinsically linked to the development of urban architecture and a sense of place (Kalan & Oliveira, 2015). It traces back to the evolution of Islamic societies of the past and the growing of the region as commercial centers of trade. The history of the souqs is interwoven with the Arab civilization due to the nature of commerce and trade across Africa, Europe, and the Far East. Key locations including settlements along these trade and exchange routes gave rise to commerce that initiated the first souqs as many of these initial marketplaces were temporary and mobile (Gharipour, 2012). Before the 10<sup>th</sup> century, souqs were mostly identified as *caravanserais* located along the outskirts of the city across the trade routes connecting East to West. Caravanserai was a roadside inn placed on the outskirts of the town where

traveling merchants could rest and recover after their journey, exchange goods, trade with local markets, and meet other merchants. As such, caravanserais developed a cross-fertilization of cultures, ideas, and languages along the length of traveled routes along the Silk Road and found in countries like Turkey, Iran, and Syria (**Figure 15**) (UNESCO, 2015).



**Figure 15.** (left) Zeinodin Caravanserais in Yazd, Iran (Tehran Times, 2018); (right) Khan As'ad Pasha, a caravanserai in the old city in Damascus, Syria (Phillip L. Harvey).

With the Islamic conquests and the expansion of the Muslim Empire and caliphate<sup>6</sup>, souqs moved inward into the city and solidified its place as the backbone that extends into all areas of traditional, urban life (Zein, 2018). Trading expanded among the Arab civilization, transforming their cities into commercial capitals encompassing schools, offices, residential dwellings, mosques, public baths, factories, and retail facilities where the souq became the socio-economic center of these capitals. The importance of souqs lies not only in its economic value but also in the cultural and social value that each market holds for its society. In the narrow alleys, the

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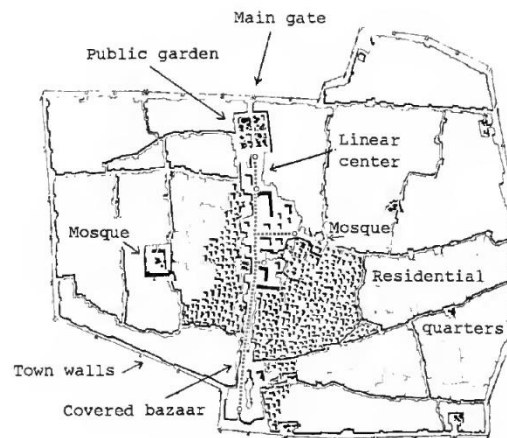
<sup>6</sup> Caliphate is the political-religious state comprising the Muslim community following the death of the Prophet Muhammad (632 CE) to the decline in 1258 CE (Afsaruddin, 2019).



craftsmen's shops highlighted the traditional skills they have acquired over generations in the same manner as guilds in the medieval European city. Traditional market activities were not confined to merely selling products, but also providing the opportunity for social and political interaction.

### *Characteristics of Urban Islamic City:*

Before getting into the historical development of souqs in the MENA region and Arabian Peninsula today, it is necessary to understand the historical concept of the "Islamic city" as the souq is considered one of its dominant features. Roughly speaking, it is possible to construct a picture of a 'typical' Islamic city that one would expect to find such features in terms of physical form and layout shown in **figure 16**.



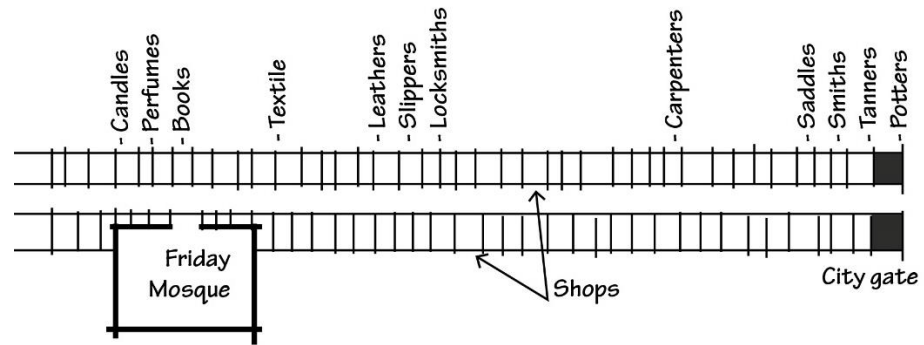
**Figure 16.** Typical traditional 'Islamic City' in Kashan (Hugh & Roberts, 2006).

- The Islamic city was usually small in terms of population, seldom larger than 100,000 inhabitants. (Ahmad, 1995)
- They were typically high in building density (1,300 inhabitants per hectare) (Priyoyudanto, 2014).

- Islamic cities were mostly walled cities with citadels placed on some natural defense work.
- There was often a royal quarter which included the administrative office, located either somewhere the city or within the citadel.
- The center of the city usually included an urban complex where the prayer areas and Friday mosque were found along with schools and the central souq with their *Khans*<sup>7</sup>. The souqs were specialized places assigned for the main groups of traders and artisans **Figure 17**.
- They usually included or possessed adjacent residential quarters. These were generally small quarters or neighborhoods inhabited by a homogenous population with similar occupation, religion, and origin.
- Life within the city was usually oriented towards the center. It is considered the most important part of the city and so easier to protect.
- Mostly a pedestrian city with narrow and winding streets, especially in the residential areas.
- There were many other characteristic features like a major open space referred to as *maydan* or public bathhouses called *hammams* that are still an area of argument between scholars.

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<sup>7</sup> *Khans* or *Qaisariya* in Arabic language are crossroads of commerce and culture along the Silk Roads. They are usually vaulted with a door at one or both short sides that was securely locked at night. It was utilized for the sale of precious objects, especially textiles, or for wholesale trade.



**Figure 17.** A typical arrangement of goods in the souqs according to the observations of Jihad Awad, 1989 (Sketch by author based on (Awad, 1989).

As many Arab cities experienced globalization and rapid urbanization in the late 20<sup>th</sup>/early 21<sup>st</sup> century, many of these characteristics changed or evolved, although some remained, in part, because of these historical physical attributes.

A dual arrangement of *pagus meractorum*<sup>8</sup> was operative in Islamic cities. The town center was the focus of commerce, where the guilds were prevalent. A secondary commercial quarter, known in the Ottoman period as *taht al-Qalaa* (“under-the-citadel”), developed when political or military power became embodied in a fortress at the urban periphery. Makers of arms, transport industries, grain markets, and horse markets mostly occupied the fortress site. However, the classic origin of trade was the linear market area called the souq or bazaar. These traditional markets are organized in clusters of categories of business except for livestock and fresh food (Kostof, 1992). There was a hierarchy to this organization related to the public buildings connected to the souq. Beginning at the mosque, vendors of small leather goods were located along with bookbinders and booksellers; then the general textile and clothing markets,

<sup>8</sup> A native Latin word meaning merchant village/quarters that lay on the river front outside the Roman wall of the city. The Romans use the phrase *pagus meractorum* for marketplaces that were considered meeting paces where trades bring about the existence of a city (Dickinson, 1951; Santosa, 2007).

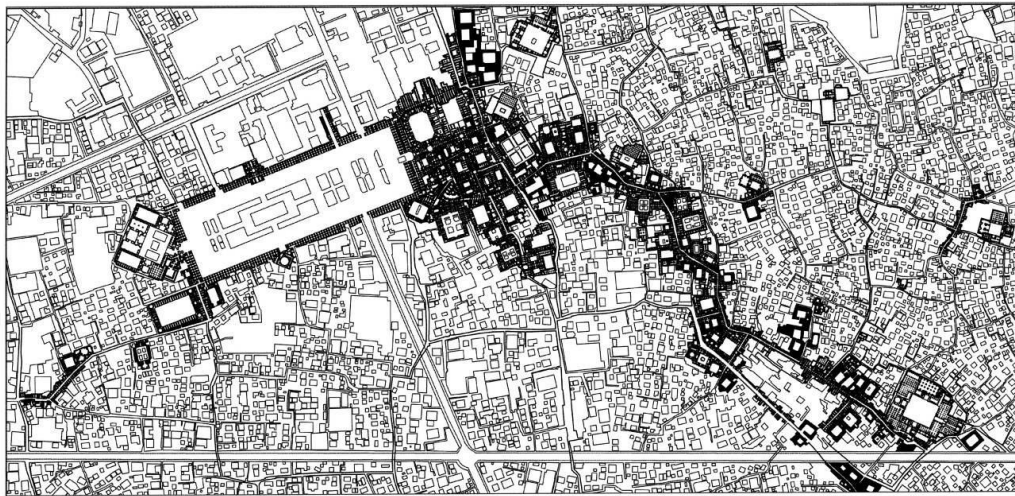
except for silk, fur, and other precious textile sold in a separate and secure building within the markets called *kissariya* or in Turkish, *bedesten* (the western equivalent might be something like London's Burlington Arcade) (**Figure 18**); then came furniture and household goods; finally, close to the city gates, most markets were directly related to long-distance commerce: ironmongers and smiths, and sellers of saddles and bridles, tents, baskets, and other such necessities for the caravan trade. This appears to initially emerge based on self-organization in space amongst the individual souq vendors, though this might be later replicated by regulation of governing authorities.



**Figure 18.** (left) London's Burlington Arcade (Evening Standard, 2014); (right) Bedesten of Kayseri in Turkey (Kayseriden, 2006).

For example, the *bedesten* or covered arcade would be positioned along a main street in Algiers or within a loose business grid of relatively wide, open, and regular streets such as Istanbul. In general, this would include a *saga* (market for currency exchange) situated close to the great mosque. This explains the frequently central location of the Jewish quarter due to their traditional involvement in financial services. Whereas the mile-long souq in Isfahan, Iran follows the ancient trade route leading

south from the old city towards the river where the main circulation spine is lined with shops grouped and positioned according to goods. The main route is domed throughout its lengths; at intervals, arches give access to mosques, storage areas, and bathhouses (**figure 19**).



**Figure 19.** Plan of linear Souq in Isfahan, Iran, connecting the 11-century congregational mosque as the north to the new Maidan-i-Shah district created in the 17<sup>th</sup> century (S-travels, 2019).

Traditional markets in the gulf region follow several of the characteristics of the traditional Islamic city but with slight differences allowing for climate and culture. The traditional settlements were typically on the coast, close to the oasis or other freshwater sources such as aquifers but land that had little agricultural value. They were sometimes protected by a ring of walls that helped protect the settlements from sand storms or outside attacks. The narrow, winding main streets (usually a width to accommodate two passing camels) normally intersected at or near the geometric center of the settlement. These streets are often crooked due to spontaneous, unplanned construction and irregular positioning of private dwellings. These center

cores are usually characterized by an ensemble of a palace, mosque, and a courtyard. Along these roads, the traditional souqs extended linearly with the adjoining roofs of structures providing shade and shelter in the harsher climate.

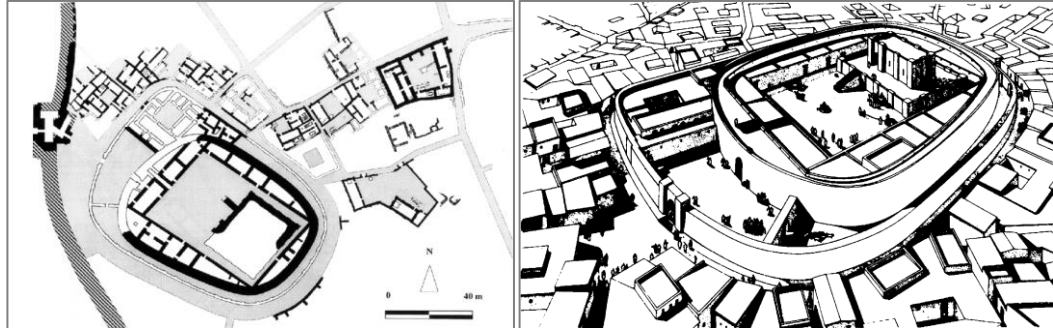
### *The Social Dimension of Urban Public Spaces*

By shaping the built environment, urban planners and designers influence the patterns of human activity and, therefore, social life. There are several land uses that serve as social entities within souqs. Historically, the inclusion of urban gathering-place like squares and courtyards was often the prerogative of religious architecture (Gil-Mastalerczyk, 2016; Zhang & Wei, 2017). The atriums of the early Christian basilica and the *sahn*<sup>9</sup> of the Muslim mosque were large urban courtyards entered through one or more gates and surrounded by covered porticoes. This was also present earlier in the temples of ancient Near East cultures. For example, the courtyard of the Oval Temple at Khafjah in Iraq was the largest open space in the city. The Site of Khafjah contained four mounds of which one extends back as far as the Uruk period and contains the oval temple. It is the temple of the god Sin (**Figure 20**). Other known examples are the Greek agora and Roman forum (Eatonj, 2004). The forums were public squares reserved primarily for religious, political, and social activities. Often, these courtyards would assume non-religious functions. The forum mainly served as a marketplace for day-to-day shopping. In early Islam, the communal treasury had its pavilion in the *sahn*. These courtyards accompanied by mosques became important civic centers of the town as teachers held classes under the arcades, people sat together, judges heard cases, and the town crier read the proclamation. This led to a

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<sup>9</sup> *Sahn* is an Arabic word referring to the courtyards in the Islamic Architecture. Most of the traditional mosques have a large central *sahn* which is surrounded by *riwaq* or arcades on all sides. The *sahn* courtyard is also common in traditional residential dwellings (Al-Mohannadi, 2019). It is equivalent to cloister in European medieval architecture.

well-defined sense of public spaces in Islamic cities.



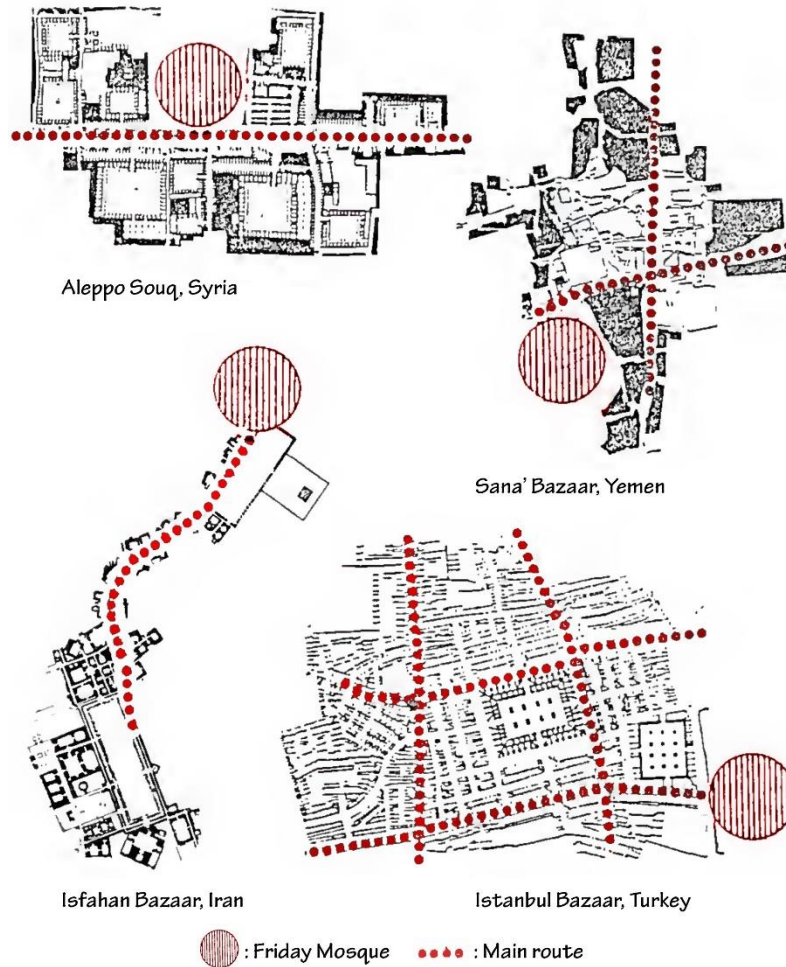
**Figure 20. (left)** Plan of the oldest phase of the Oval Temple, Iraq **(right)** A 3D model of the temple with the surrounding context showing the inner courtyards. (Temples in Iraq).<sup>10</sup>

### *Typical Arabian souqs*

**Location:** Traditional souqs occupy the same location in Islamic cities at the center and adjacent to the Friday mosque<sup>11</sup>. Each quarter had its mosque; however, the Friday mosque is not only the center of religious activities but also the assembly place of all the inhabitants of the city. Within the same principle, the souq was placed in the district of the Friday mosque to be easily accessible as shown in **Figure 21**. Ultimately, the souq's location supported the interaction and unity of secular and religious life in these cities and economically provided the most attractive place for retail, commercial activities on the other.

<sup>10</sup> <https://sowke.us/view/>; Accessed August 15,2019.

<sup>11</sup> In cities of pre-Islamic origin, the relationship of the souq to the Friday mosque was coincidental to the relationship of the classical market street and temple site.



**Figure 21.** The different forms of the souq’s main routes in relation to the Friday mosque in Middle Eastern and Persian markets (Awad, 1989) – edited by author).

**Social and economic aspects:** The users of the souq could be classified into three groups, those coming to shop or passing through the souq on their way to their destination, artisans and shop owners, and foreign traders who come to sell their goods in the souq. This has contributed to the building of *Khans* to accommodate foreign merchants and their goods. *Khans* were likely to be located close to the souq or near city gates.

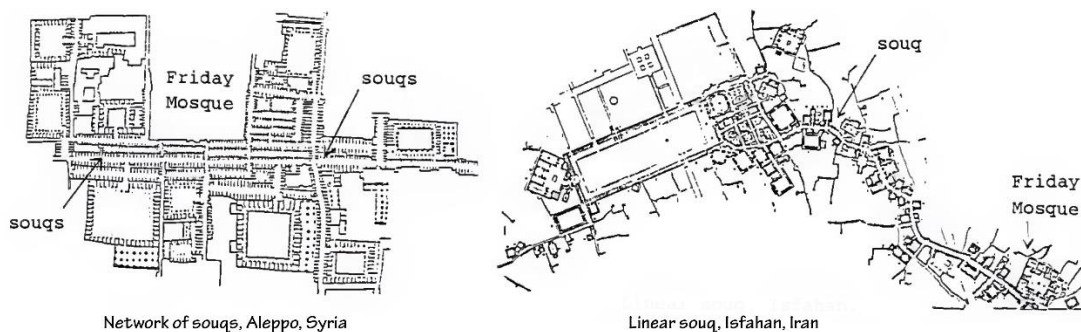
**Spatial and functional activities:** Trades with similar goods were usually clustered in the same area of the souq. Some souqs have specialized areas within the



souqs like the ancient cities of Baghdad and Samarra in Iraq. The order in which each occupation took its place in the souq was substantially similar in early Muslim towns as explained earlier. This grouping system allowed the shoppers to inspect the quality of the goods displayed within a limited area with little effort. It also made it easier for the *muhtasib* to control the quality of the goods and collect taxes.

**Architectural characteristics:** Two distinctive patterns of the souq layout are identified: the linear souq and the network of souqs illustrated in **Figure 22**. The linear souq consists of a major route (spine) with shops on both sides, usually extending from the opposite gates or Friday mosque to the main gate like Isfahan, Iraq. The network souq is a city in miniature consisting of streets intersecting at right angles like souqs of Tunisia and Aleppo. The height of the souq is in proportion to its width (usually height is twice the width) (Awad, 1989).

Despite the organizational differences in the formal urban structure of Early Islamic cities, it could be argued that they all followed a distinct equation, summarized as Friday mosque, souq, and residential dwellings.



**Figure 22.** Patterns of souqs' layout. **(left)** Network of souqs in Syria. **(right)** Linear souq in Iran (Antoniou, 1981; Burckhardt, 2009).

### **2.2.2 About Doha, Qatar, and Muscat, Oman**

It is essential to understand the current situation of the souqs in terms of their locations' context, demographics, historical evolution, and regional development to be able to analyze their morphological characteristics. This section aims to provide a historical analysis of Qatar and Oman and their capital cities, Doha and Muscat, by describing the impact on these traditional souqs and the built environment.

With the urbanization driven mainly by mega-projects, urban expansion and refill have transformed these cities from fragmented conglomerations into more coherent, complex urban entities (F. Wiedmann, Salama, & Ibrahim, 2016). Many projects and satellite cities are set up as leapfrog developments in the desert with only a tenuous, major road connection (usually a highway) and functionally designed to ignite future development instead of complementing and integrating seamlessly with the existing urban pattern (Harris & Ullman, 1945; Major, 2018). Globalization and rapid urbanization in the GCC tend to represent a constant negotiation between tradition and modernity for governments, professionals, and citizens alike, which results in urban regeneration projects. In Oman, and specifically the capital city of Muscat, the central government maintains even stricter regulations on the development to guide interventions in the city's traditional urban fabric<sup>12</sup>. This more cautious, sustained approach appears to have aided in preserving the unique characteristics of Muscat.

While the population of different urban areas is increasing, few regions are experiencing growth as fast as the Gulf countries. The urban share of the total population was reported to be 70% by the end of 2015, whereas the average for all developing countries was 54% (World Bank, 2014). This is because the largest cities

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<sup>12</sup> Building Regulation issued in 1981, Ministerial Decree 40/81

are located in the more inhabitable coastal areas, whereas the hinterlands internal tend to be uninhabitable deserts and/or wasteland. The urban populations in the Arabian Gulf states have continued to grow more rapidly, driving total population size and implying continued urbanization in **Table 5**.

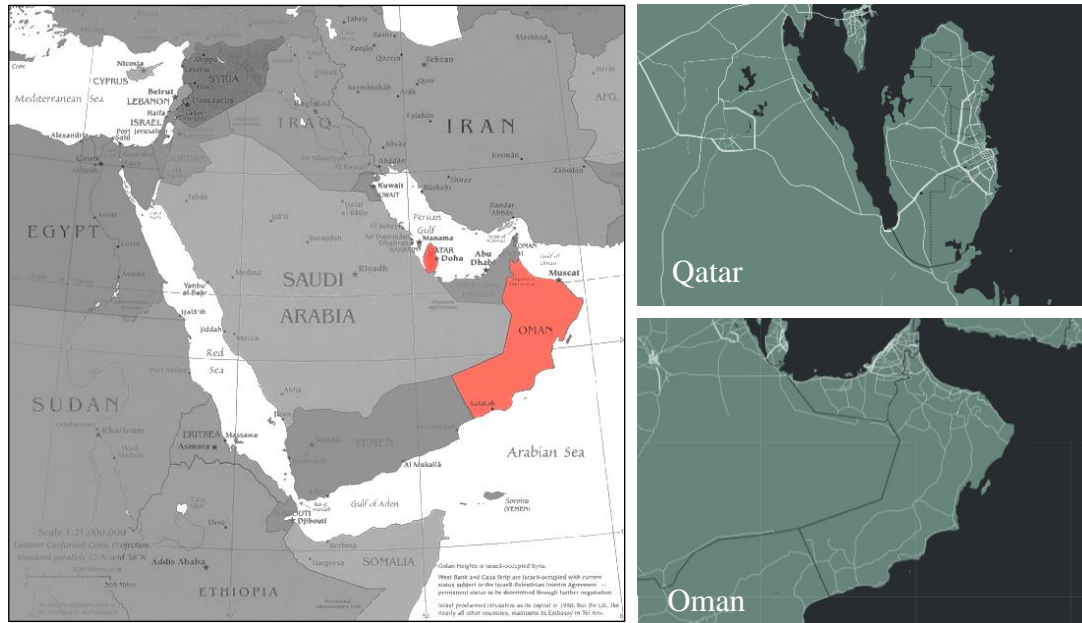
**Table 5.** Total population and average rate of population growth of the Arabian Gulf states in comparison to the world. (United Nations 2009, GIC estimates based on UN data).

Country	Total Population			Average Rate of Population Growth	
	1970	2010	2050	1970-2010	2010-2050
<b>World</b>	3,685,77	6,908,688	9,194,984	1.58%	0.72%
<b>Dev.</b>	2,678,300	5,671,460	7,874,742	1.89%	0.82%
<b>Country</b>					
<b>Arab Reg.</b>	127,865	359,273	598,174	2.62%	1.28%
<b>Bahrain</b>	220	807	1,277	3.30%	1.015%
<b>Oman</b>	<b>747</b>	<b>2,905</b>	<b>4,878</b>	<b>3.45%</b>	<b>1.30%</b>
<b>Qatar</b>	<b>111</b>	<b>1,508</b>	<b>2,316</b>	<b>6.74%</b>	<b>1.08%</b>
<b>KSA</b>	5,745	26,246	43,658	3.87%	1.28%
<b>UAE</b>	225	4,707	8,253	7.90%	1.41%
<b>Total GCC</b>	7,792	39,224	65,622	4.12%	1.29%

With the rapid economic growth of the Middle East and the Arabian Peninsula, Gulf Cooperation Council (GCC) countries have been receiving a lot of recent attention in popular media and built environment research due to seemingly ‘instant’ nature of their urban development, which is contrasted with the experience of Western cities in Europe and the much older Middle Eastern cities of the Levant such as Jerusalem, Istanbul, Damascus, and Cairo. Cities in other parts of the world have experienced similar rapid growth in the past such as Chicago in the late 19<sup>th</sup> century,

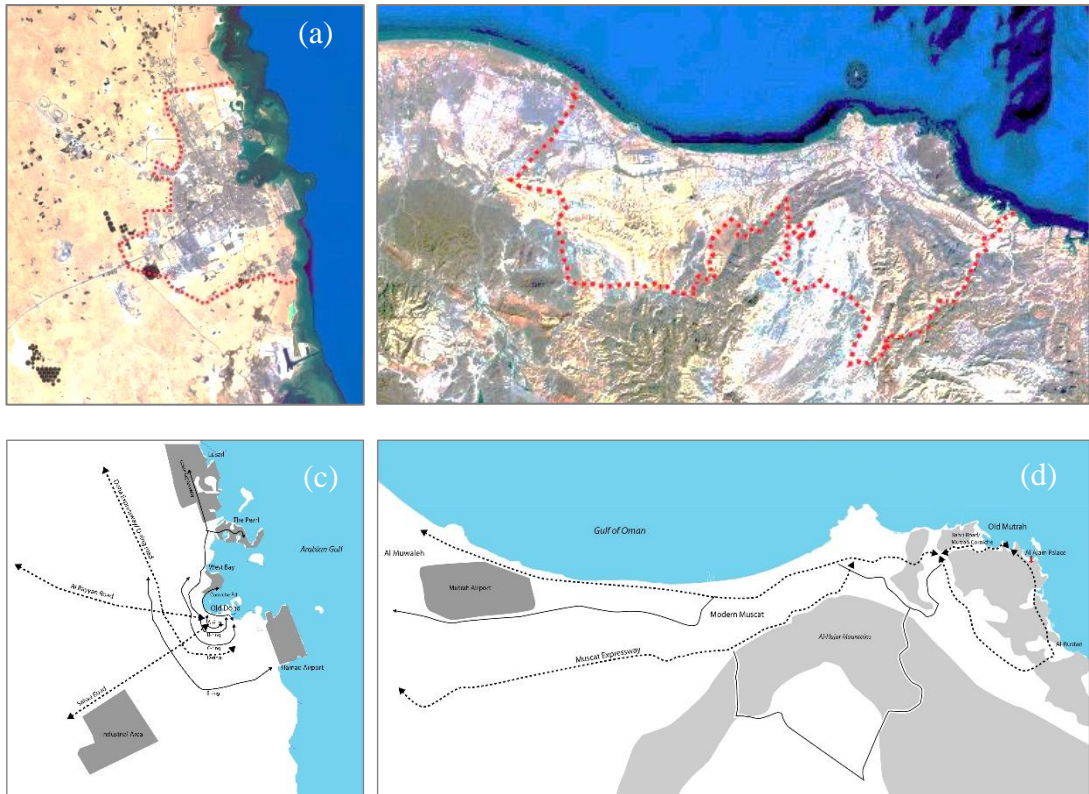
and many cities in China over the last two decades. In the 1950s, much of the northwestern coast of the Arabian Peninsula was barren land. However, a different landscape has emerged over the last half-century, with rapidly-growing cities driven by the production of oil and natural gas. This has led to significant infrastructure and mega-project investments by national governments (A. M. Salama & F. Wiedmann, 2013; F. Scholz, 2014).

Both the State of Qatar and the Sultanate of Oman are situated along the east and south-eastern coastline of the Arabian Peninsula along the Arabian/Persian Gulf and the Gulf of Oman, respectively. Qatar is a peninsular nation sharing a single border with Saudi Arabia. Oman is situated on the southwest corner of the Arabian Peninsula and shares borders with the U.A.E., Saudi Arabia, and Yemen (**Figure 23**). Qatar and Oman are known for their long summers characterized by dry, humid, and intense heat with temperature variations between 12C° in January and 50C° in July. During most of the year (especially summer), the weather is dusty and dry, with high humidity ranging between a +/- 70% and +/-40% (Source: Weather Atlas). The coastline of Muscat, Oman, stretches in an east-west direction along the Gulf of Oman with a northernmost point at Ras-al-Hamra. It has an irregular steep coastline. It incorporates numerous bays framed by high cliffs jutting into the seas and some islands with similar topography. However, there some natural beaches along this coastline.



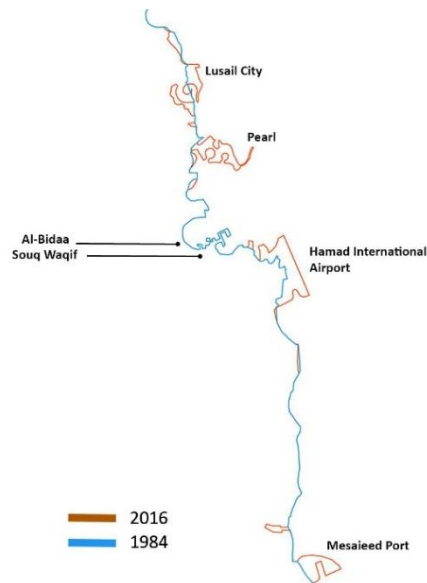
**Figure 23.** Map of the Middle East region with the State of Qatar and Sultanate of Oman highlighted in red and magnified in green. (University of Texas Libraries, 2019 – Google maps)

These geographical features are more pronounced in eastern Muscat than a mostly flat plain in the western part of the city, which is bounded to the east and southwest by mountains. This provides a more extensive and buildable land area for settlement in the more contemporary areas of Muscat. The older areas of Muscat, such as the Mutrah and Al-Alam Palace Districts, are much more mountainous (**Figure 24; a,b**). In contrast, the topography of Doha and the State of Qatar mainly consists of flat, sandy barren plains gradually rising from an emergent coastline to the central limestone plateau. The city of Doha is generally rocky and flat, with its coastline stretching in a north-south direction along the Arabian Gulf (**Figure 24; c,d**).



**Figure 24.** Satellite views of (a) Doha, Qatar, and (b) Muscat, Oman from 100 km with the metropolitan bounds of the space syntax model outlined in red (Google Earth – edited by author). Diagrammatic map of key features, roads, and places in (c) Doha and (d) Muscat.

There are several low-lying offshore islands accompanied by coral reefs located near the coast of Qatar. Large sections of the coastline in Doha have artificial modifications, including reclaimed land and islands, as the original shoreline was further inland shown in **Figure 25**. This sort of artificial modification in Muscat is smaller and more localized due to its lack of an emergent coastline in the same manner as Qatar. For reference, subsequent sections of the thesis discuss key features, roads, and places available in the diagrammatic maps of Doha and Muscat.



**Figure 25.** Changes in the Doha, Qatar shoreline through 1984-2016 (Mark David Major - edited by author)

### *Rural-to-urban migration*

The capital cities of the Gulf are the main administrative, cultural, and economic centers of their countries. Because of their political importance, these capital cities have been the focus of the development efforts deployed by the government. They are meant to be representatives of the growth and wealth of their nation. This style of development has succeeded in propelling some of these GCC capitals but has also led to the underdevelopment of other areas. Hence, both Doha and Muscat are the largest and densest regions in Qatar and Oman.

Beginning in 1967, revenues from oil exports ignited government efforts for settlement expansion in Oman during the early 1970s. the current population of Oman is over 4.9 million inhabitants (World Population Review, 2019). Most economic development and demographic growth focused on the capital city of Muscat (F. Scholz, 2014). This resulted in a surging demand for housing, commercial and storage

sites, industry, and public buildings. Within four decades, Muscat developed from a collection of small port towns and agricultural villages into a metropolis housing over 1.7 million people (Source: United Nations). The municipal (i.e., political) boundaries of the city of Muscat are 246 square kilometers (km<sup>2</sup>), whereas the metropolitan region, as defined by the bounds of the space syntax model in this thesis, covers 720 km<sup>2</sup> of land area. The population density in Metropolitan Muscat is approximately 368 people per km<sup>2</sup>.<sup>13</sup>

By comparison, Qatar's rapid growth occurred later in the late 1980s due to technological innovations in the natural gas industry. Like Muscat, revenues from natural gas (and oil, to a lesser extent) exports fed urban expansion in Doha over the last 40 years. The current population of Qatar is over 2.8 million inhabitants as of April 2019 (World Population Review, 2019).<sup>14</sup> The population density is 244 people/Km<sup>2</sup> with 90% of the population living in the capital city of Doha. The municipal boundaries of the City of Doha encompass approximately 132 km<sup>2</sup> of land area, whereas the metropolitan region, as defined by the bounds of the space syntax model in this thesis, covers approximately 650 km<sup>2</sup> (refer to Figure 24). The population density is extremely concentrated in Doha, with an average of 3,665 person/km<sup>2</sup>. At first glance, this would suggest that Doha is much denser than Muscat. However, this is not exactly the case, as we will explain in the next chapter due to the role of topography and unbuildable land (**Table 6/Figure 26**).

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<sup>13</sup> Population estimates are rounded off for simplicity's sake.

<sup>14</sup> based on the latest United Nations estimates



**Table 6.** Table summarizing the demography of Qatar and Oman and their capital cities Doha and Muscat.

Demographics Table (2019)				
Demographics	Qatar	Doha	Oman	Muscat
Area: Metropolitan (Km <sup>2</sup> )	11,586 <sup>1</sup>	650	309,500 <sup>2</sup>	720
Area: Municipal (Km <sup>2</sup> )		132		246
<b>Population</b>	<b>2,832,000<sup>1</sup></b>	<b>2,382,000<sup>2</sup></b>	<b>4,974,986<sup>2</sup></b>	<b>1,720,000<sup>4</sup></b>
Male	75%		66%	
Female	24%		34%	
Locals	10%		55%	
Expats	90%		45%	
<b>Population density (population/km<sup>2</sup>)</b>	<b>244</b>	<b>3,665</b>	<b>16</b>	<b>2,389</b>

<sup>1</sup> 2019, Qatar statistics authority, <sup>2</sup> 2019, world meters info, <sup>3</sup> 2019, world population review, <sup>4</sup> 2019, worlds capital cities.



**Figure 26.** Bird's eye views of the urban fabric in **(left)** Old Doha city 2010 with Doha Bay and the modern skyscrapers of West Bay in the background and **(right)** Old Muscat in Mutrah in 2005 (Images: Qatar Museums/Muscat Municipality).

### *Urbanization of Qatar*

The State of Qatar is known for its rapid urbanization within a short period (Al-Asiri, 2017). Qatar has transformed physically and economically from its initial fishing and pearling villages origin in the middle of the 20<sup>th</sup> century, and then the

center of Qatar's oil-and-gas production-based economy during the 1970s and 1980s; to a modern diversifies economy with global inspirations today.

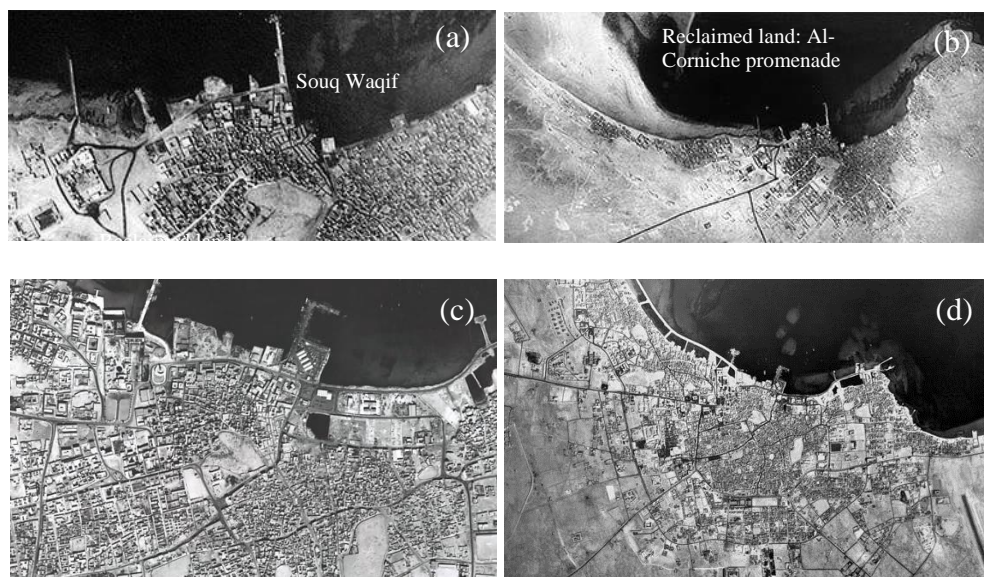
Among Gulf countries, Qatar is emerging in its regional and global aspects. With the first substantial urban settlements appearing in the 1940s, Qatar's urban development is a relatively new experience. One of the earlier aerial photographs in Qatar in **Figure 27** shows the relationship between the two coastal settlements of Al Bidda and Doha in 1947. In the ninetieth and twentieth century, the sea at the time was referred to as the Bay of Bidda (*Wadi Al-Bidda*) by the residents of Qatar. However, Doha was the larger settlement. The Wadi (*wadi* in Arabic means a depression of land with a water stream) lies on its east side, being the center of what is now Souq Waqif. The urban settlement follows the typical pattern where roads follow the lines of the watercourses.



**Figure 27.** (left) Al-Bidda area with the development near the shore, and (right) historical photograph showing the settlement pattern in Doha and Al-Bidda (Qatar Museums).

Both Doha and Al-Bidda were accessible by water, but with significant shallow water to the west and reefs immediately opposite the center of Doha's souq

shown in the photograph in **Figure 28**. The shallows were dredged in the 1970s to develop Al-Corniche (the Arabic synonym of *promenade*) and the expanded port in 1963. The reefs were hard and expensive to remove, so they were used as a base for extensions of the jetty developments. Another reef further out was also used as the base for the creation of an island extension of what is now West Bay business district.



**Figure 28.** Photographs of detailed enlargement of (a) the center of Doha. (b) reclaimed land along the coastline for what will become Al-Corniche promenade, and (c, d) areal photographs of Doha taken in 1959 (Qatar Museums and Stepfeed, 2011)

Although gas resources are immense, the government is pushing for diversification into tourism and other services. Qatar hosted the 2006 Asian Games and a regular venue for major international tennis and golf events. It is also seeking to establish in Doha as an onshore financial center, the Qatar Financial Center, which aims to rival both the long-established offshore banking sector in Bahrain as well as the newly established Dubai International Financial Center (Dumper & Stanley,

2007). It is also aiming to become the education center for the Gulf region. Education City now houses high-rank international universities as well as the national university further north. Other satellite cities like The Pearl are also constructed on a large scale reshaping the urban fabric of Qatar (Rizzo, 2014). The government is also currently working on developing Qatar Rail transit, Hamad Port, public parks, and the stadiums supporting the facilities associated with hosting the FIFA Cup in 2022 (**Figure 29**).



**Figure 29.** Maps of Doha highlighting (a) main metro station lines (SmartrailWorld); (b) satellite cities, mega-projects, and FIFA 2022 stadiums; and (c) major green park and promenades.



*The city of Doha: Mega-projects and infrastructure-led development*

Doha is the largest city and capital of the State of Qatar and has one of the fastest growing populations in the Arab world. Its population has increased by approximately 30% just between 2003 and 2012 (**Figure 30**). With the majority of Qatar's population living in Doha, the country has taken significant steps towards creating sustainable and improved urban infrastructure in its capital city.



**Figure 30.** Urban Land in Doha, 2003 and 2012 (Salama and Wiedmann, 2013).

Although the implementation of these projects has contributed to Doha's growth, the absence of a national planning framework has caused more traffic congestion, land value inflation, affordable housing shortages, and localized environmental impacts (Rizzo, 2013). To confront these issues, and in the light of the Qatar National Vision (QNV) of 2030, the Ministry of Municipality and Urban

Planning (MMUP) has adopted a national framework for urban development to guide strategies across all public and private sectors of the country. Based on this vision, the MMUP and Ministry of Municipality and Environment (MME) developed a strategic policy document detailing a national master plan under the Qatar National Development Framework (QNDF) (Ministry of Municipality and Environment, 2016).

One of the fundamental principles for guiding development was the appropriation of urban design and planning strategies to ensure sustainable growth, conservation of the urban identity, and preservation of land for public green spaces. The QNL rests on four pillars: human, social, environmental, and economic development, shown in **Figure 31**. The human development strategy focuses on citizens' basic needs, such as healthcare and education. Social development, on the other hand, oversees the establishment of cohesiveness within the entire society. The Ministry of Environment oversees the environment development strategy. Four other ministries in cooperation with the Qatar Central Bank have prepared policies concerning economic development. One of the main aims is to enhance the urban fabric and junctions of culture and infrastructure by bringing forth diverse urban mobility. Qatar Rail project mentioned earlier is one of the main contributions to the QNV of 2030 as a response to the rising demand of the growing population.



The national vision aims to transform Qatar into an advanced country by 2030, capable of sustaining its own development and providing a high standard of living for its population and future generations.



The state of Qatar aims to achieve this through the following four pillars.



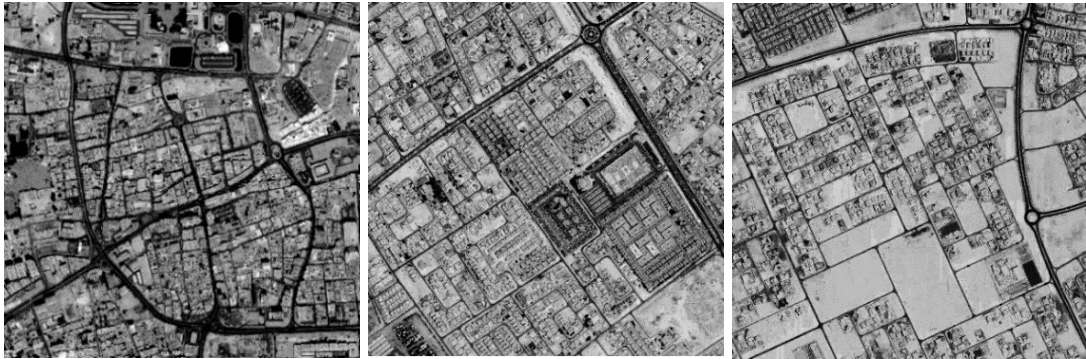
**Figure 31.** Qatar National Vision 2030 (Government Communication Office, 2019).

### *Neighborhoods of Doha*

The prosperity after the oil revenue of the late 1970s not only changed the urban fabric but also contributed to changes in Qatar’s national housing forms and built environments. Neighborhoods before the oil discovery consisted of complex systems of winding alleys that served as access to individual homes. These neighborhoods, also known as *Fereej*, were wall-to-wall family houses in proximity to one another. The high density of the built area was also influenced by the hot climate and the necessity to shade walkways and expose walls (Rizzo, 2014).

Conversely, neighborhoods built after the 1970s suffered from sprawl as the development of modern infrastructure determined settlement patterns. Subsequently, low-density modern buildings replaced old courtyard houses, and roads widened in central areas as seen in **Figure 32**. While the oil economy led to the sprawl of the suburban settlements around a mixed-use center, the most recent growth strategy has led to a phenomenon of “cities within a city” with a predominant emphasis on waterfront developments such as The Pearl, Lusail City, and Katara (Wiendmann,

Salama, & Thierstein, 2012). However, Souq Waqif and Doha Bay remained the heart of old Doha and enlarged old Doha, the heart of the metropolitan region.<sup>15</sup>



**Figure 32.** The **left** image (2 Km<sup>2</sup>) shows a traditional urban neighborhood with an interconnected alley street system. The **middle** and **right** images show neighborhoods with highway street systems and superblocks.

### *Urbanization of Oman*

Investing heavily in mega-projects to promote rapid economic growth has become a common trait in the capitals of the Gulf region as seen earlier in the case of Doha. In the hope of becoming global world cities, these capitals duplicated several urban trends and strategies like the ‘cities within cities’ referred to earlier (Bamakhrama, 2015). However, Oman joined these growth trends later for several reasons, such as the country’s less generous natural resources of oil. The urbanization of Oman represents a somewhat slower, more cautious approach with sustained progress. It was only later that Oman joined the neighboring Gulf countries in the

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<sup>15</sup> Residents often refer to ‘west bay’ for both the bay itself and for an Central Business District located on the northern shore associated with the famous skyscraper image. This thesis refers to the physical water as Doha Bay in order to avoid confusion with the area of West Bay



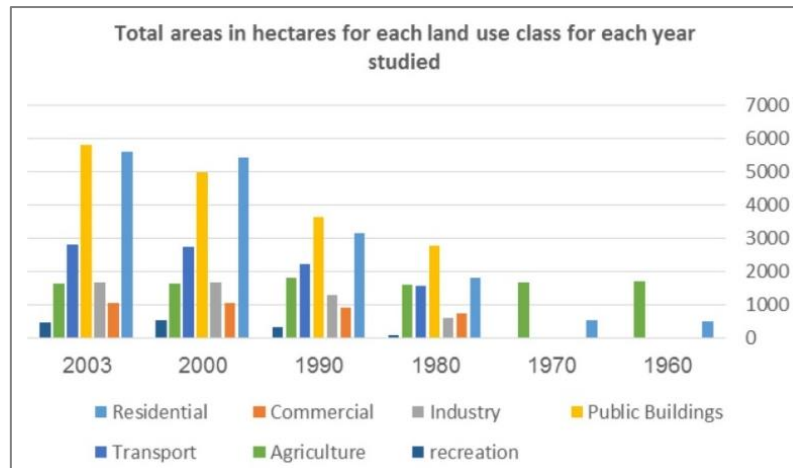
planning of mega-project developments, some of which was co-founded by Qatar or the UAE, such as Duqm Port, Salalah Beach, Al-Mouj, Jabel Hebel Sifah (Benkari, 2017).

The Sultanate of Oman has been undergoing significant changes in the last 50 years (W. Scholz & Langer, 2019). It transformed from a traditional country into a wealthy, modern state. The discovery of oil in the late 1950s, along with the later influence of Oman's Sultan Qaboos on the development of the country, plays a large part in this transition. After Sultan Said was enthroned in the 1970s, the young Sultan Qaboos started the exploitation of oil to modernize the local economy. He also started an educational and cultural renaissance, which continues up to this day (Landen, 1967).

With the oil income, the initially-designed infrastructure to serve and increase rapid oil production has evolved into full-fledged industrial cities. Though in a more restrained fashion than the neighboring GCC countries, Oman has invested in its transportation: two ports (Sohar and Duqm), three international airports (Muscat, Sohar, and Salalah), and a number of local ones (Duqm, Adam, Sohar, Ras Al-Hadd, Haima, Shaleem, and others) have started operating or are still under construction. In part, this is because Oman is a physically larger country than Qatar. Since the 1980s, these types of public buildings and projects have occupied the largest portion of the built-up surfaces in the country shown in **Figure 33**. Within 30 years, the population of Oman has increased from over 1.1 million inhabitants in the 1980s to over 4.9 million in 2019 including over 45% expatriates as of September 2019<sup>16</sup>.

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<sup>16</sup> NCSI (National Center for Statistics and Information), "The population of the Sultanate of Oman by August 2019." Accessed August 5, 2019.



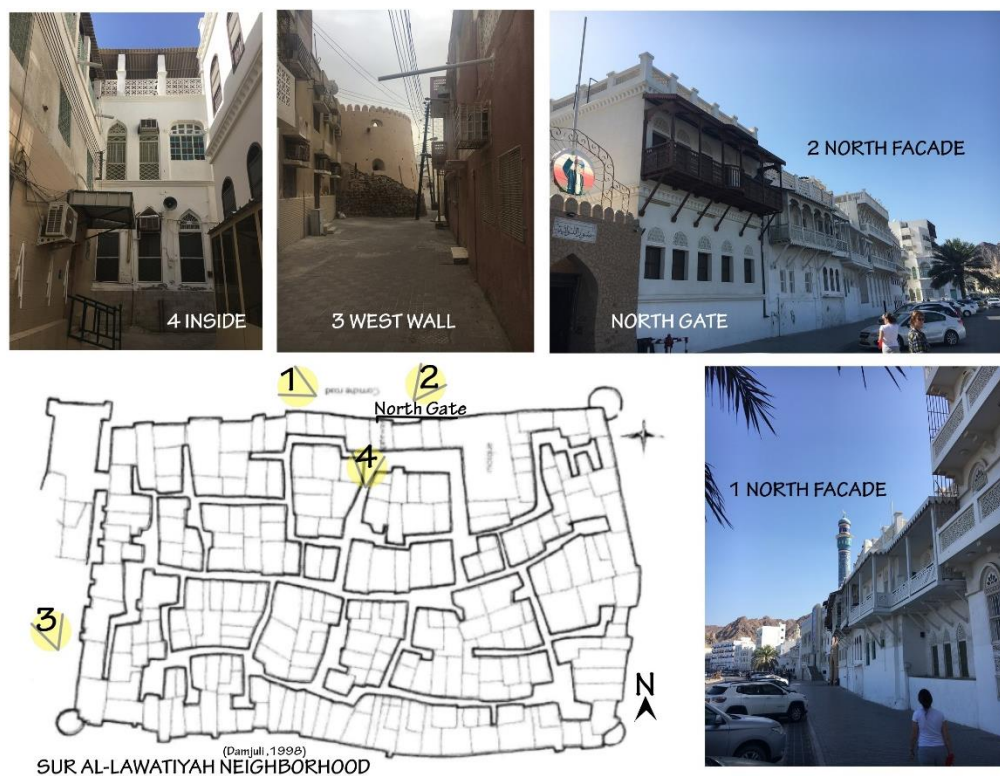
**Figure 33.** Total areas per land-use class per year studies in Muscat (Benkari, 2017).

The urbanization trends of Oman are mainly due to the country’s climatic and geographical setting, as a high percentage of the country’s total surface is covered by desert and not fit for permanent settlements, and a large part is mountainous and hard to access (Nebel, 2011-2014). Dispersed settlement structures characterize the urbanization pattern both in the urban expansion areas of Muscat and in the areas undergoing transition from rural to urban land uses. This was also noted in the findings of this thesis later in chapter 4. This separation of settlements increases the need for cars as the primary mode of transportation. Similar to Qatar, the single villa on a walled plot is the favored residential building type. However, the influx of revenues from the oil industry was followed by significant demographic changes and challenges with increasing population growth (W. Scholz & Langer, 2019). These changes drove continuous urbanization patterns in several parts of the city, especially the capital area of Muscat.

*The city of Muscat and Mutrah District in Oman*

Muscat Governorate is the capital city of the Sultanate of Oman. It covers an

area of 3,900 Km<sup>2</sup>. Muscat consists of six *wilayat* (Arabic for provinces or states; singular is *wilayah*): As Seeb, Boshier, Al-Amerat, Mutrah, Muscat, and Qurayat. Mutrah *wilayah* is known for its sixteen *wadis* (e.g., valleys/creek) and two main *falaj*, e.g., an irrigation system. This irrigation system consists of tapping groundwater and wells accessing underground aquifers for domestic and irrigation purposes. There is always a groundwater flow, but the total reservoir of water varies according to the amount of the annual rainfall. Mutrah is also known for several *sur* like Sur Jibroo, Sur Ruwi, Sur of Old Mutrah, and Sur Al-Lawatiyah<sup>17</sup> (Figure 34).

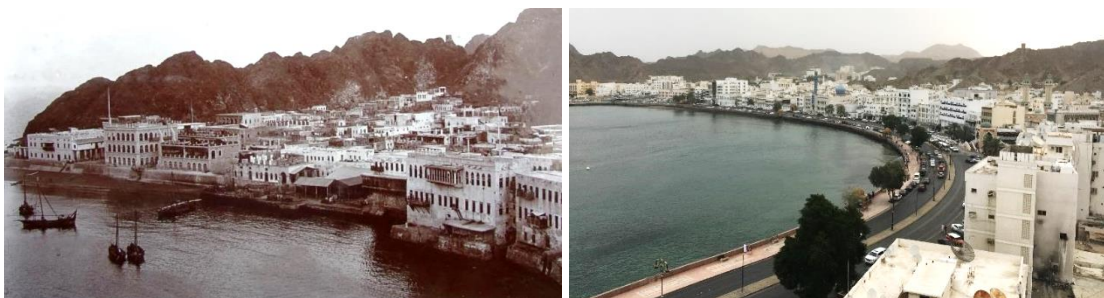


**Figure 34.** Sur Al-lawatiyah (walled Lawatiya) neighborhood (Author unless otherwise noted).

<sup>17</sup> A *sur* (سور) is an Arabic word that generally and specifically mean a wall that could be a fence, rampart, enclosure, and fortification. It could be referred to the walls of an enclosed community, *bastide* (‘fortified town’) in the European tradition or *presidio* in the Spanish tradition during colonization of the New World.

Muscat has developed extensively within the so-called ‘capital area.’ Due to the mountainous and often inaccessible terrain surrounding the old city and port, many of the settlements initially were developed separately as independent towns. Later, they have been incorporated into the greater city of Muscat (A. Salama & F. Wiedmann, 2013). The urban expansion of the city had to take into account these morphological and topographical circumstances.

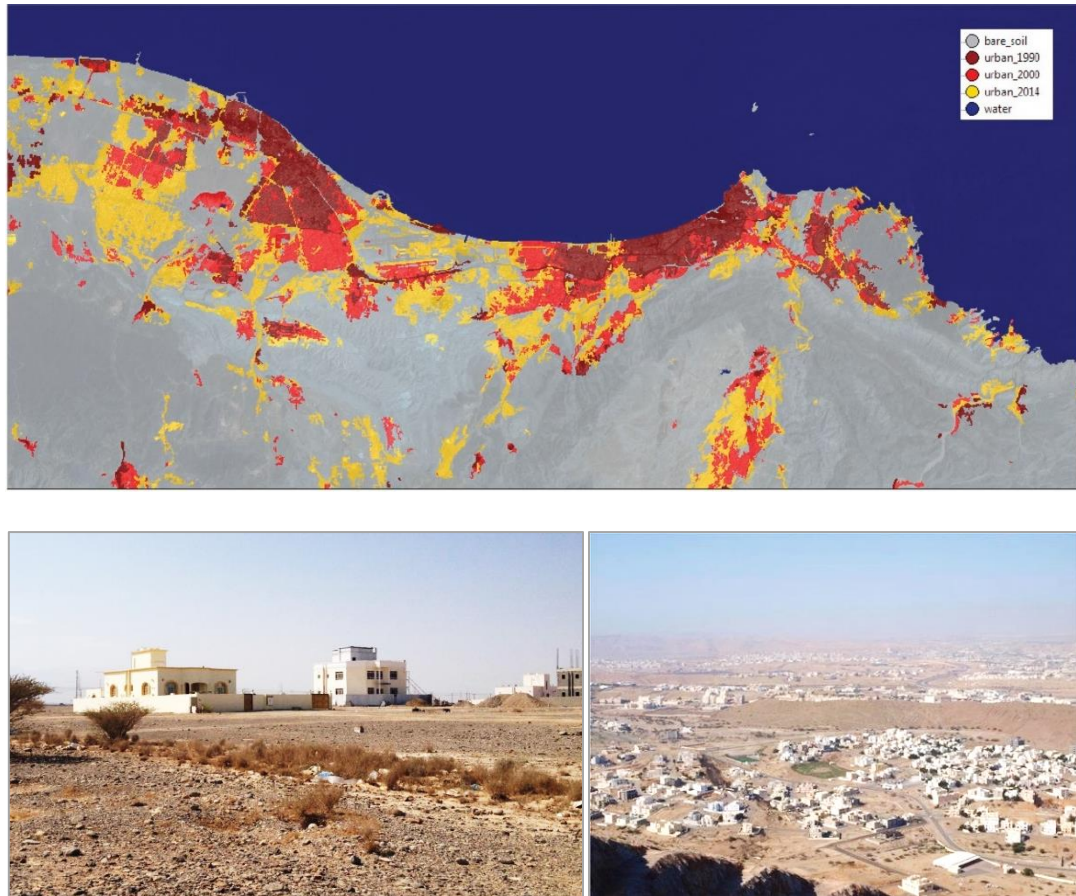
However, Oman offered, from today’s perspective, many attractive features that make it different than neighboring Gulf states as they were only able to expand the city westward across flat terrain. The strategic location of Oman between extensive coasts and deep deserts, protected by mountains (seen in **Figure 35**), has played a significant role in trade routes which contributed to the flourishing of several civilizations in the region. While there are common traits with the urban growth in the GCC countries, urban development in Oman distinguishes itself in many of its characteristics



**Figure 35. (top)** Historical photograph, 1913 (Heathcaldwell), and **(bottom)** Muscat from the harbor, 2019 .

Most of the Omani administrative structure, including the urban planning

system, has changed during the political transformation process beginning in 1970. Strong institutions were implemented with the establishment of the Higher Development Planning Board and the Directorate of Planning in Development in 1972 to guarantee a linkage between spatial planning and economic development (W. Scholz & Langer, 2019). Today, urban planning is undertaken by the Supreme Council of Planning (SCP). One main factor shaping urban development today is the ‘land lottery’ system. All the land in Oman belongs to the Sultan, who distributes them to companies and citizens for the development of commercial, industrial, and residential purposes (Kader, 2015). The government assigns somewhat randomly a plot to citizens above 23 years of age through the policy of its land lottery (W. Scholz & Langer, 2019). The main problem resulting from this system is underdeveloped plots. Many of the distributed plots wind up undeveloped due to several reasons like the inconvenience of the time upon receiving the granted plot in terms of owner’s plans, needs, or capacities, i.e., the plot could be distributed far away from the citizen’s current job or family resulting in long travel distances. **Figure 36** illustrates the large consumption of land development in the last decades while showing a typical situation of the underdeveloped neighborhoods in the western parts of the city.



**Figure 36. (top)** Expansion of urban areas between 1990 – 2014 (W. Scholz & Langer, 2019). **(bottom)** Underdeveloped neighborhoods in Muscat Capital Area (Heim, Joosten, Richthofen, & Rupp, 2018; W. Scholz & Langer, 2019)

### 2.2.3 Background to the case study marketplaces

#### *Souq Waqif, Doha: History and Development*

As highlighted earlier in the study, Doha's terrain is generally rocky and flat and lies along the coastline of the Persian Gulf. This was not the case in the past as the banks of Wadi Musheireb connected the sea to the land (**Figure 37**) The banks were often wet during wintertime which allowed the merchants to sell their goods while standing, giving the traditional marketplace the name of Souq Waqif, literary translating to the 'standing market' (سوق واقف) (Radoine, 2010). The buffer zone of



unbuilt land between the souq and the sea known as *kharis* (خريس), allowed the merchants and fishermen in the souq to have a direct relationship with the sea and the fishing jetties. However, the shoreline now is filled and pushed forward, changing the morphology and topographical condition of the souq and its surrounding area from the past. After renovation, the souq's main water route was covered and subtly marked with the stone floor.



**Figure 37.** Sketch of Doha in 1880 drawn by the Qatari artist Mohammed Ali Abdullah showing the banks of Wadi Musheireb extending/ dispersing towards the north-west (Abdullah, 2005).

The souq today is characterized by the synthesis of contemporary and traditional urban fabric within the city center of Doha. Even though several of Doha's historic settlements were replaced during the modernization period, the country's rulers aimed to establish Doha as a cultural center. Subsequently, the heritage site of the traditional Souq Waqif was rebuilt in its original location using traditional materials and techniques in 2004–2008.

The souq reflects the historical trade and cultural exchange with southern Iran and other Gulf countries (Radoine, 2010). Initially, the souq was a weekly market constructed by the local Bedouins to sell and trade goods and freshly caught fish and pearls. With its strategic location on one of the banks of the *wadi* that connects the sea to the land, Souq Waqif played a significant role in the development of the city of Doha until the present day. The *wadi* became one of the main features of the historical village's morphology (Alraouf, 2012). With Doha's gradual development, the souq became an attractive and permanent market. Most merchants transformed their residential units and plots into shops. Souq Waqif's organization thus consisted of three main parts: storage areas, craft shops, and open-air stalls. The items sold in the souq included goods imported from the Arabian Peninsula, India, Persia, and East Africa.

#### *Characteristics of the local and physical context of the market*

The southern architecture of Iran influenced the general architecture of the Souq Waqif. It is the typical architecture found in the northern part of the Arabian Peninsula. The souq's front façade is known for its architectural simplicity with apparent structural skeleton and rough coating. Most of the roofs are constructed of scarce wood (also known as *dangeel*<sup>18</sup>), and so the excess wood that remains outside the borders was maintained and left hanging in different sizes, which added to the character of the souq buildings seen in **Figure 38**.

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<sup>18</sup> Wood was used to decorate buildings, roofs, doors, and many others in Qatar.



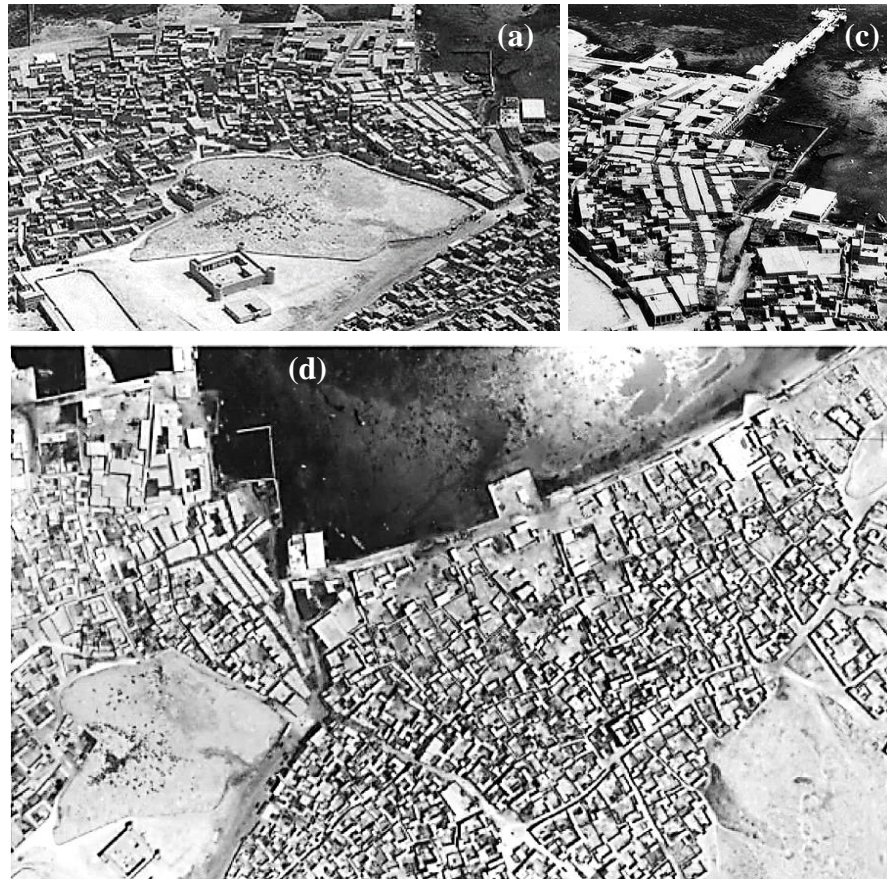


**Figure 38.** Photographs showing the **(left)** inspiration by Persian architecture shown in the alleyway, **(middle)** wooden ceilings, and **(right)** dangeel wooden structure (P. Jodidio & Halbe, 2015).

The urban pattern of Souq Waqif was more spontaneous as it was constructed gradually following the distribution of the shops. During the regeneration of the souq, some of the internal alleys (*sikkak*) were roofed with a corrugated metal structure to provide a degree of protection for the activities carried out at ground level below.

The souq had a clear relation with the cemetery<sup>19</sup> (*maqbara*), the open-air prayer ground outside of the mosque, the Turkish fort Al-Kuwt (or Al Koot) sitting south of the cemetery, and the adjacent residential and commercial urban fabric. As illustrated in **Figure 39**, Al-Kuwt occupied a large, central area of Doha at that time. It is also possible to identify the new commercial streets around the cemetery. The souq was bound by what would become Ali Bin Abdullah St. to the south and Banks St. to the east around the 1980s. The photograph illustrates the organization of the central souq with the jetty used to unload goods straight into the warehouses along the shore. The government had an area near the shore associated with customs requirements and security facilities.

<sup>19</sup> Note that the location of the cemetery was used as a car park associated with the redevelopment of Souq Waqif in 2013 and is currently (2019) an empty space used for the construction of temporary events.



**Figure 39.** (a) An aerial photograph of the center of Doha showing the cemetery and al-Kuwt Turkish fort within Souq Waqif and the surrounding urban texture. (b) The jetty on the coast; and (c) aerial view of Doha in 1952 (Qatar Museums).

The historical photograph in **Figure 40** illustrates the informal expansion of the typical Arab town, particularly the area immediately to the south of Souq Waqif. The urban grain of the area around the center of Doha provides a guide to the character of the city. Most of the buildings are two or three stories high with a simple urban layout and dwellings units with high ceilings on the ground floor. The merchants operating the souq occupied these properties, and so many of these houses were also used to store goods. As a result, the alleys were constructed with consideration of the movement of bulky goods with porters and carts. Interestingly, there does not seem to

be a rule governing the orientation of the ground floor construction as there was in other areas in Qatar.

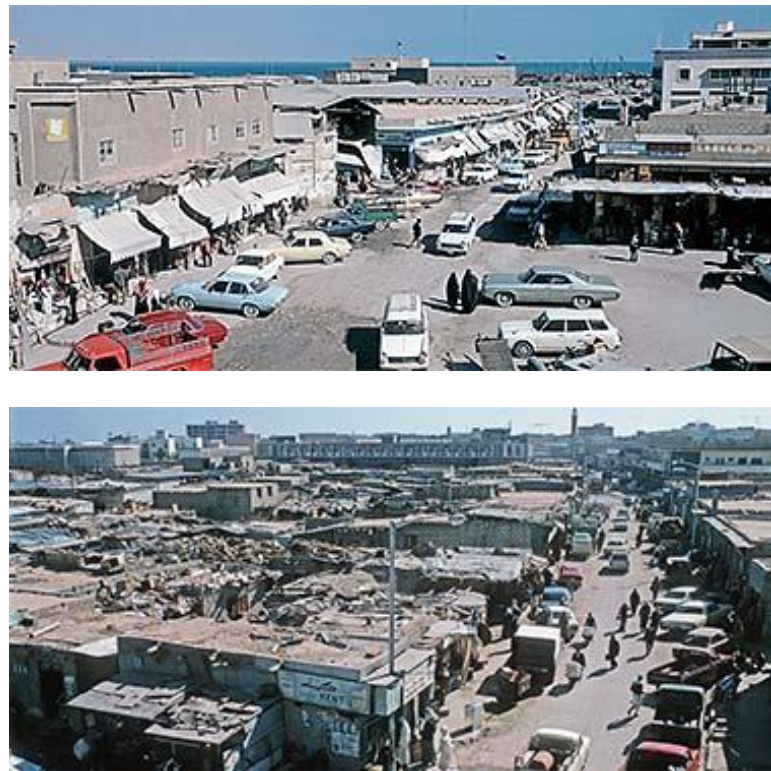


**Figure 40. (left)** Aerial photograph looking north-west of Doha's central souq dating back to the late 1940s. The cemetery is showing on the left corner. **(right)** A photograph of the the west souq. (John Lockerbie, 2005).

The souq expanded linearly from the jetty into several interconnected, covered passages. The development appeared random to the naked eye and contained a mixture of retail of different trades like food supplies, construction material, home appliances, and clothing established as discrete areas. Specialized areas with similar products formed accordingly like the Gold Souq, Spice Souq, Pet Souq, Clothing Souq, and others were established, which remain to this day.

There are only a few photographs of the central area of Doha and particularly of Souq Waqif in its early days. The pictures in **Figure 41** date back to February 1974, taken from the north of the souq facing the Persian Gulf. It shows the north end of Doha's souq ends with the Central Police Station. During the time of the photograph, the ground floors were operating as retail and the upper floors as staff

accommodations and storage. The souq appears to be a destination for shoppers, of which were mostly men at that time. Many of these shoppers perhaps required taxis and pick-up trucks to load their large purchases like tools, goats, furniture, and so on, which might explain the presence of so many vehicles in the photographs.



**Figure 41.** Photographs of Souq Waqif dating back to 1974. **(top)** Shows the main entrance of the Souq. **(bottom)** Shows the “second-hand souq,” as referred to by the locals (John Lockerbie, 2005).

Most of the alleys had unpaved sidewalks, and so many shops were raised from the ground to avoid the occasional flooding along the *wadi*. The souq was characterized by its complex layout and the construction of the shops using temporary materials. Several types of products were sold like livestock, clothing, and second-hand items (CNN travel, 2018; Furlan, Nafi, & Alattar, 2015; Qatar Architect



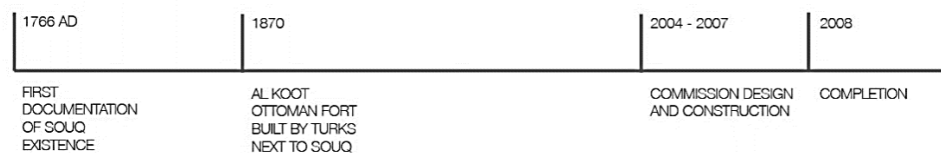
Institute, 2017).

With the city of Doha continually re-inventing itself and its image, many of its heritage sites have been gradually destroyed over time. With the advent of Qatar's rush to embrace modernity, Souq Waqif fell into decline by 1990, followed by a fire that destroyed large sections of the souq in 2003 (Jaidah & Bourennane, 2010; P. Jodidio & Halbe, 2015; Salama, 2007). Trying to reassert the suitability of local architecture, The Emir of Qatar His Highness (Sheikh Hamad bin Khalifa Al-Thani) invited international experts to propose a new design for the reconstruction of the souq. The renovation of Souq Waqif was undertaken by the Private Engineering Office (PEO) acting on behalf of the Emiri Diwan (Philip Jodidio, 2015). Eventually, the reconstruction was based on a painting of the souq as imagined by the artist Mohamad Ali Abdullah<sup>20</sup>. After studying the history, architecture, culture, and environment of the souq, the renovation began in 2006 with a bold decision of demolishing buildings constructed later than the 1950s (Furlan et al., 2015). The designer of the project, the artist Mohamed Ali Abdullah, undertook "a thorough study of the history of the market and its buildings, and aimed to reserve the dilapidation of the historic structure and remove inappropriate alterations and additions" (Aga Khan Development Network, 2019). The renovation of the souq was completed in 2008 and proved to be an incredible success by becoming Doha's most popular tourist destinations. The present-day appearance of the souq is similar to that before the construction of modern buildings in the late 1950s as the renovation attempted to

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<sup>20</sup> Mohamed Ali Abdullah explains in a discussion in a conversation with Ibrahim Al Jaidah, *In conversation: On Artists' Impact on the City* [video published by Mathafmodern March 29, 2012]. Accessed on August 19th, 2019: "I am an intruder into the art of architecture. I am a painter. I was asked to put together a concept to restore Souq Waqif. I did three or four acrylic paintings. It was just my imagination working – how would I like to see this place? My father's shop was there when I was a child. I played on the roof of the Souq. I knew how the Souq looks before the 1970s changed everything. His highness liked the concept. His Highness the father Emir was anxious for us to use traditional materials and techniques. The Souq Waqif was a chance for me to put the theories into practice. The memories of people about the place are so important that we should not feel that it is not real or true. I went to the old people who had shops there and ask them what they thought."

revitalize the historical image of the place. Traditional built roofs of *dangeel* wood and bamboo with a binding layer of clay and straw replace metal sheeting. Sophisticated lighting systems replaced neon lighting, and new features and traditional strategies were introduced to insulate the buildings against the hot, humid climate of the city of Doha (Furlan & Faggion, 2015; Furlan et al., 2015). **Figure 42** provides a simple timeline of major events at Souq Waqif. The completed project was shortlisted for the 2010 Aga Khan Award for Architecture (Philip Jodidio, 2015).

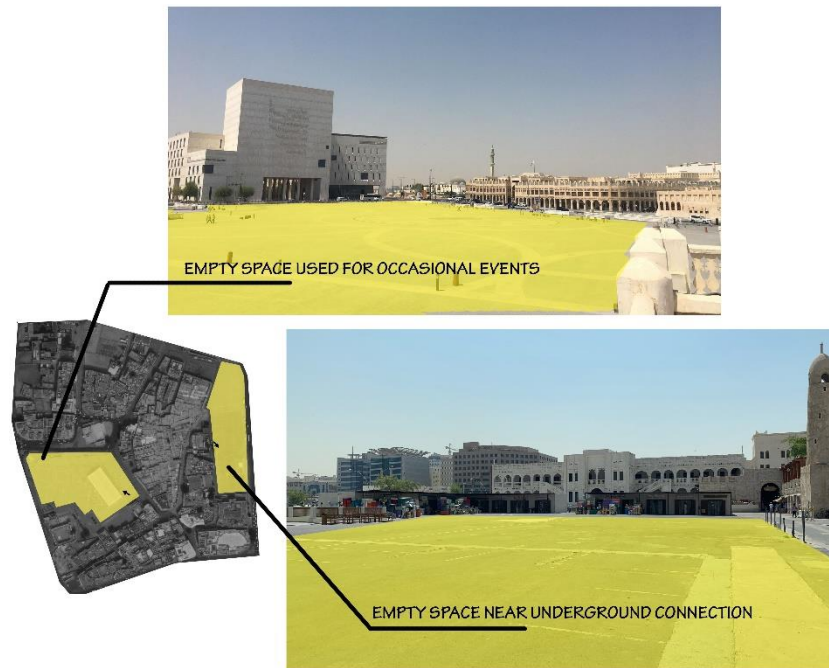


**Figure 42.** Timeline of Souq Waqif from 1766 AD to the completion of the renovation in 2008 (GlassInTheDesert, 2016).<sup>21</sup>

After the renovation, Souq Waqif became a showcase for the traditional architecture of Doha along with a modern illustration of the architectural design of the markets and open-air public spaces heavily used by people. It is currently known for its traditional urban fabric of social, cultural, commercial, and recreational centers. It is in a strategic location referred to as ‘the heart of Doha,’ adjacent to Msheireb Downtown Doha to the west, Al-Corniche to the north, and Amiri Diwan (Palace of the Emir) to the northwest. The northern edge of the souq parallels the coast and Al-Corniche next to Grand Hamad Street and consists of an approximate area of 195,000

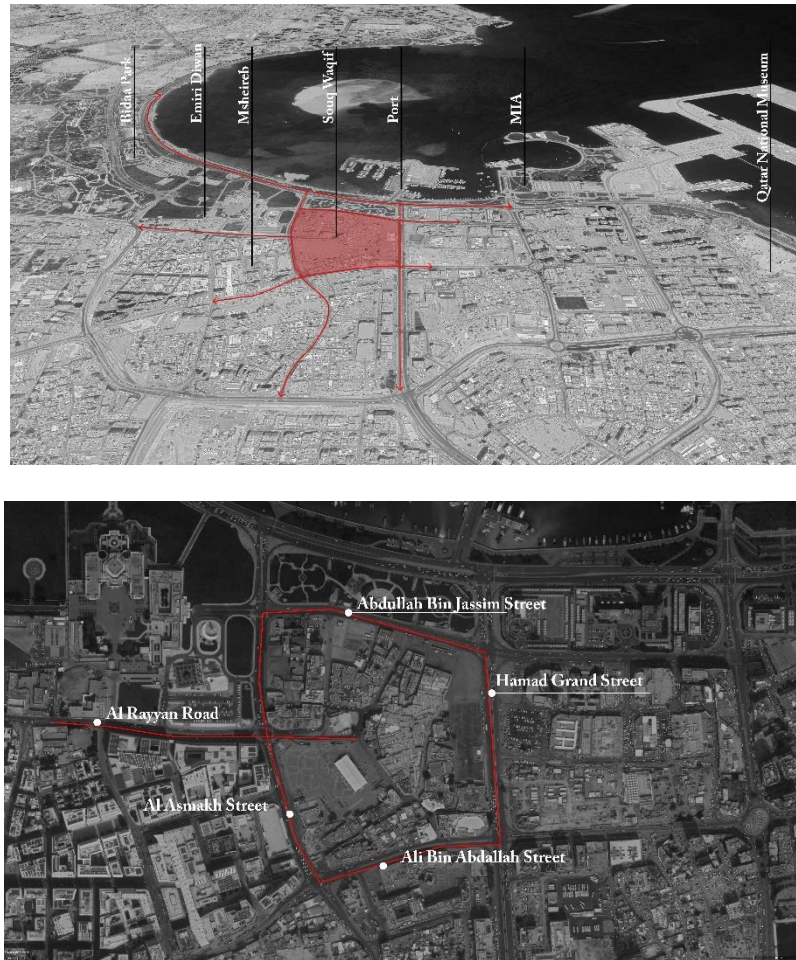
<sup>21</sup> Source: <https://www.glassinthedesert.com/souq-waqif-adaptive-reuse/>

m<sup>2</sup>. However, there are two large empty spaces, highlighted in **Figure 43** within the perimeters of the souq, which account for near 20% of the area, making the metric area of the actual souq (market itself) around 150,000 m<sup>2</sup>.



**Figure 43.** Unfilled Space highlighted in yellow to the east and west of the souq.

The souq had a direct connection with the coast. However, with pushing the shoreline outward into the bay with landfilling, an additional area was added to the north of the souq of what is now a park, a highway, and Al-Corniche promenade. The premises of the souq now lie between four main streets; Abdullah Bin Jassim St. to the north, Banks St. to the east, Ali-Bin Abdullah St. to the south, and Al-Asmakh St. to the west as illustrated in **Figure 44**.

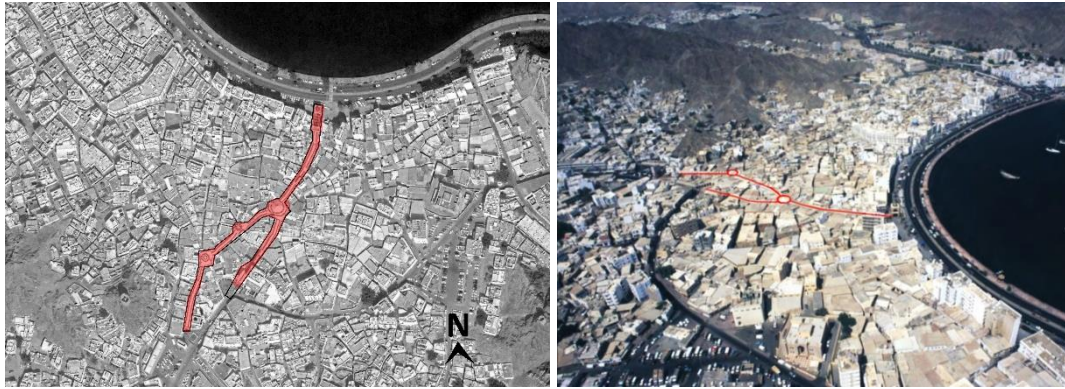


**Figure 44.** (top) Location of Souq Waqif with the city’s context and relevant landmarks. (bottom) Main streets around Souq Waqif.

### *Souq Mutrah, Oman: History and Development*

Oman is known for a variety of traditional souqs throughout the Sultanate. The Ministry of Tourism listed several souqs in 2016 as touristic destinations, including Souq Mutrah, as one of the oldest traditional markets in the Sultanate dating back about 200 years (F. Scholz, 2014). The souq is in the old city of the Mutrah district and extends along the coastline of the Mutrah Corniche. The main spine, shown in **Figure 45**, extends from the main gate on the Al-Corniche promenade/coast at the north and splits to two gateways towards the city’s old quarters to the southwest.





**Figure 45.** Main spine of Souq Mutrah highlighted in red (**left**) on satellite image in 2019 and (**right**) on bird view of Mutrah District: Goolge Earth/ Muscat Municipality, 2005 - Edited by author)

When Sur Lawatiya to the northwest of the souq was built, the souq started to form. Gradually, the storage rooms were converted into shops overlooking the outer rails with fronds and wooden ceilings (Muwaffak, 2019). This main branch of the souq is called *Al-Dhalam*, meaning ‘darkness’ in Arabic, is the local name of the Souq Mutrah in Oman (EverythingOman, 2017). This local name of the souq arose due to the dark and crowded alleyways. Historically, sunrays did not penetrate the market requiring the users to utilize lamps to navigate to their destination.

The souq is opposite to the port of Mutrah, known as Sultan Qaboos, which saw immense trade during the age of sailing ships, being strategically located on the way to India and China. Today, it is an important tourist gateway attracting cruise ships from various parts of the world. Souq Mutrah covers an approximate area of 50,000 m<sup>2</sup>, considering that it overlaps with adjacent residential areas with no defined boundaries<sup>22</sup>. The souq faces the coastline of the Gulf of Oman to the northeast (also known as the Sea of Oman), Mutrah Corniche, and Al-Bahri Road (**Figure 46**).

<sup>22</sup> The metric area of Souq Mutrah is obtained using Google Earth.



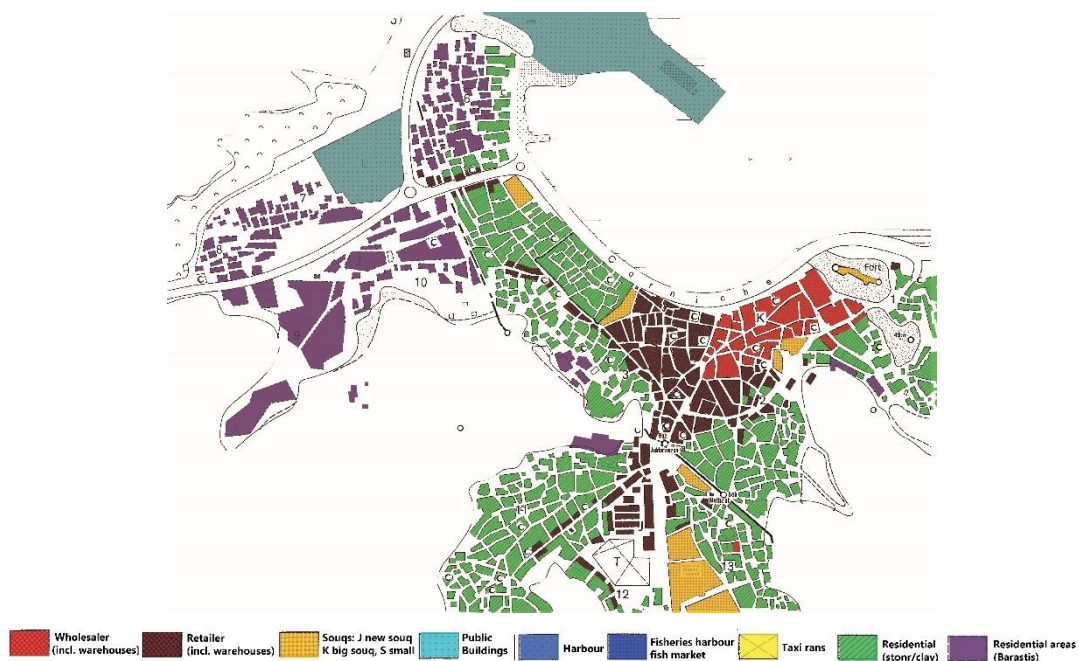
**Figure 46** Historical photographs of the **(left)** Souq Mutrah, and **(right)** what is now Al-Corniche promenade in Mutrah, Oman (EverythingOman).<sup>23</sup>

Traditionally, Souq Mutrah mainly consisted of two parts – one for retail and another for wholesale where they sell food, textile, household items, and traditional Omani clothing, as shown in **Figure 47**. Since the Portuguese occupation in the 16<sup>th</sup> century, Mutrah district has been the central commercial hub of Muscat. Due to these commercial activities, Mutrah had a diverse multi-ethnic population of Arabs, Africans (primarily from East Africa), Pakistani, Indians, and Persians. With the exploration of oil and gas since the 1970s, followed by rapid economic developments of the country and the introduction of supermarkets, Mutrah lost its importance as the commercial hub. As a result, vendors lost their customers, causing many businesses to move to other districts. This has resulted in observable structural changes in Souq Mutrah during the late 1970s and 1980s as the souq developed from a traditional

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<sup>23</sup> Accessed September 1<sup>st</sup>, 2019; <https://everythingoman.blog/2017/02/23/souq-al-dhalem-the-dark-souq-of-oman/>

market predominantly providing food, household items, and textile for Muscat residents to a more localized souq that catered more to the residential areas in its direct, immediate surroundings as well as the expatriate community (i.e. tourism) (F. Scholz, 1990). The general architecture of the souq reflects the cultural identity of the city, especially vernacular architecture.



**Figure 47.** 1974 Land Use Plan/Functional territorial structure of Souq Mutrah (Scholz, 2014 – re-colored by author)<sup>24</sup>.

### *Characteristics of local and physical context of the Souq*

Little seems to have changed in Souq Mutrah since the 1980s, but the built area has expanded. The matted palm leaf huts have made way for permanent structures. The cohesive façade of the souq quarter from Al-Corniche is composed of

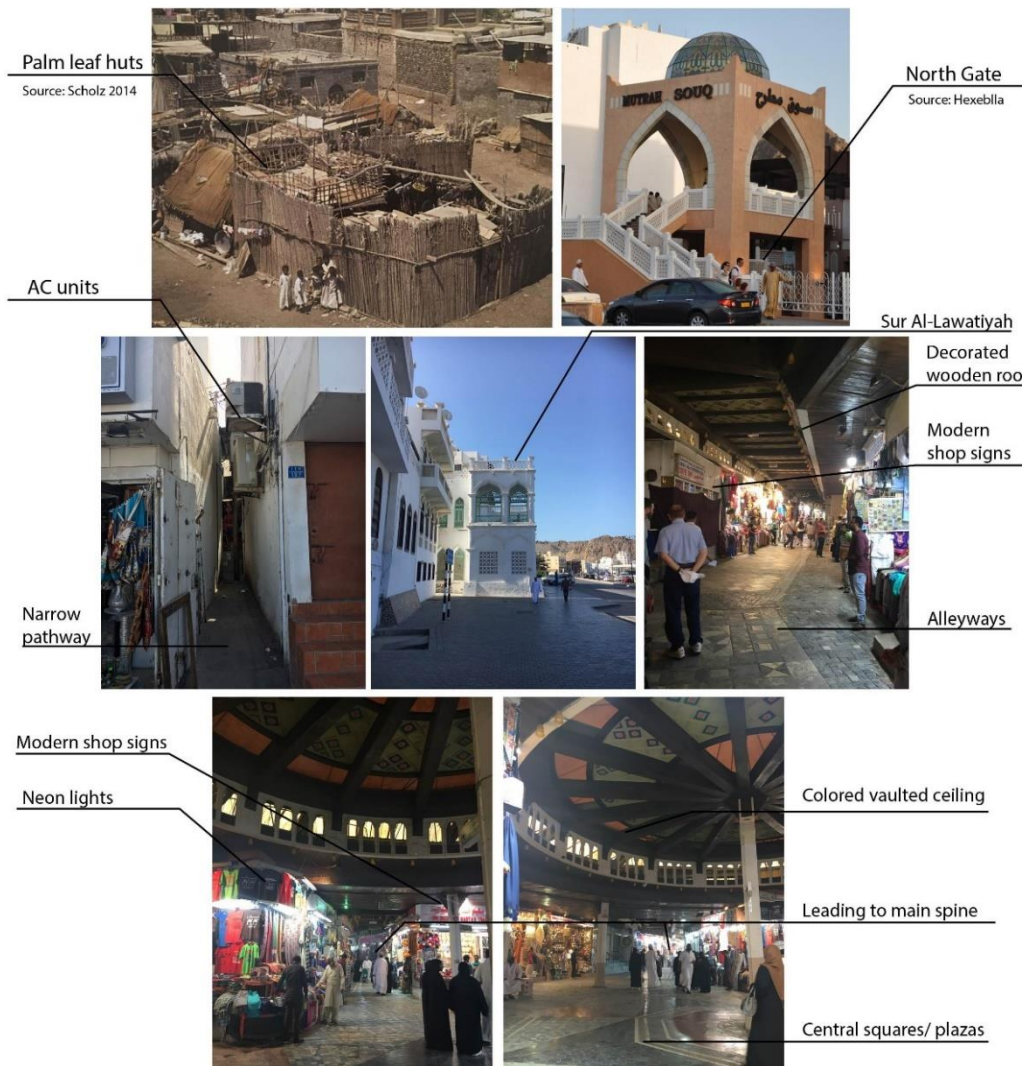
<sup>24</sup> Original plan is found in Appendix H



multi-story shops and office buildings. In the middle, a pastel-colored towering gateway rises to identify and give access to the souq's main artery. Most of the buildings are one to two-story-high with narrow interior staircases leading to the continuation of the shop on the ground floor or a storage area. Continuing in the alleyways of the souq are retail units with sales counters, display windows, signs, and air-conditioning now predominate. In some places, decorative wooden, mats, fabric, and glass ceiling replaced the corrugated metal sheet ceiling set up by the retail unit owners shown in **Figure 48**. Wherever the spine routes intersect, widened out squares have been established and covered with colored vaulted ceiling. **Figure 49** shows a collection of the mentioned features.



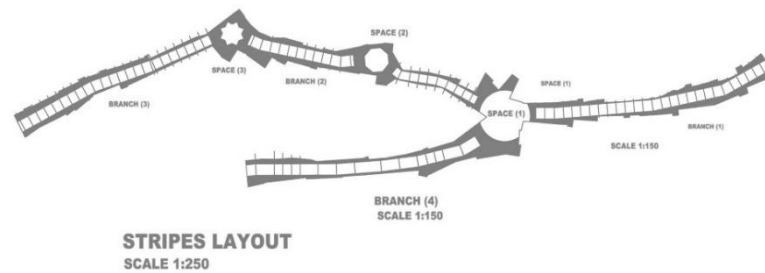
**Figure 48.** A collection of different alleyway decorated ceilings.



**Figure 49.** A collection of pictures highlighting some features of Souq Mutrah (Author unless otherwise noted).

In collaboration with the Ministry of Tourism in 2004-2005, Muscat Municipality developed a plan to enhance the conditions of the souq as a touristic destination. According to interviews conducted with Al-Asfoor and Vidyasagar in 2013, the Souq Mutrah Development Project faced many challenges (Al-Maimani, 2013). Similar to Souq Waqif, the main spine of Souq Mutrah lies on a *wadi*, which explains why most of the shops are elevated from the floor, which caused many rainwater drainage problems. Hence, some of the development objectives of the

projects included protecting the souq from the weather conditions, especially rain, creating an underground drainage system for the *wadi* water coming from the mountains, distinguishing the main entrances, reducing the heat in the main pathways, protecting from fire hazards, and covering the pathways of the souq while allowing for sunlight to penetrate. The souq now has three main gates with adjacent public spaces: the north gate faces the Al-Corniche, and south and south-west gate with entrance plazas shown in **Figure 50**.



**Figure 50.** Map of the development project area in 2005 (Muscat Municipality, 2005).

According to Scholz (2014), the tourists and the foreign workers set the pace of the souq. Omanis are currently more attracted to the air-conditioned malls towards the west of the Muscat (F. Scholz, 2014). However, Souq Mutrah still tends to attract many local Omani costumers. The change in the souq is also evident in the fact that the Shiite traders like Lawatiya and Khoja, along with the Hindu traders (Banjans), no longer characterize the souq. Although many of the shops belong to them, they tend to be operated by expats from India and Pakistan.

There were several meetings held by the Ministry of Commerce and Industry, Muscat Municipality, and Wilayat Mutrah Wali Office from 1996 to 2001 to discuss

improvements of the souq (Al-Maimani, 2013). The primary concerns were: electrical connections; meeting safety and security standards; identification of main entrances for the souq; and, the souq's touristic, economic, and historical importance. Attention was given to preserving the souq in 2001 by recommendation of the Muscat Municipality. Several projects were implemented to enhance the shape of the souq, during 2004-2005 like the Souq Mutrah Development Plan, Development of Souq Mutrah and Cornish Mutrah, and Beautification of Mutrah.

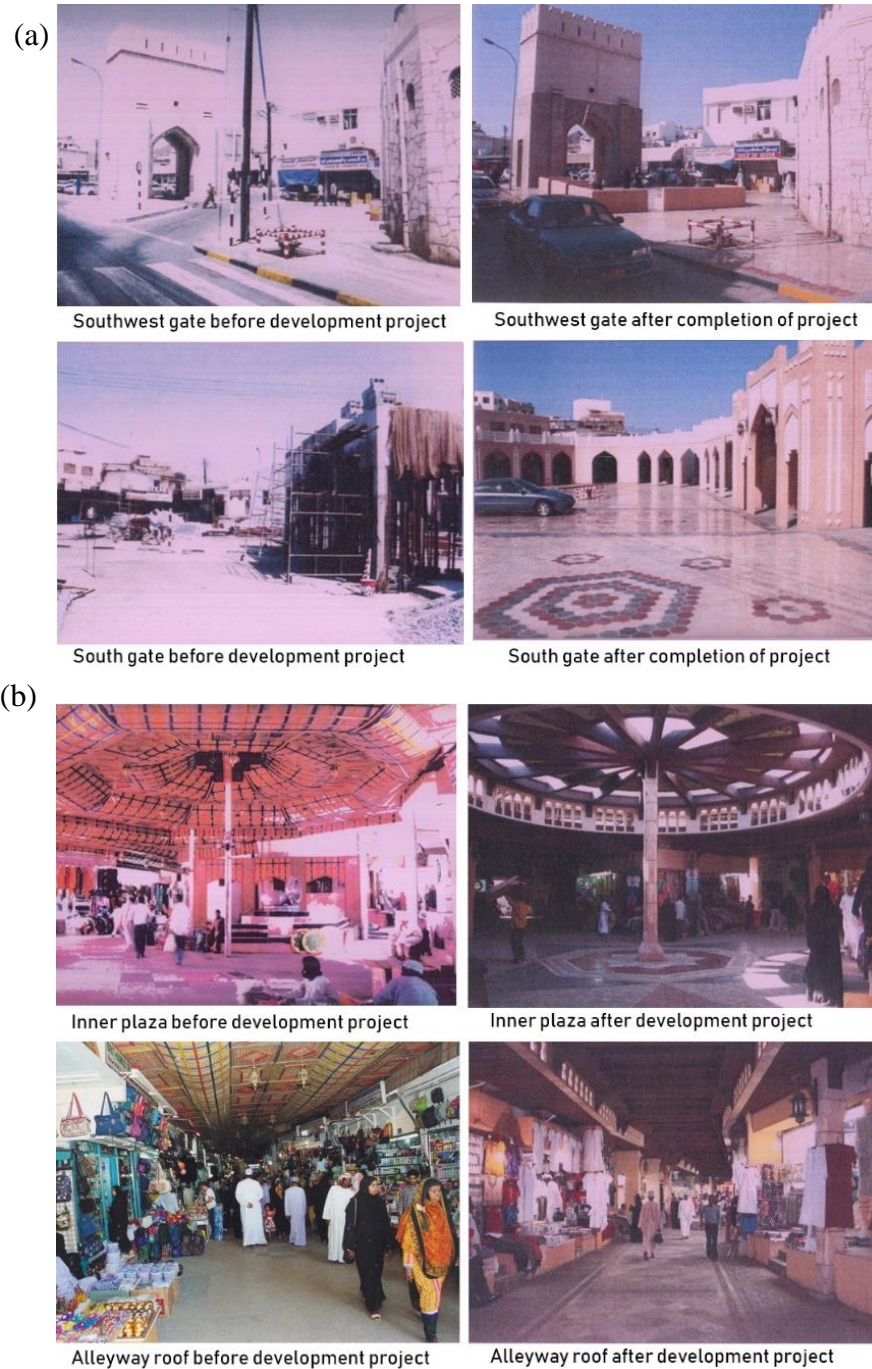
As a result, an elevated structure was designed for the north gate (Gate 1, refer to Figure 50) facing Al-Corniche promenade. The structure was meant to be a landmark to help identify the main entrance of the souq. It was meant to connect to a traditional food restaurant on the upper floor (Al-Maimani, 2013), but now mainly works as a resting and shading area shown in **Figure 51**.



**Figure 51.** North gate through the development project (Muscat Municipality, 2005).

The southwestern gate (gate 2) was meant to become a social gathering space for people to sit, relax, and socialize. The proposal and design interventions are thought to be successful as the public areas associated with the gate host a notable number of people every day (**Figure 52a**). The south gate (gate 3) is an open plaza with arcades that hold retail units and cafe shops. The small space associated with the gate was meant for events to welcome visitors with traditional performances like dancing and singing. Al-Asfoor, the chief engineer for the project of enhancing the souq, adds that during the Eid holidays, the space becomes an attraction for families and children (Al-Maimani, 2013). The ceiling materials of the inner, primary pathways like date palm leaves, steel, and fabric were also replaced by molded glass-reinforced plastic, wood, and other materials (**Figure 52b**) Roof openings were created to allow the penetration of sunlight. Other projects included enhancing the pedestrian experience by adding shading devices, reducing the temperature with AC units, expanding walkways, and providing a more direct connection and sight of Al-Corniche promenade and coast (Al-Asfoor, 2013; Vidyasagar, 2013).





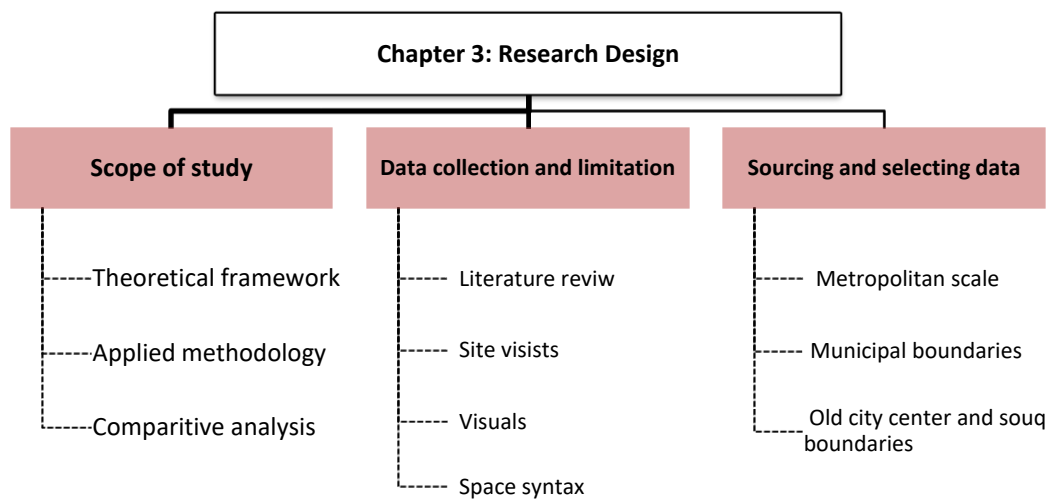
**Figure 52.** Through development project in (a) Southwest and south. (Source: Muscat Municipality, 2005), and (b) alleyways and plazas (Muscat Municipality 2005, Ministry of Information, 2002).

Today, the government has put effort to renovate the market while maintaining its authentic architectural style and shopping experience. Some other projects include the restoration of stairs, and standardizing of shop panels.

### Chapter 3: Research Design

This chapter outlines the research design and methodology for this study of the form, function, and morphological differences between Souq Waqif in Doha and Souq Mutrah in Oman. These two Arabian traditional markets possess many similarities yet some key differences, which the literature review helped to demonstrate. The research design helps to better define and illustrate these aspects of the analysis.

The methodology for studying the two souqs starts with the scope of the study, data collection techniques, data sources and selection, defining the area of study, and concluding with the data analysis tool(s) summarized in **Figure 53**.



**Figure 53.** Summary of the research design of the thesis.

### 3.1 Scope of Study

The overall research methodology consists of three main parts:

- (1) The theoretical framework includes an overview of urbanism in MENA and Gulf Region focusing on the regional contexts of the capital cities of Doha in Qatar and Muscat in Oman, souqs in urban settlements as well as a conceptual review of related concepts such as urban morphology, souq evolution, comparative assessment between the traditional markets based on selected evaluation criteria from the literature review, and a brief explanation of space syntax and its application in this research.
- (2) An applied methodology focuses on several aspects, including space syntax analysis of the urban patterns of Doha and Muscat, concentrating primarily on the area surrounding the traditional markets and old city centers.
- (3) A comparative analysis is conducted between the two traditional souqs. The study of the two traditional markets, Souq Waqif in Doha and Souq Mutrah in Oman, analyzes the history, urban patterns, topographical conditions, architectural characteristics, morphological composition, spatial configuration, typological analysis, spatial context and logic, and land uses according to a set of common criteria.

The activities in the souqs and the way they function are indicators of their success. Much in the same way that Lynch argued public spaces could not be assessed by only looking at the physical space but also at the way people use it (Lynch, 1960). Hence, the souqs will be qualitatively observed to assess how they are used and how well they appear to work as public spaces as an indication of their effectiveness. Based

on these objectives, space syntax serves as the selected method to assist in describing and analyzing the relationship between space of urban areas, including assessing the level of Souq's connectivity and integration within the rest of the city.

### **3.2 Data Collection and Limitations**

In the process of collecting data for this research study, four main methods were applied after conducting the literature review into the background of the cities and souqs:

- (1) **Site visits:** since there is a lack of historical detailed maps/plans for both souqs, especially Souq Mutrah in Muscat, it was necessary to undertake analysis in the field. The methodology includes a survey of existing physical conditions (footprint, number of shops, and figure-ground), observation to study and analyze the functions and life in the souq, and a land-use survey. The site visit to Souq Mutrah occurred in March 2019. Multiple visits to Souq Waqif occurred during this research including in March, June, and September 2019.
  
- (2) **Plans and maps:** Official maps of Souq Waqif and the city of Doha are from the Ministries and Municipalities of Doha (MME, MSUD, MMUD). Although it was possible to collect general information about the original context, it was challenging to gather information about the historical urban fabric of the souqs. However, analyzing the current condition is the primary goal of the thesis. A series of available historical photographs are utilized to help understand the evolution and story of these souqs based on discernible photographic evidence.

- (3) **Mapping, photographing, and test walks:** the aim of these methods was for the observer to note problems and potentials for the public life on a given route. Behavioral mapping and tracing of people's movement helps in understanding and studying public life (Gehl & Svarre, 2013). These methods help to provide a picture of a specific moment in an area. Activities within public spaces are plotted. Photographing is also essential as they provide a visual aid for communication and an analytical tool for capturing situations for later documentation, especially in public spaces. The author methodically conducted two test walks in each souq: one was to understand the use of space for social life primarily in March and September 2019, the other to estimate the connection between the souqs and the coast as it was a historical feature of both souqs.
- (4) **Space Syntax:** Space syntax helps to clearly illustrate, quantify, and understand the morphological similarities and differences arising out of the historical evolution of the souqs as well as the different topographical settings in the two metropolitan regions of Doha and Muscat. The study controls for axial size (i.e., number of streets represented as axial lines) in the space syntax modeling of the metropolitan regions for the sake of comparability based on previous methodology (Major, 2015, 2018). The thesis argues that these topographical differences led to distinct strategies for spatial structure in resolving the paradox of Hillier's principles of centrality and linearity during urbanization. Space syntax helps to better understand these morphological differences to address a gap in our knowledge about Arabian cities.

Based on the processing of axial maps reviewed in this section, two scales of

space syntax models are utilized in this study. One is the study areas of the souqs within their metropolitan network and the other within its more immediate urban context. The differences in the modeling technique are defined later in this chapter. The former consists of around 20,000 axial lines and the latter has around 13,000 lines. Each map is measured for connectivity, global and local integration, and global choice, respectively. Several models were constructed; however, only the most relevant models at a particular scale are shown in this thesis. An axial map without one connected streets was also examined for a more straightforward representation of the fully-distributed urban spatial network in both cities. According to Major (2015), eliminating cul-de-sacs produces a ‘distributed’ model, meaning there is at least one ring of circulation available along any line... cul-de-sacs are only about locally accessing land uses (usually residential) instead of circulation in terms of patterning of the urban layout as a whole. The author utilized the software program Depthmapx-0.5 for processing the space syntax model.

The research also studies the typology of urban tissue based on evaluation of the mentioned patterns as established through aerial photographs, maps, plans, and field studies, including a brief evaluation of block size and shape. The thesis investigates with special attention discernible changes in the physical form of a city over time and how these different cities compare to each other in terms of the pattern and relationship between buildings and open spaces, urban functions and human activities, and street typology and spatial network.

The research began with compiling historical maps of the two souqs and surrounding areas. Data collection involved systematically checking satellite data, Google Earth/Maps satellite data and aerial photographs (including images from 1940

to the present day), development project websites, and historical maps<sup>25</sup>. For both areas, block-based figure-ground representations at half-, one-, and two-kilometer scales were produced. The thesis applies the figure-ground as a source of research inquiry for comparing, contrasting, and analyzing the souqs. The purpose of the figure-ground is to illustrate urban form and space using *poche* technique, scale comparisons, edge definition, texture analysis, and pattern recognition.

**Limitation of the study include:**

- **Time constraint:** due to time limitations and available resources in the literature, land use surveys for the studied souqs was restricted to a defined area and specific points in time. Due to time limitation and travel, the land use survey, test walks, and analysis of Souq Mutrah was mainly focused on the main spine and alleyways around the souq.
- **Lack of resources:** the lack of detailed historical maps and written information of the studied souqs, especially Souq Mutrah in Muscat, as it has not been restored and renovated similarly to Souq Waqif in Doha.
- **Map accuracy:** detailed maps of Souq Mutrah land use were only available later in the study. The plans developed earlier were gathered using an on-site visit,

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<sup>25</sup> Figure ground of Muscat is done using:

- Satellite images; source: Google Maps/ Earth 2018, 2013, and 2012
- Historical Sur Allawatieya Map; source: (Ferwati, 2012)
- BING Maps
- Functional territorial structure of Mutrah, 1974; source: (F. Scholz, 2014)

Figure ground of Doha is done using:

- Satellite images; Source: Google Maps/Earth 2018, 2016, and 2014
- Historical maps of Souq Waqif; Source: (Doha Municipality, 1985, 1986)

available maps, and photographs. Hence, the color legend is not the same for Souq Waqif and Souq Mutrah. However, the uses are similar and easily comparable.

- **Qualitative observations:** qualitative research is time-consuming and subject to many limitations, e.g., heavily dependent on the perception of the researcher, cannot be generalized and might be influenced/limited by the researcher's experience of a place. The features of social life in the souqs that might have been taken for granted through the research were observed by the researcher with a different cultural background, and so some nuances about the markets and their structure and operation may not have been appreciated fully. However, the fresh perspective of the researcher appeared to yield some interesting findings.

### **3.3 Sourcing and Selecting Data: Defining Model Boundaries**

In defining the physical form of the city, its edge or boundary is the most apparent visual delineation of its size and shape. These boundaries are usually used to mark the transition between different epochs, e.g., older agricultural society and the newer industrial. There are many notions as to what constitutes the most appropriate boundary of the city. **Table 7** and **8**, at the end of this section, summarizes the different scales and boundaries utilized in this research.

#### **Metropolitan scale:**

As mentioned earlier, for the sake of comparability, this research controls for axial line when modeling the metropolitan region of Doha and Muscat. The space



syntax model of metropolitan Doha stretches from the coastline to the inside of the G-Ring/Orbital Highway (east-to-west), excluding the highway itself and from Lusail City to Al-Wakrah (north-to-south). It consists of over 22,000 streets representing as axial lines over a metric area of 650 Km<sup>2</sup> (approximately 250mi<sup>2</sup> or 160,000 acres).

The physical barrier of the mountains surrounding the city of Muscat help to define the edge of metropolitan Muscat clearly. The space syntax model of Metropolitan Muscat stretches from the Al-Bustan to Al Mawaleh (east-to-west), and from the Gulf of Oman to Murayat, Al Amarat, and Al-Hajar mountains (north-to-south) (refer back to Figure 24 for orientation purposes). It consists of over 21,000 streets of what is known as ‘Muscat Capital Area’ consisting of 720 km<sup>2</sup> of land area (approximately 278 mi<sup>2</sup> or nearly 178,000 acres).

### **Municipal boundaries:**

The municipal boundaries are set according to the political boundaries for Doha and Muscat. The municipal boundaries of the City of Muscat are 246 km<sup>2</sup>. The municipal boundaries of the City of Doha encompass approximately 132 km<sup>2</sup> of land area. (Source: Qatar Municipality of Development Planning and Statistics/Google Earth).<sup>26</sup>

### **Old city center and souqs’ edge:**

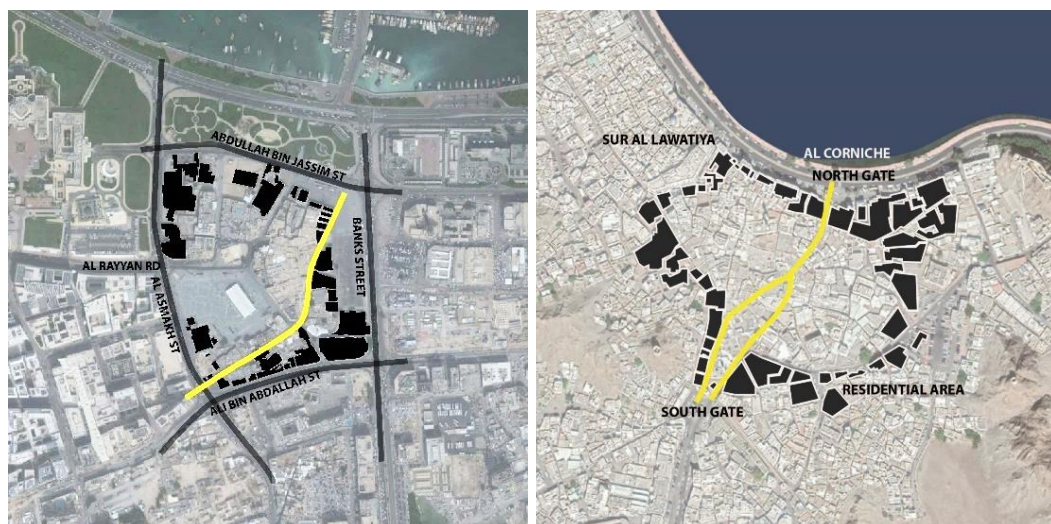
There is no commonly-accepted defined boundary for the old city centers of Doha and Muscat. However, they are defined by the author through the historical maps and plans

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<sup>26</sup> The Municipal boundaries are analyzed later in chapter 4 with the elimination of the industrial area because it is a highlight interconnected geometric grid, and the purpose was to isolate the city center to understand the pattern in the center of Doha better. We are not trying to discover how important the industrial area is – we already know.

available (found in the Appendix B-G). The souqs remained at the heart of the old city centers in both cases, however, in different ways, as will be explained later in Chapter 4. The boundaries of Souq Waqif are well-defined by the streets at its edges. The size of the actual marketplace has increased with the renovation of the souq. However, the main spine and covered market remained consistent with these well-defined boundaries.

Conversely, Mutrah Souq does not have a clear boundary. The souq tends to filter into the surrounding residential areas. However, the main spine of the souq has remained the same over time. Hence, in this research study the boundaries of Souq Waqif are set according to the surrounding streets at the edges and Souq Mutrah boundaries are limited to Sur Al Lawatiya to the north-west, edge of south gateway to the south, residential areas to the east, and north gate/Corniche promenade to the north (Figure 54).

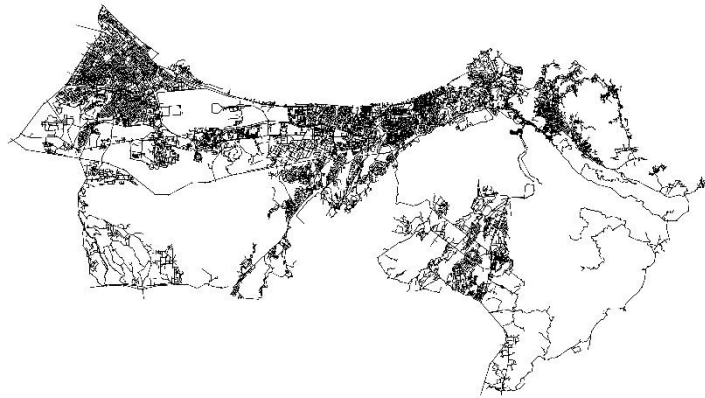


**Figure 54.** The main spine and edge of (left) Souq Waqif and (right) Souq Mutrah for research study.

**Table 7.** Summary table of the boundaries and scales used in this thesis for the city of Doha

Metropolitan Doha	Municipal Boundaries	Old City Center
Area: 650 Km <sup>2</sup>	Area: 132 Km <sup>2</sup>	Area: 2 Km <sup>2</sup>
Axial lines: 22,478	Axial lines: 13,137	Axial lines: 257
less one connected streets:	less one connected streets:	less one connected streets:
20,638	11,834	253

**Table 8.** Summary table of the boundaries and scales used in this thesis for the city of Muscat.



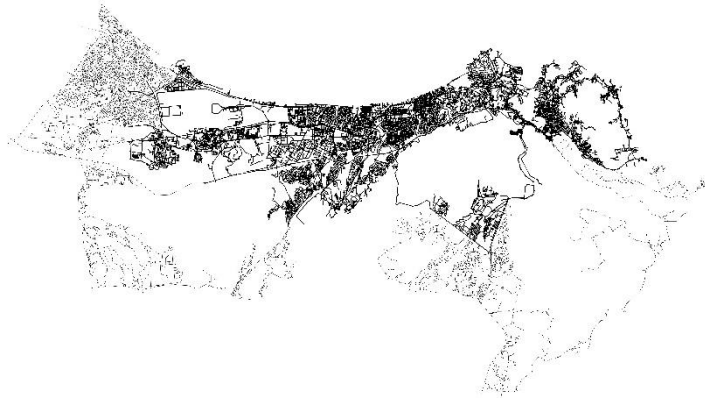
**Metropolitan Muscat**

Area: 720 Km<sup>2</sup>

Axial lines: 21,521

less one connected streets:

15,869



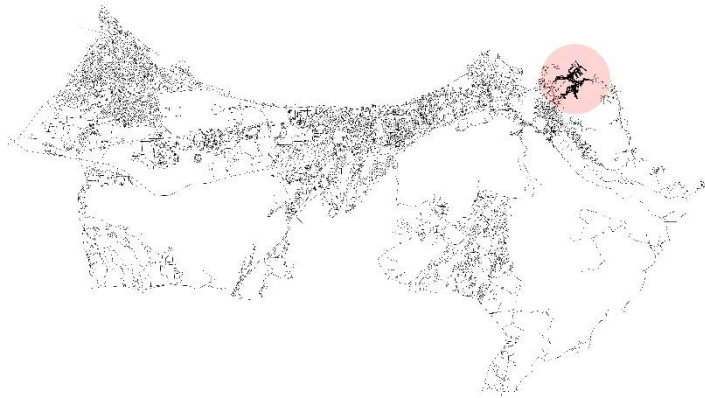
**Municipal Boundaries**

Area: 246 Km<sup>2</sup>

Axial lines: 14,487

less one connected streets:

10,515



**Old City Center**

Area: 1.1 Km<sup>2</sup>

Axial lines: 263

less one connected streets:

310

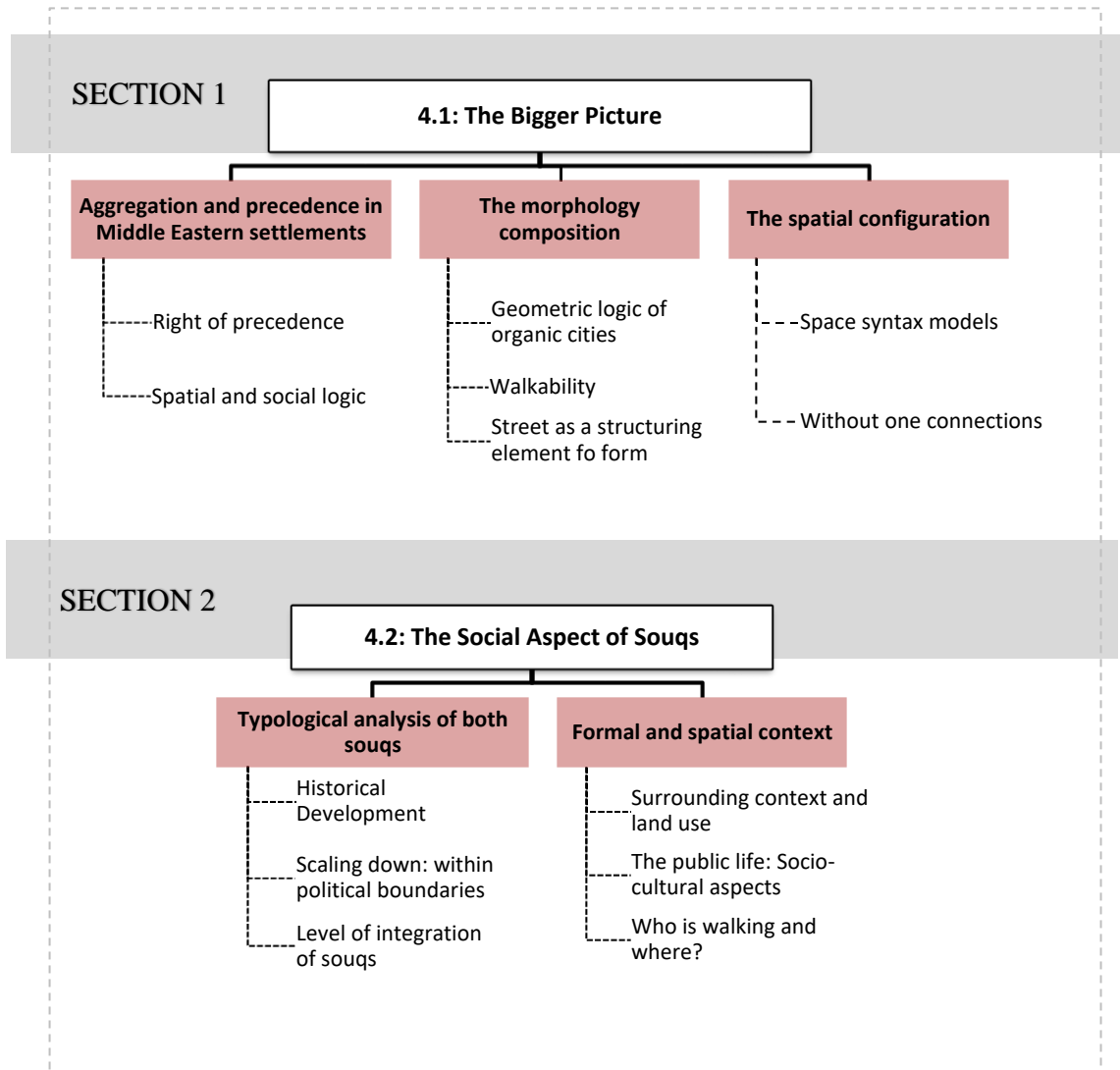
## Chapter 4: Findings & Data Analysis

The city is two things: a large collection of buildings linked by space and a complex system of human activity linked by different types of (casual and formal) interaction. They can be referred to as the physical city and the social city (Hillier & Vaughan, 2007). In the same manner, this chapter is divided into two sections concentrating on the physical and social aspects.

**Section 4.2:** “The Bigger Picture” consists of three parts. The first part focuses on the right of precedence in Middle Eastern settlements and discusses their spatial and social logic. The second part continues to compare the morphological compositions of the souqs and the metropolitan areas of Doha and Muscat in terms of geometric logic and urban typology. The third part presents a comparison using space syntax of the two metropolitan regions of Doha and Muscat.

**Section 4.2:** “The Spatial and Social Aspect of Space in Souqs” presents the topological and typological analysis of the traditional markets within these cities, Souq Waqif in Doha and Souq Mutrah in Muscat, in terms of historical development and accessibility as measured using space syntax. It continues with an analysis of the formal and spatial context, surrounding context, land use, and the socio-cultural aspects of public life. Understanding the social aspect and the way people use public space is crucial for understanding an urban environment.

**Figure 55** provides a summary of the chapter’s structure.



**Figure 55.** Summary of the structure of chapter 4: findings and analysis.

### 4.1 The Bigger Picture

This section includes an analysis of aggregation and precedence in the Middle Eastern settlements. It continues to analyze figure-ground representations for understanding the spatial organization and urban form of Souq Mutrah and Souq Waqif within their immediate surrounding context. The goal is to provide an easily comparable visual representation from which we can make meaningful inferences about urban form and space in each city and marketplace. Finally, analyses of the spatial pattern and configuration of the cities of Doha and Muscat.

#### **4.1.1 Aggregation and precedence in Middle Eastern settlements**

The early development of the Doha and Muscat settlements followed a restricted random process based on simple rules for aggregating dwelling units previously described in *The Social Logic of Space* (Hillier & Hanson, 1984). The most straightforward rule is not to block a neighbor's access to their dwelling unit when constructing your own dwelling. This organic process of restricted random aggregation arises out of purely local actions of users to shape the initial morphology of the settlement in concert with generic function (Hillier, 1996; Hillier & Hanson, 1984). Generic function refers to movement and the basic human requirements for occupation, i.e., food, water, and shelter (Major, 2018). This is responsible for the founding of Doha and Muscat in coastal locations adjacent to a bay, namely, for economy, i.e., pearling, fishing, and water transportation. Access to freshwater in Doha was scarce, which is dependent on replenishing its aquifer mostly through annual rainfall (+/-7.5 cm or 3 inches) and groundwater (Source: U. S. *National Oceanic and Atmospheric Administration*). In Muscat, annual rainfall is higher (+/-10 cm or 4 inches) (Source: Oman Ministry of Regional Municipalities and Water Resources and Kwarteng et al., 2008). Freshwater is also available via groundwater and flash channel systems that access water discharge from natural springs and/or neighboring mountain slopes. Historically, this has placed a premium on the management of water resources in both cities; Doha, more so than Muscat.

The process governing restricted random aggregation in Middle Eastern settlements comes with additional rules in comparison to the European model (Hillier & Hanson, 1984). This includes a 'right of precedence' conveying some rights for preceding properties over successive properties to constrain and order the adjacent physical relationships between neighbors (Akbar, 1998). These additional rules in the

Middle East emerge out of Islamic religious practice, which becomes realized in the physical fabric of settlements where “the environment should be seen as a series of constraints... (which) produce(d) a network of relationships between each owner and his neighbors” (Akbar, 1998).

In summary, the most important rules were a new dwelling unit’s front door cannot be located immediately opposite of a preceding dwelling nor place a window overlooking a neighbor’s yard and violate their privacy. Because of this right of precedence, there also tends to be a less robust tradition of living above shops than found historically in Western settlements. This type of living still occurred but, generally, residential land uses tended to occur more around the periphery of market areas instead of vertically above shops when the settlements were still small. This additional rule helped to give rise to the distinctive settlement form of Middle Eastern (or Islamic) settlements. They might seem labyrinthine to the casual observer today. In fact, they appear to have a well-defined – even sophisticated – spatial and social logic (**Figure 56**) (Correia & Taher, 2015; Major et al., 2019).



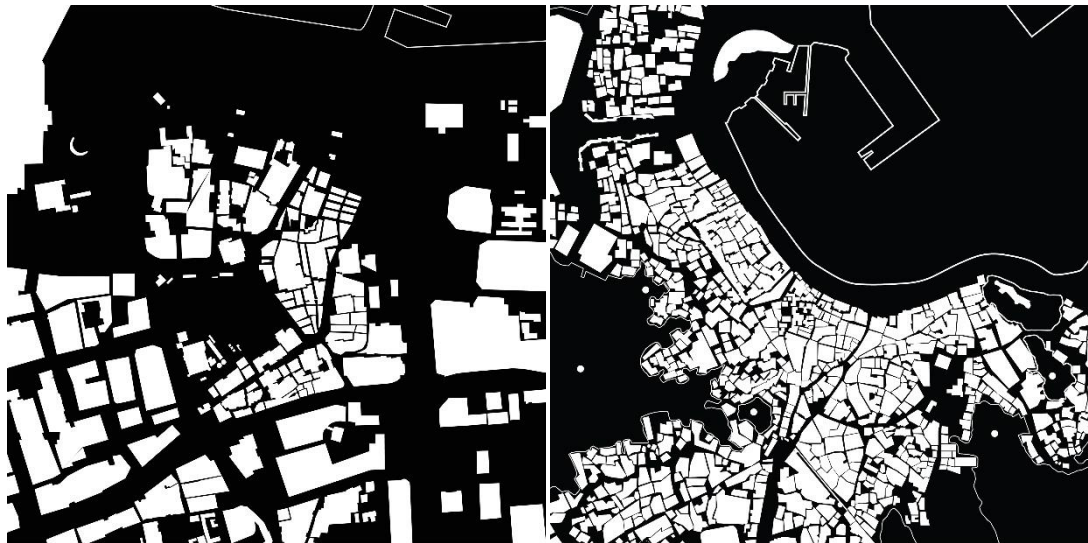
**Figure 56.** Aerial historical photographs of (**left**) Old Doha showing the Souq Waqif and Msheireb areas in the 1940s (Qatar Museums) and (**right**) Old Muscat showing the Mutrah area circa 1900 (Zmewer, 1900).



However, as these settlements become physically larger, this spatial logic requires adaptation to resolve Hillier's (1996) paradox of the principles of centrality and linearity in urban form (Major, 2018). The most internally integrating shape is a circle, which is akin to an urban block due to the human tendency to vertically build at (or near) right angles. The most externally integrating shape is a line, which is akin to a street. As Hillier points out, these are inherently contradictory concepts governing internal relations in a settlement and its relations to the outside world, which requires resolution of this paradox in the physical form of settlements (Hillier, 1996 and Major, 2018). This becomes necessary to maintain the center of the settlement accessible to its ever-expanding edges while successfully mediating between different parts of the urban grid within the collective whole. As described by (Hanson, 1989) and (Hillier, 1996), this tends to result in blocks becoming more rectangular and streets broader and longer, most often via the mechanism of geometry, which gives rise to the distinctive ortho-radial urban grid (i.e., laws of spatial convergence as per Hillier, 1996) found in all cities around the world to one or another (Major, 2018).

For example, this process is apparent in the emergent superblock structure seen in the figure-ground representation of one square kilometer (1 km<sup>2</sup>) of Old Doha (**Figure 57**, left). This includes the hierarchal differentiation of street widths within the restored Souq Waqif (at the center), especially in comparison to the wide Al-Corniche Road to the immediate north, and the more rectangular blocks in the areas (Msheireb to the west, Al-Souq to the east, and Al-Najada to the south) surrounding Souq Waqif. In the figure-ground representation of 1 km<sup>2</sup> of the Mutrah area of Old Muscat, there is less evidence of this process, but it is still apparent along the wide Al Bahri Road of the Mutrah Corniche and Mutrah High Street itself running in a north-south direction to the center of the area (**Figure 57**, right). As we shall see in the space

syntax modeling of the metropolitan regions, the resolution of this paradox during rapid urban expansion, as well as the topographical differences between the two cities, combines to have a profound effect on their emergent spatial structure based on laws of spatial emergence as per Hillier (1996).



**Figure 57.** Figure-ground (space in black, blocks/buildings in white) of one square kilometer ( $1 \text{ km}^2$ ) area in the urban fabric of **(left)** the older neighborhoods in Doha, including Msheireb and Souq Waqif and **right)** Figure-ground of Mutrah in 2018.

#### 4.1.2 The morphological composition

Figure-ground diagrams provide visual information about the urban form and space of the souqs and their surrounding areas in its conceptual simplicity by having two entities to contrast with one another, i.e., the foreground or *figure* and the *background*. Figure-grounds help us to evaluate several discrete ideas about the relationship between open spaces and buildings, the scale and pattern of development, density, and organization of elements (**figure 58, 59**).



**Figure 58.** 2 km<sup>2</sup> Poche plans (blocks in black and space in white)/ figure grounds of **(left)** Doha, Qatar, and **(right)** Muttrah District, Oman.



**Figure 59.** 2 km<sup>2</sup> network print plan (routes in white and space in black) of **(left)** Doha, Qatar, and **(right)** Muttrah District, Oman.

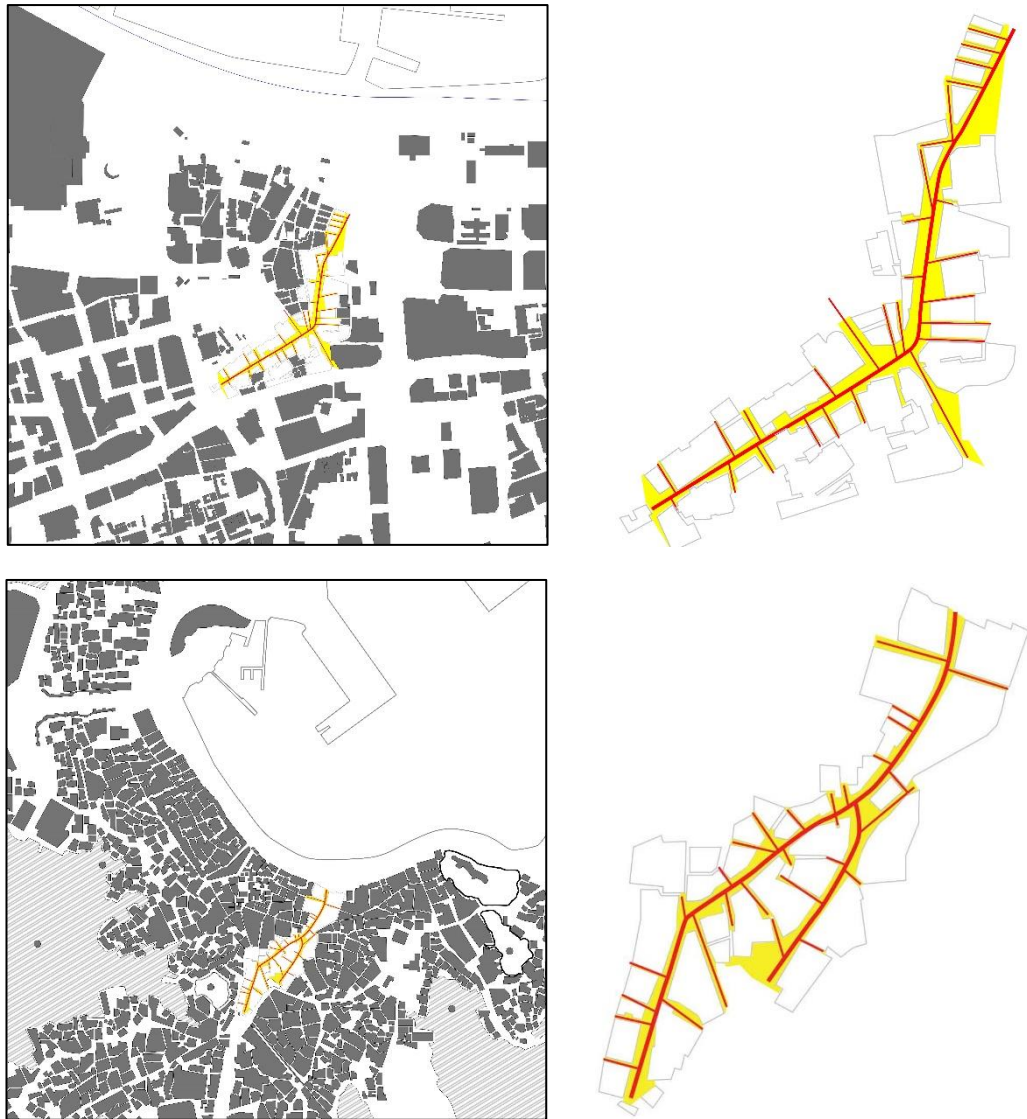
### *Geometric Logic of Organic Cities*

When viewing the results, it is essential to note that the goal of producing these

visuals is to allow for easier comparison and evaluation with the research questions in mind. The physical form of organic cities is often described in terms like deformed, regular, or organic (Major, 2018). However, (Hillier, 1999b, 2009) argues that even apparently irregular or 'deformed' grid of organic cities possess a consistent geometric logic in their axial structure, which is open-angle connections formed by the incidence of intersecting lines (within  $15^\circ$  of a direct  $180^\circ$  continuation) and near right-angle connections (usually within about  $15^\circ$  of  $90^\circ$ ) (Hillier, 1999b). Angles at or near  $45^\circ$  occur but less frequently in comparison. Another geometric variable, line length, has an equally observable relation with angle intersection in deformed grids. For the most part, highly obtuse angles of incidence are associated with long lines and the near right angles with shorter lines. The result is principal streets that tend to be composed on successive lines of sight and access that terminate on building facades at an open angle with secondary streets connecting at a near right angle. (Major, 2018).

A deformed grid layout tends to initially emerge from a local process of aggregation in a settlement; that is, the aggregation of dwellings based on simple purely local rules (Hillier & Hanson, 1984). However, during the evolution of urban form of a deformed grid layout, streets also tend to become straighter and wider and blocks larger in size to varying degrees, more so in European settlements (Hanson, 1989) and less so in Middle Eastern ones (Karimi, 1997 and 1998).

Both souqs, as one of the oldest areas of their city, follow Hillier's logic of deformed grids of open-angle connections and short right-angle connections off them. The main spine of the souqs consists of long paths made up of open-angle obtuse angle connections with near right angle connection prevailing adjacent along these paths, for the most part emphasizing the local sequences of paths rather than the grid itself (**Figure 60**).



**Figure 60.** Main spine constructed obtuse angles with shorter lines connected in near right angle of **(top)** Souq Waqif and **(bottom)** Souq Mutrah.

This occurs not only in the pervasive geometric construction of the street network at the local level of the souqs, but, as we shall see in a later section, we can detect a surprising degree of order in the spatial structure at the global level. As the road network started to get built-in, streets started getting wider and more geometric with clearer right-angle connections. These are later urban blocks, so they start to layout in small-scale grids, whereas the routes of the older areas in the souqs rely on

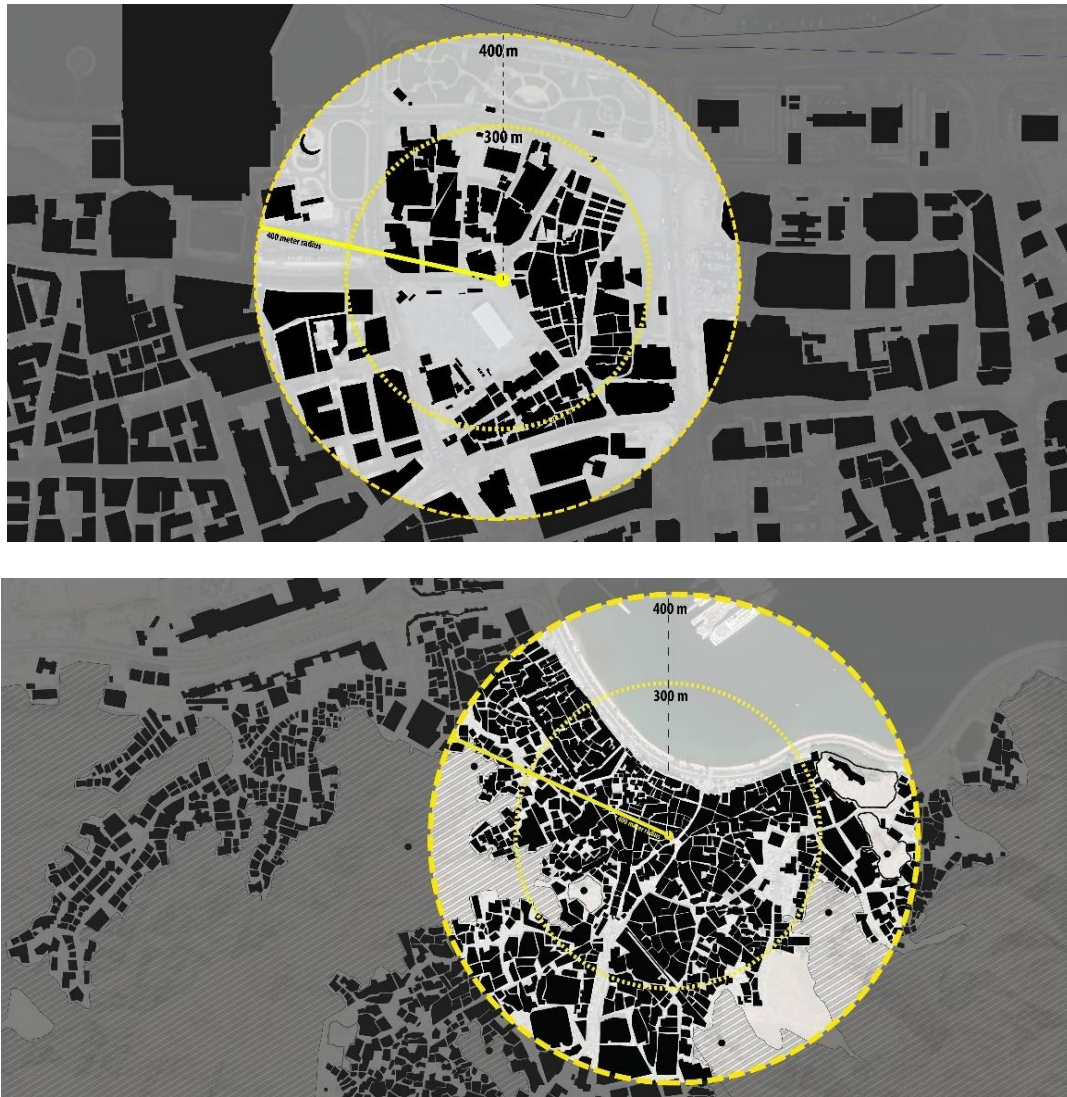
the open-angle connections. So, it is only short routes that connect to those open-angle connections, which tend to be at or near right angles.

### *Urban typology and walkability*

To some extent, the figure-ground helps to illustrate the potential of walkability. For example, the area of the Souq Mutrah appears to be walkable. This is reflected in the figure-ground where the density and connectivity appears high in relative terms. Whereas in Doha, buildings surrounding Souq Waqif are separated by a large distance, which suggests longer walking trip distances. The building and street scales are also larger, which might be less attractive for pedestrian use (Gleckner, 2017). Doha also appears to be composed of a mixture of block sizes. The same places show mostly consistent block shapes; for example, Msheireb Downtown Doha to the west of the souq is composed of compatible blocks with a central courtyard. On the other hand, Muscat seems to have more irregular blocks.

The pedestrian shed diagrams in **Figure 61** highlight the places within walking distance from the geometric center of the souqs. This thesis employs the general assumption that 800 meters (400m radius from the center of the souq) represents a reasonable distance for a typical pedestrian to walk comfortably (Cervero, 2000). It corresponds to the Puget Sound Regional Council (State of Washington, USA) definition of “Transit Community.” Taking into consideration the hot and humid climate during most of the year in these souqs, we are also considering the reduced distance of 600m (300m from the center of the souq) as a comfortable walking distance.





**Figure 61.** Pedestrian shed of a 10-minute walk (600-800 meters) from the geometric center of **(top)** Souq Waqif and **(bottom)** Souq Mutrah.

There are about 82 blocks or buildings within 0.28 km<sup>2</sup> (28 hectares) distance that are reachable within a radius of 300 meters from the geometric center of Souq Waqif. This is an artifact of the superblock structure of Doha and bigger block sizes in comparison with Mutrah. The areas within this pedestrian shed are Msheireb to the west, Souq Waqif Park to the north, and entrance of the Gold Line Metro Station and Barahat Al-Jufairi Park to the southeast. These areas are the immediate boundaries of

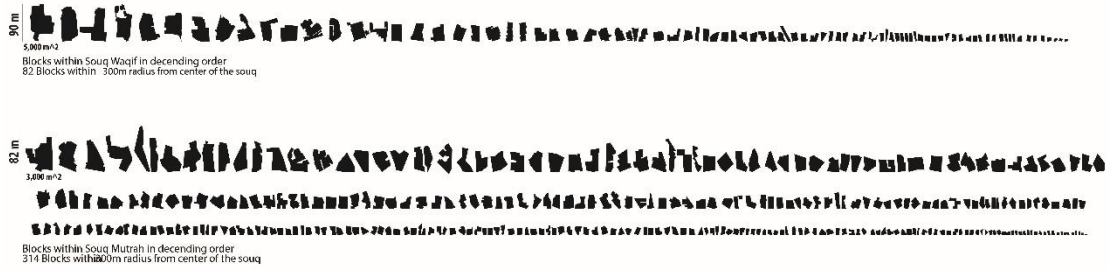
the souq. However, although the pedestrian shed appears to reach the Al-Corniche promenade to the north, it does not reach the street corners where there are crosswalks available for pedestrians to reach the promenade.

About 314 blocks or buildings are reachable within 300 meters from the center of Mutrah Souq, which is almost four times the number of urban blocks in comparison to Souq Waqif. This area covers Al-Lawatiya gated neighborhood (inaccessible to non-residents), Al-Corniche promenade, and all surrounding residential areas. Taking into account the closeness of Souq Mutrah to the coast and harbor as well as adjacent mountainous terrain, this pedestrian shed effectively connects Mutrah Souq to the entirety of the Mutrah area for all intents and purposes.

Another factor is the difference in the perimeter of the souqs. Souq Mutrah continues into the residential area with no defined boundaries, whereas Souq Waqif has well-defined boundaries as an artifact of the superblock structures and street layouts, especially after the renovation.

Even though both Souq Waqif and Msheireb Downtown Doha are regeneration projects, these two oldest areas have much smaller blocks in comparison to more contemporary areas of Doha (Major et al., 2019). The blocks tend to get bigger and more geometrical towards the south and east of the souq. **Figure 62** lays out a rank ordering of the urban blocks within each of these souqs and nearby areas in terms of metric area. There is a range of large to small blocks available in both, but a lot more of every size available in Souq Mutrah, especially small urban blocks.



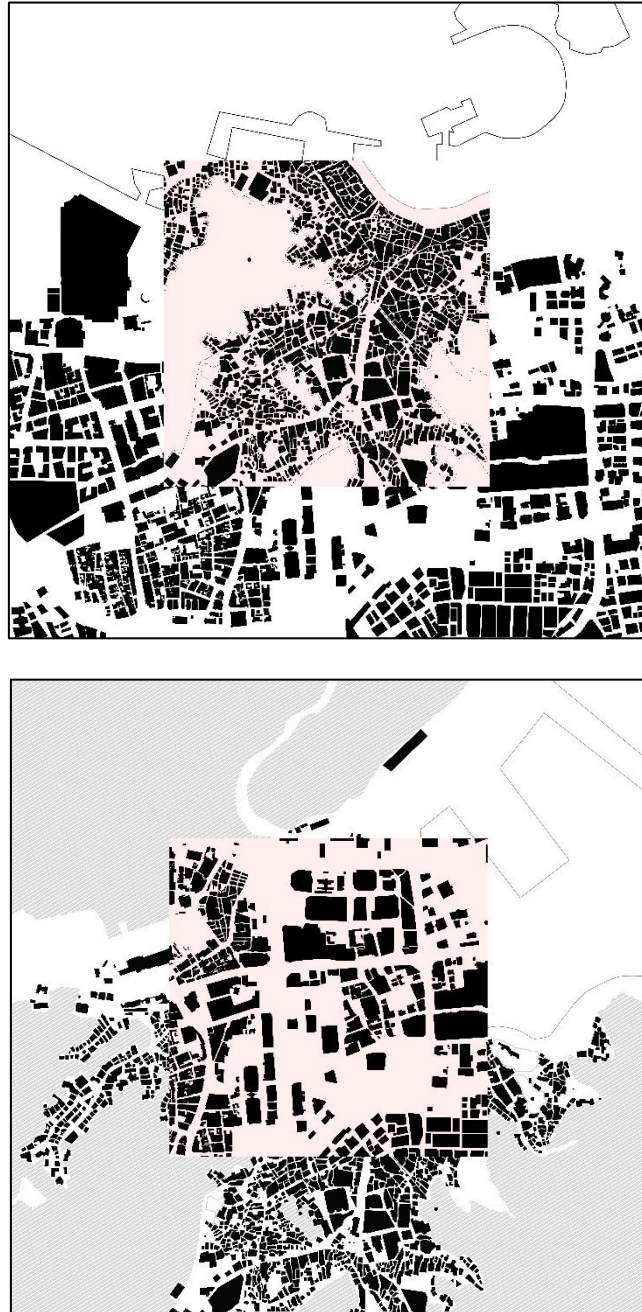


**Figure 62.** Blocks within the radius of 300m (0.28 Km<sup>2</sup>) in descending order (in terms of area) within the area of **(top)** Souq Waqif and **(bottom)** Souq Mutrah set to the same scale.

### *The street as a structuring element of form*

The organization of the figure-ground further illustrates the street patterns in both souqs. In Doha, rather than streets acting as anchors for building orientation (i.e., entrances), the pattern of building placement reflects other elements. Traditional western cities' buildings face streets, and the orientation of the street network can usually be inferred by looking at a building footprint. This is not the case in Doha. It can be argued that Muscat provides a more apparent distinction between street versus building development patterns. In the figure ground of Muscat, the scale of the space between buildings is small with a more precise reciprocal definition of streets. The buildings in Doha, on the other hand, are well spaced and tend to turn inward, offering a limited definition of the streets in terms of entrances. **Figure 63** places 1 km<sup>2</sup> of Mutrah district in 2 km<sup>2</sup> of Doha and vice versa to provide a direct comparison. The effect is noticeable when walking on the ground (**Figure 64**). In the center of Muscat, one will generally travel along the street with many building entrances parallel to the sidewalk. The buildings act as both a container of the street and provide immediate access to land uses. Both Doha and Muscat provide a variation of the scale and organization of urban form. Doha generally displays the large super-block pattern

because of modern transportation planning, whereas Muscat provides a more organic and smaller building footprint strictly contained by its mountainous topography.



**Figure 63.** (top) 1 km<sup>2</sup> Poche plan of Muscat, Oman inserted in 2 km<sup>2</sup> poche plans of Doha, Qatar, and (bottom) 1 km<sup>2</sup> poche plan of Doha inserted in 2 km<sup>2</sup> poche plans of Muscat.



**Figure 64.** Illustrations are demonstrating typical street views of (a) Doha and (b) Mutrah at the same scale as interpreted by the author based on-site visits.

### 4.1.3 The spatial configuration

The axial size of Metropolitan Doha and Muscat serves as the initial control variable in this comparative analysis based on previous methodology (Major, 2015, 2018). The difference in axial size is only 5%. This provides a starting point to bring to light some key metric and morphological differences between Doha and Muscat using space syntax.

Initially, by looking at the population density described earlier in the study, Doha appears over 50% more dense for population than Muscat. However, this appears to be an artifact of the inclusion of the mountainous areas of Muscat, which accounts for nearly 60% of the metric area with 420 km<sup>2</sup> of current unbuildable land. The street density in Doha is approximately 35 streets/km<sup>2</sup>, both with and without the airport lands. The street density in Muscat is more comparable to Doha at approximately 30 streets per km<sup>2</sup>, representing a difference of approximately 15%

between the cities. However, street density in Muscat dramatically rises to 65 streets/km<sup>2</sup> in the absence of the mountains and airport lands. This suggests that Muscat is denser (+81%) than Doha in terms of a buildable area based on street density. This seems to be confirmed since this approximately translates into a population density of more than 5,700 people/km<sup>2</sup> for the buildable area illustrated in **table 9**. This street density is even more remarkable considering the number of one-connected streets in Muscat without the mountain and airport lands, i.e., nearly 4,800 streets. Even with the removal of these one-connected streets, the street density remains 49 streets/per km<sup>2</sup> (+44% compared to Doha).

In contrast, the number of one-connected streets in Doha (8%) is similar to that previously found for 10 European city centers (Major, 2015). In Doha, this is primarily the effect of development patterns, i.e., suburban layouts. In Muscat, this appears to be an effect of both suburban development patterns and edge conditions throughout the metropolitan region due to elevation changes in the topography. Collectively, this has widespread implications for the urban functioning of both cities in terms of spatial structure.

**Table 9.** Summary table of metric area (km<sup>2</sup>), mean depth from the most integrated street and its radius measure, number of axial lines, number of 1-connected lines, and the line density per km<sup>2</sup> in Metropolitan Doha and Muscat.

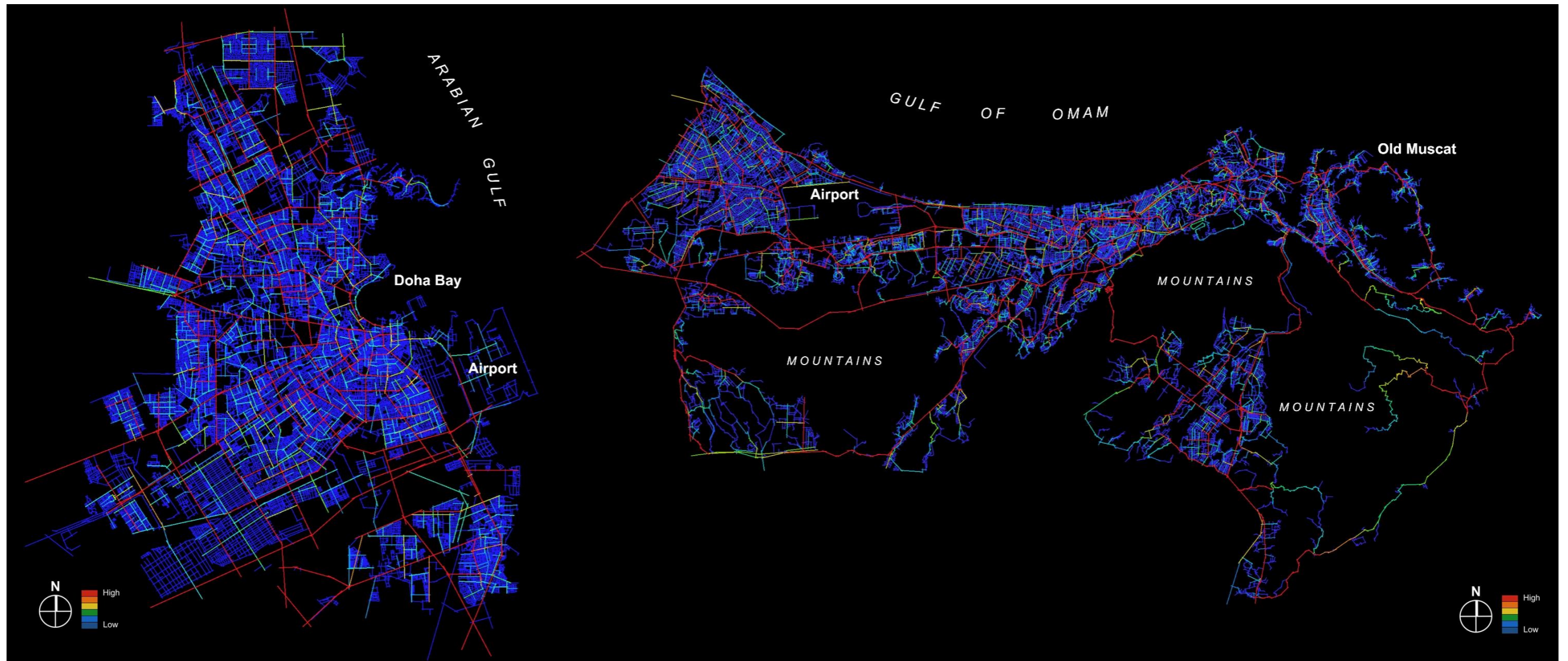
City	Area (km <sup>2</sup> )	Mean Depth	Radius	Axial lines	One Connections	Population (Million)	Population density (per/km <sup>2</sup> )	Density (street/km <sup>2</sup> )
<b>Metropolitan Doha</b>	<b>650</b>	<b>7.5</b>	<b>8</b>	<b>22,478</b>		<b>2,382,000</b>	<b>3,665</b>	<b>35</b>
Less one connection		6.4	6	20,638	8.2%			32
<b>Metropolitan Doha (w/o airport)</b>	<b>610</b>			<b>22,246</b>	<b>1.0%</b>		<b>3,905</b>	<b>36</b>
Less one connection (w/o airport)				20,473	8.0%			34
<b>Metropolitan Muscat</b>	<b>720</b>	<b>20.52</b>	<b>21</b>	<b>21,376</b>		<b>1,720,000</b>	<b>2,389</b>	<b>30</b>
Less one connection		12.8	13	15,869	25.8%			22
<b>Metropolitan Muscat (w/o airport and mountains)</b>	<b>300</b>			<b>19,445</b>	<b>9.0%</b>		<b>5,733</b>	<b>65</b>
Less one connected (w/o airport and mountains)				14,662	24.6%			49

The space syntax model of global choice with all streets (including the one-connected streets) highlights the major road network of through-routes in each city. Choice is a measure based on all streets receiving a value of 1, proportionally sharing that value amongst all streets immediately connected to it, and then totaling the amount of reciprocally-shared values for all streets. Choice tends to represent the pattern of through-movement in an urban spatial network. In Doha, this includes the core of Salwa Road and the D-Ring Road/Doha Expressway as well as the other successive series of ring roads (A-E) radiating outward from Doha Bay to the metropolitan edges. It also highlights the importance of the single road connection (Pearl Boulevard) into the reclaimed island development of The Pearl as well as Lusail Expressway on the mainland to which connects to Pearl Boulevard. Global choice even highlights the main portions of the Al-Corniche Road at the edges of the

metropolitan network on Doha Bay and Omar Al-Mukhtar Street, paralleling a little further inland through West Bay.

In Muscat, global choice highlights the major east-west roads paralleling the coastline and heading north-south into and around the mountains (**Figure 65**). Choice also highlights the entire Mutrah Corniche of Al-Bahri Road/Bait Al Falaj Street/ Al-Nuzhah Street/Al-Saidiya Street ring sequence connecting around the old area of Muscat to the contemporary resort area of Al-Bustan in eastern Muscat (refer back to diagrammatic orientation maps in Figure 24).





**Figure 65.** Space syntax model of choice in metropolitan **(left)** Doha and **(right)** Muscat with all streets, including one-connected lines or cul-de-sacs.

### *Without one-connecters (cul-de-sacs)*

By simply removing the one connected line from the space syntax models, we can understand a significant difference in the topography. Because Doha is relatively flat, it utilizes a similar number of cul-de-sacs as European Cities and American cities (8% and 5% being the average, respectively) primarily due to suburban-type layouts (Major, 2015 and 2018). However, because Muscat has hilly topography, it has a full quarter (26%) of all axial lines at the metropolitan level have only one connection due to a combination of suburban-type layouts, mountainous access roads, and cul-de-sacs at the edge of steep changes in elevation, which is unbuildable land without major earth-moving interventions in the topography.

Due to the high percentage of one-connected streets in Muscat, the study analyzes integration (e.g., relativized mean depth) at various radii based on a distributed model of both cities. Distributed model means the removal of all one-connected streets, including any large-scale, cul-de-sac sequences representing one-way-in/one-way-out routes.<sup>27</sup> This provides a purer network view of the urban spatial network in the city. This because cul-de-sacs contribute little to the systematic functioning of the urban spatial network in terms of configuration other than providing access to individual lots and drawing segregation to the most isolated streets (Major, 2015, 2018). We know these streets are segregated, so there is nothing additional to be gained by retaining them within the model. Our purpose is to understand the network, not the edges of that network.

The space syntax model of global integration (radius=n) in Doha highlights the main integration core of Salwa Road and the D-Ring Road/Doha Expressway,

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<sup>27</sup> Eliminating a one-connected line at the end of such a sequence creates a new one-connected line out of a previously two-connected line. All such one-connected lines are deleted until eliminating the entire cul-de-sac sequence of lines.



which connects in all cardinal directions across the metropolitan region especially in the north and west directions (**Figure 66**). It also highlights the strongly geometric, inter-connected grid of the Industrial Area at the southwest edge of the metropolitan region. The historical origins of Old Doha, including Souq Waqif and Msheireb Downtown Doha, moderately integrate near the center of the urban spatial network on Doha Bay at the eastern end of the Salwa Road/Wadi Musheireb route sequence. This sequence connects east-to-west from one edge of the metropolitan region to the other, which helps to maintain Old Doha (including Souq Waqif) relatively accessible to the ever-expanding boundaries of the metropolitan region, which are approximately 17.5 km to the southwest edge along Salwa Road and 17 km each to the north in Lusail and south to Al Wakra.

In contrast, the pattern of global integration in Muscat highlights the main integration core in modern Muscat on relatively flat terrain at the center of the urban spatial network with longer east-west routes connecting with the rest of the metropolitan region. Shorter streets intersect with these longer routes to provide important cross-circulation within the local area. The historical origins of Old Muscat, including the area around Al-Alam Palace and Mutrah, are segregated at the northeasterly edge of the metropolitan region, quite distant with an approximate distance of 45 km from the westernmost areas of the city such as the Al-Mawaleh region between Sultan Qaboos University and Muscat International Airport. Segregation also dominates the area of Al-Amarat in the mountains in the southeast portion of the metropolitan region.

The space syntax model of integration based on mean depth from the most integrated street highlights the strong and consistent ortho-radial spatial structure of the urban grid in Doha. The radius is set using the mean depth from the most integrated

street in the city, i.e., the longest length of Salwa Road (6.4) (**Figure 67**).<sup>28</sup> In Muscat, the radius is set using the mean depth from the most integrated street in the city, i.e., a relatively long, straight portion of Sultan Qaboos Street (12.8) at the center of the urban spatial network in modern Muscat.<sup>29</sup> For Muscat, it highlights four distinct areas in the pattern of integration at this radius: Old Muscat (northeast), Al-Amarat (southeast in the mountains), modern Muscat (center), Al-Amarat (south), and the Al-Mawaleh region (northwest) between the Sultan Qaboos University and Muscat International Airport. This demonstrates the polycentric nature of the spatial structure in the urban grid caused by the topographical constraints on buildable area in the city of Muscat.

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<sup>28</sup> In this case, rounded down to the near whole number.

<sup>29</sup> In this case, rounded up to the near whole number.

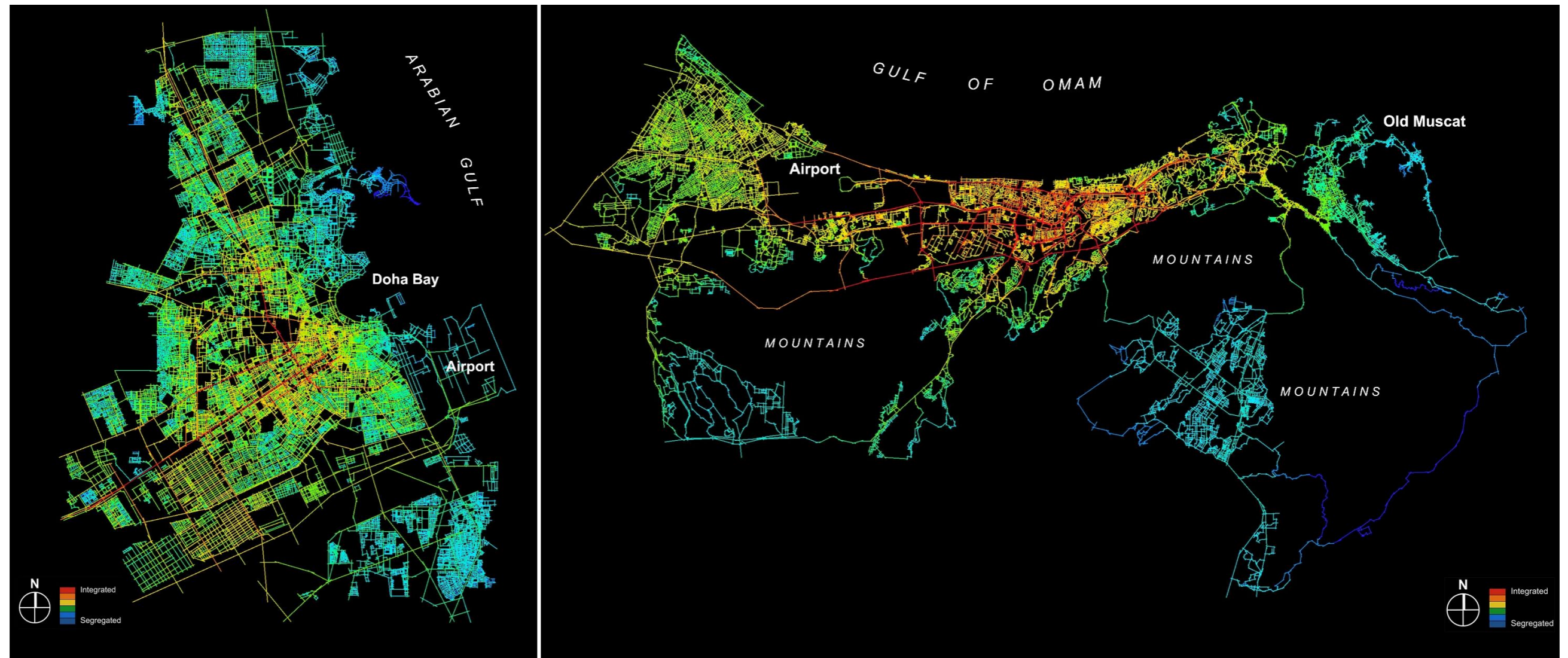


Figure 66. Space syntax model of global integration (radius=n) in metropolitan (left) Doha and (right) Muscat.



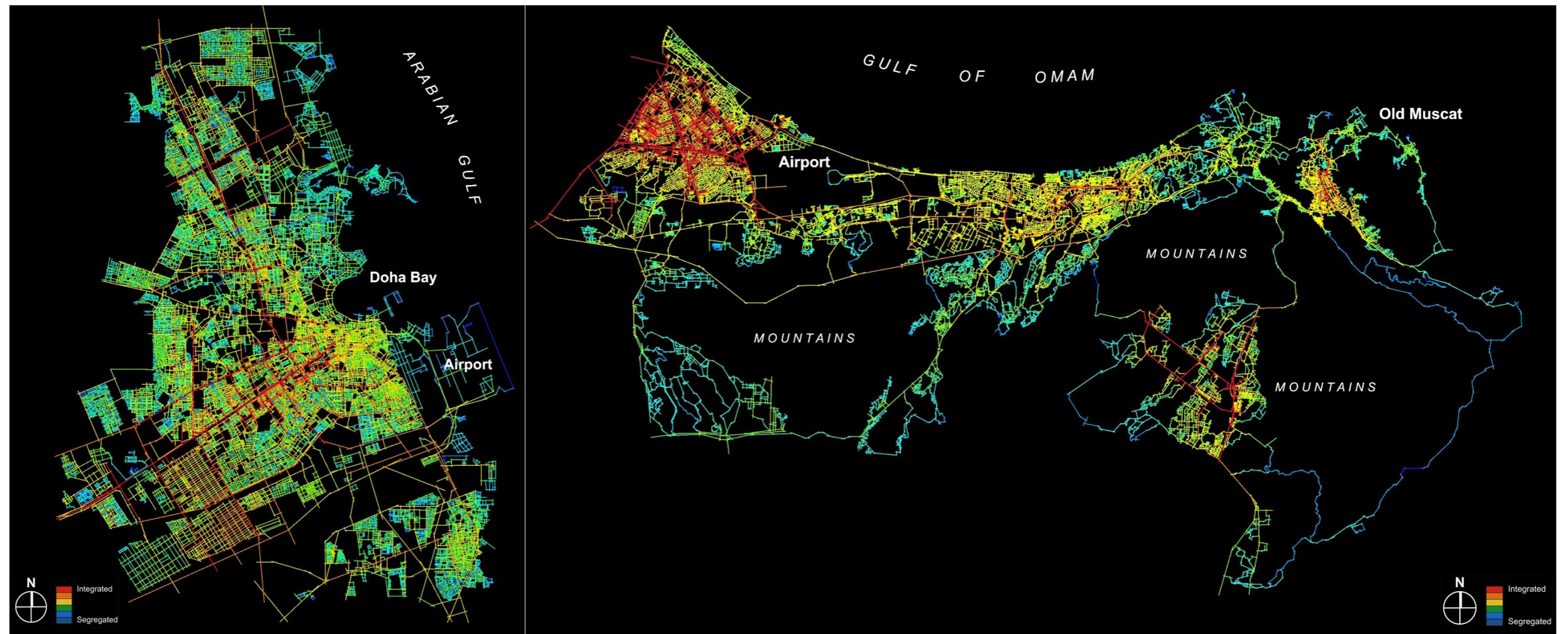


Figure 67. Space syntax model of integration based on mean depth from the most integrated street in metropolitan (left) Doha (radius=6) and (right) Muscat (radius=13).

The analysis demonstrates that both cities had to pursue subtly different spatial strategies for design and planning decisions due to the topographical conditions, which gave rise to different emergent spatial structure. Topography does not necessarily determine these spatial strategies as there are plenty of examples around the world of cities laying out strongly geometric urban grids despite severe topographical constraints (San Francisco, CA in the United States is one of the most famous examples) and highly deformed grids being utilized on relatively flat terrain (such as settlements in The Netherlands). Spatial structure will be likely based on laws of spatial emergence and convergence (Hillier, 1996).

“Spatial emergence is unforeseen macro changes result from a series of micro-changes, and the contrary effect, by which unforeseen macro changes result from a series of micro changes” (Hillier, 1996, p. 122). The “eventual global pattern of space ‘emerges’ from the localised step-by-step process’. At the same time, processes whole ruler are similar ‘converge’ on particular global types which may vary in detail but at least some of whole most general properties will be invariant” - the tendency to form long sequences with few branches, to generate one-deep dead-end space, and to form smaller or larger rings (Hillier, 1996, p. 245).

However, these differing emergent spatial structures in Doha and Muscat do represent a kind of ‘path of least resistance’ development strategy related to the terrain in terms of construction while increasing the city’s physical and population size. In this sense, the topography is not fate but merely another variable that has to be addressed during urban growth in some fashion in the spatial network.

Theoretically, the flat topography of Doha allows urban growth in all directions from the coast. However, this abundant land is mostly barren and desert-like except along the coast. Because of this, the urban form of Doha has remained

relatively compact and dense during urban growth due to the local climatic and soil conditions. The municipal boundaries of Doha (132 km<sup>2</sup> or 51 mi<sup>2</sup>) is only a little larger than the municipal boundaries of the City of San Francisco, California USA (121 km<sup>2</sup> or 47 mi<sup>2</sup>) (Source: Qatar Municipality of Development Planning and Statistics/US Census). Collectively, this gives rise to a relatively coherent and easy-to-understand emergent spatial structure in the city (Major et al., 2018). Doha resolves Hillier's (1996) paradox of the principles of centrality and linearity by balancing these formal characteristics at both the macro- and micro-scale of the ortho-radial grid, much in the same manner detected using space syntax in other cities in the world, especially in Europe (Major, 2018). This is most obvious in the clear layout of ring roads (A-E) and highly integrated radial routes such as Salwa Road and Al Rayyan Road in the city radiating outward from the coast and Old Doha.

In contrast, the urban expansion of Muscat accounts for the stark differences between total land area and real buildable area in the city due to its mountainous terrain. The emergent spatial structure of the city reflects these topographical conditions and morphological realities. This leads to stark differences in the spatial structure at the macro- and micro-scale of the metropolitan region. The planning of Muscat favors linearity (specifically for vehicular movement) at the macro-scale to overcome the local topographical conditions. This is most obvious in the layout of linear road sequences in an east-to-west direction paralleling the coast and the shorter streets making cross-connections in the narrower north-south direction of the metropolitan region. At the same time, Muscat privileges an intense form of centrality (specifically for walkability) at the micro-scale of the spatial structure in different areas such as Mutrah, Modern Muscat, Al Amarat, and Al Mawaleh. We could describe the spatial structure of Muscat as a kind of morphological polycentrism,

which has a physical and topographical nature. This is different from previous research about a kind of functional polycentrism based on the privileging of street segments for integration and angular choice in distinguishing the pattern of land uses arising in the spatial structure of some cities (Mirincheva, 2015). In any case, the emergent spatial structure of Metropolitan Doha and Metropolitan Muscat offer an interesting contrast despite their similar origins as coastal settlements for us to better understand the modern Arabian metropolis. Muscat is compact and dense in its parts, whereas Doha is both relatively as a whole.

#### **4.2 The Spatial and Social Aspect of Space in Souqs**

This section discusses the development of the cities of Doha and Muscat and the way they grew in respect to the case study souqs. It continues with a smaller scale comparison of the souqs to understand their level of integration within their context. The section later analyzes the socio-economic variables realized within the physical fabric of the urban development pattern, surrounding context, composition and configuration of the two souqs, and finally their land uses.

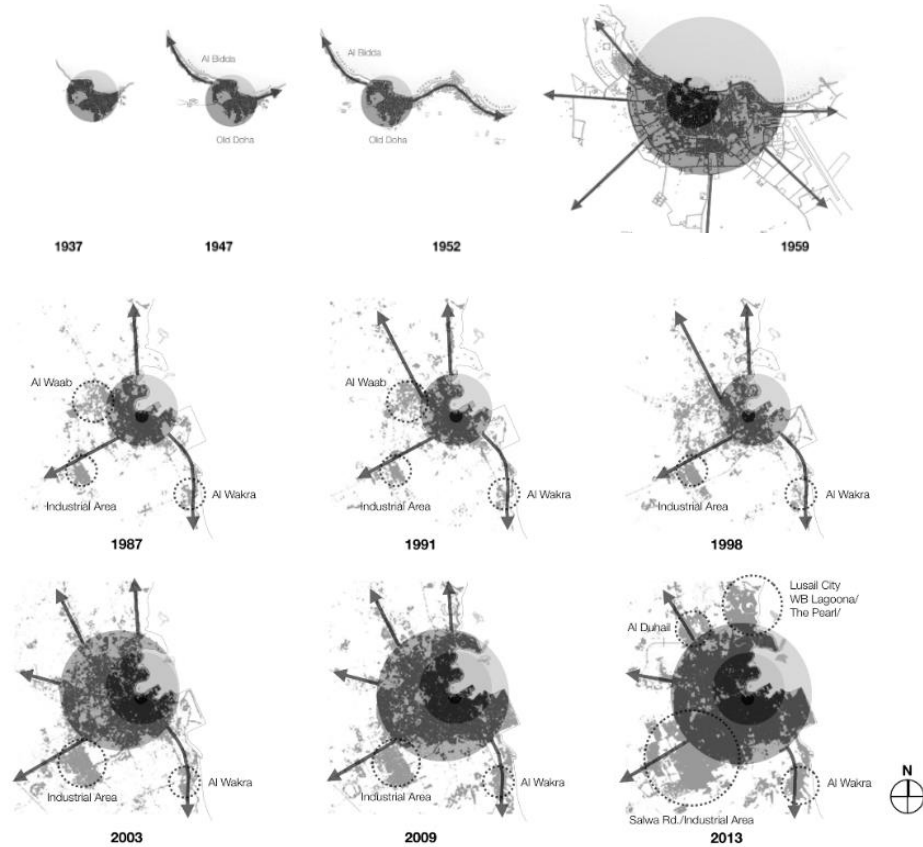
##### **4.2.2 The development of the urban pattern**

Properties of centrality and linearity in urban form often appear in representations of urban growth over time. For example, Chicago and Baltimore showing linear development along routes into and out of these cities contrasted with concentric patterns of growth from the initial settlement related its ever-expanding boundary (Gallion & Eisner, 1963; Kostof, 1992; Major, 2018). Hillier's (1996b) Urban forms must pursue both compactness and linearity by creating external

integration to connect to the outside as well as internal integration for connections amongst locations within the settlement (Hillier, 1996).

Qatar can be described as a ‘deformed wheel’ structure with an enlarged integrated core (refer back to Figure 66 and 67). Hillier and Hanson (1984) describe a ‘deformed wheel’ structure as a convex-shaped integration core forming the axles of the wheel, diagonal lines radiating from center-to-edge forming other integrated cores with the diagonal streets radiating from center-to-edge of the urban spatial network. In this sense, ring roads increase internal integration, and diagonal streets from center-to-edge maximize both internal integration at the city center and external integration towards the rest of the city and the outside world. For example, Salwa Road radiates from the center of Doha towards the southwestern edge thereby introducing centrality into the urban grid while simultaneously maximizing external integration to the Industrial Area, the rest of Doha, and even the entire State of Qatar in terms of linearity due to its eventual connections to the Saudi Arabian border in the southwest of the country (**Figure 68**).





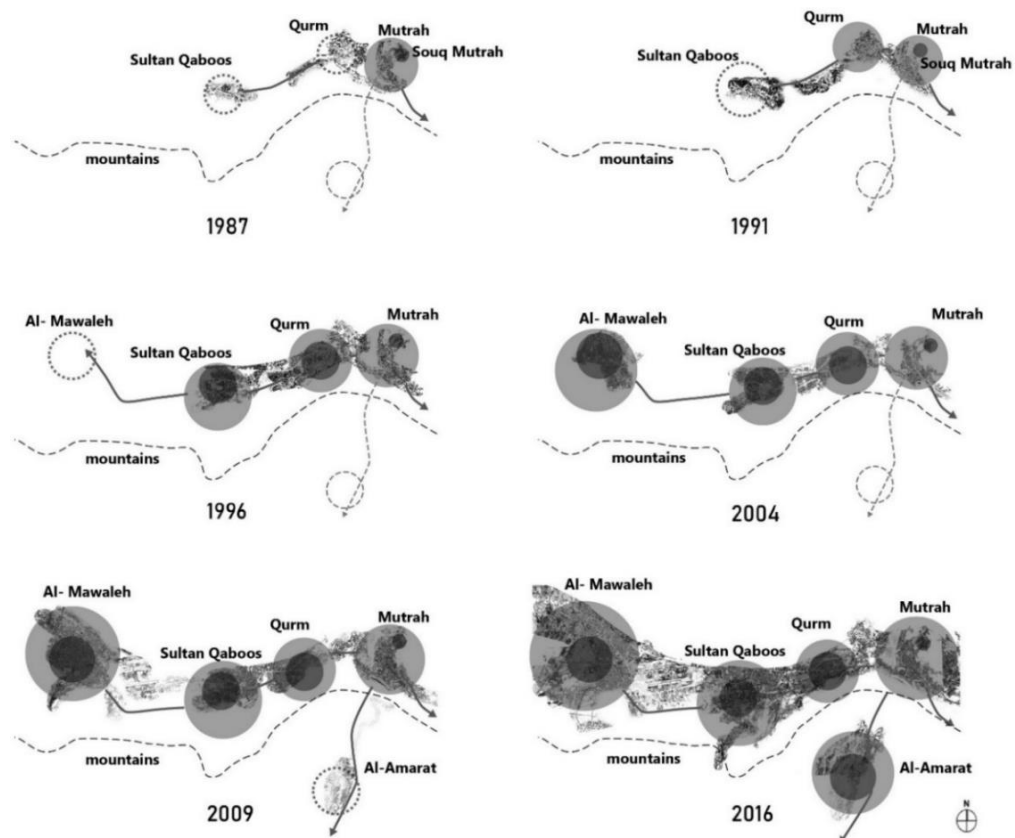
**Figure 68.** The growth of Doha, 1987 – 2013 (base from (A. Salama & F. Wiedmann, 2013) – centrality and linearity growth diagram overlay by Mark David Major)<sup>30</sup>.

- The center becomes larger as the ring roads increase.
- As the diagonal lines increase, the center becomes more connected to the rest of the city like Al-Wakrah to the south, Lusail (Jaidah & Bourennane, 2010) to the north, and Duhail to the northwest.
- These areas become centers of themselves with high internal integration.
- In a sense, Doha grew with direct connections to the center (without neglecting the center). This enabled the city to maintain its center during rapid urbanization

<sup>30</sup> The base images for the top row illustrations from 1937-1959 are from Jaidah and at a different scale compared to the base images for the bottom two rows of 1987-2013 from (Jaidah & Bourennane, 2010; A. Salama & F. Wiedmann, 2013).

and expansion, including spatial privileging of Souq Waqif and Msheireb Downtown Doha.

Given the city of Muscat's mountainous terrain, topography plays a correspondingly significant role in shaping the possibilities for generating the emergent spatial structure in the city (**Figure 69**). Topography can play a role in allowing, limiting, or even denying particular opportunities for the patterning of the urban grid, which Park and Burgess (1925) characterize as the natural advantages or disadvantages of geography for shaping the framework of the urban plan in facilitating or hindering certain activities such as movement (Major, 2018).



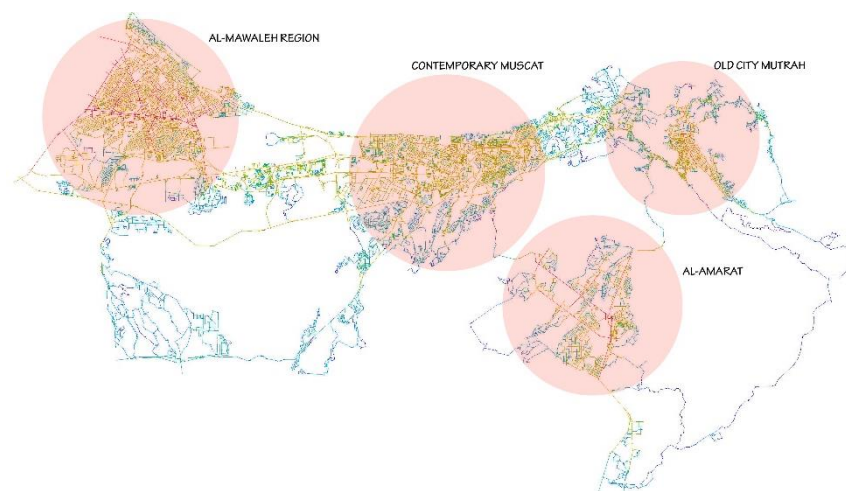
**Figure 69.** The growth of Muscat, 1987 – 2013, with a diagram of centrality and linearity urban growth overlaid.

- Muscat expanded to the west due to the mountainous terrain (refer back to Figure 66 and 67).
- As the diagonal lines increase, the center shifts towards the west to form other centers like Qurum, Sultan Qaboos, and Al-Mawaleh in the west and Al-Amarat towards the southwest.
- These areas become centers in themselves with high internal integration.
- In a sense, Muscat and the city of Mutrah grew away from the old city center to form other settlements to accommodate the topography. This is common for coastal settlements with steep topography such as Rio de Janeiro in Brazil.
- There was a need to expand the historical center of Mutrah for new commercial buildings at the beginning of the 1970s. Al-Amarat, located to the south of Mutrah, within a flat area, provided an ideal location. It is now where the businesses and low-income residential dwellings for 79% of non-Omani expats exists (W. Scholz & Langer, 2019).

Doha's souq might have had the option to keep the residents and operate as a local market if not for the effects of globalization, rapid urbanization, and suburbanization (A. Salama & F. Wiedmann, 2013). However, despite these radical changes, because of its flat terrain, it grew in such a way that the street network still tended to reach out to its expanding edges to keep the Souq Waqif (and Msheireb Downtown Doha) relatively shallow within the enlarged whole. This could be tied back to Hillier's concepts of linearity and centrality in the sense that when it is possible to expand in all directions, it is much easier to remain compact. Because cities must reconcile linearity with centrality, it is much easier to do that and remain compact when there is flat terrain. We also must recognize that even though the terrain

is flat, but it is desert land (not fertile), so sprawling out with these circumstances does not make sense in terms of urban sustainability.

Because of the mountainous terrain in Muscat, it tends to consist of highly localized areas (four settlements) linked together as a function of street linearity (**Figure 70**).



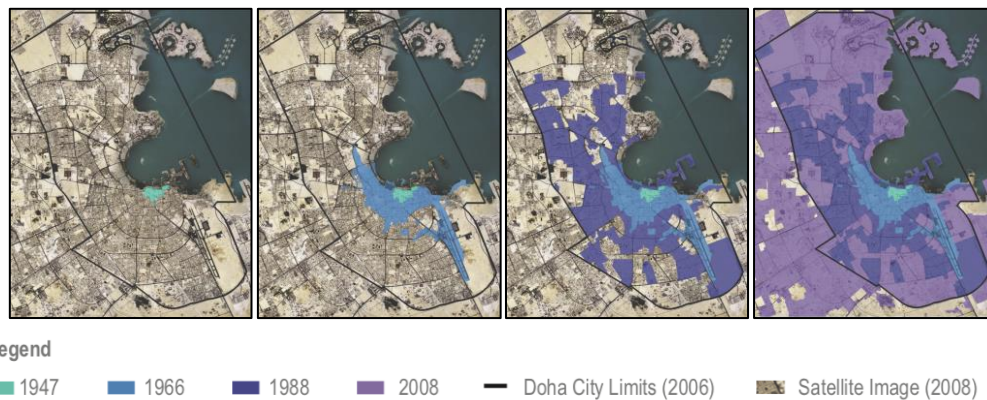
**Figure 70.** Space syntax model of the urban spatial network of Metropolitan Muscat for integration (radius=13).

### *The old city center within municipal boundaries*

Scaling down from the metropolitan scale to municipal boundaries helps in understanding the different scales of the city. Eventually, in terms of the areas of the souqs relative to the size of the city, we are dealing with small areas and a correspondingly smaller contextual model for both souqs: B-ring/A-ring in case of Doha and immediate mountain bounds for Mutrah.

Both cities originated with the souqs as a critical part of the city center. Souq Waqif is still considered at the center of Doha even though it appears to be technically

at the edge of the metropolitan region. Doha has grown in a way that it does not leave behind the souq. Based on the layout of the street topography, people who live and work in different parts of Doha can easily journey to the souq since it remains accessible (**figure 71**).



**Figure 71.** Urban growth of Doha through 1974 – 2008 showing Souq Waqif and surrounding areas as the first developments of Doha (in blue) (Qatar National Framework).

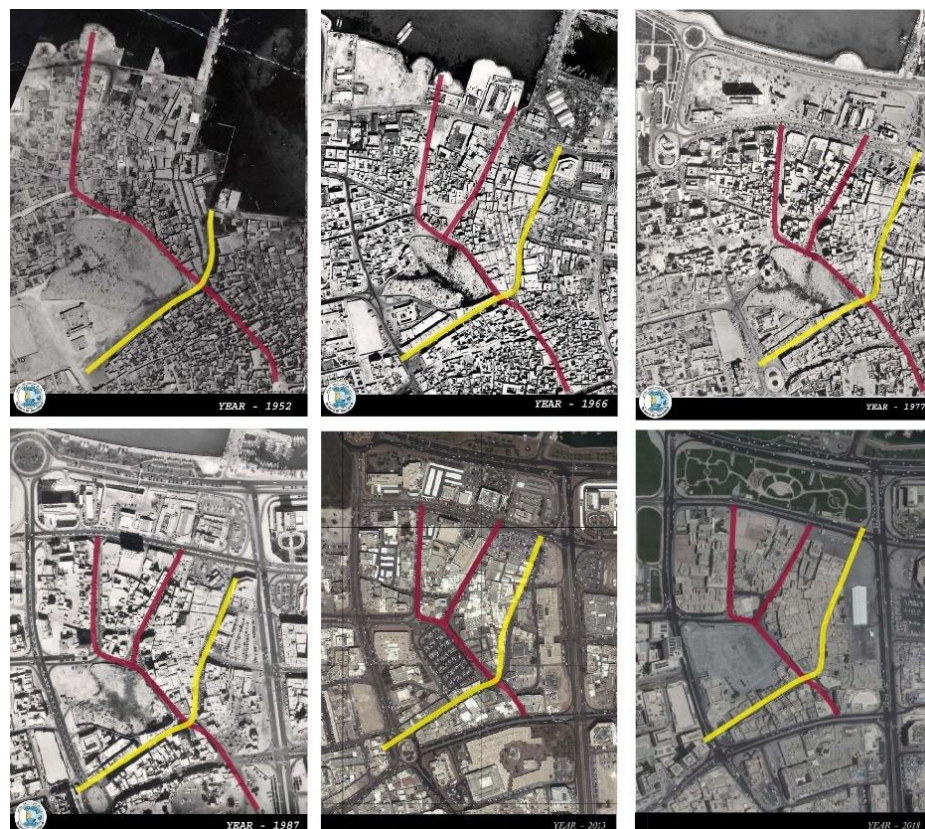
Considering its location and connections within the metropolitan region and the current land uses, going to Souq Waqif is more of a regular nightlife type of trip. Whereas, with the way Muscat is growing towards the west to adjust to topographical constraints, Souq Mutrah (at least in terms of scale) shifted from being at the center of the city towards the metropolitan edge to become a tourist destination trip or localized market instead. It is heavily used by the people who live in the immediate area and tourists. It is less obvious whether it is being used by Muscat residents from other parts of the city.

Souq Waqif and the surrounding area have undergone constant change through

modernization. Some streets have gotten wider, and some have gone straighter.

Therefore, the concentration will be on what remained consistent:

- The main spine of the souq remained the same even as the blocks were increasing in size and metric area.
- The souq had a direct connection with the coast until the construction of Al-Corniche road and the block to the north during which the souq became absorbed into the super-block structure of Doha. (**figure 72**).
- The souq was also directly connected to the south, especially the residential areas.



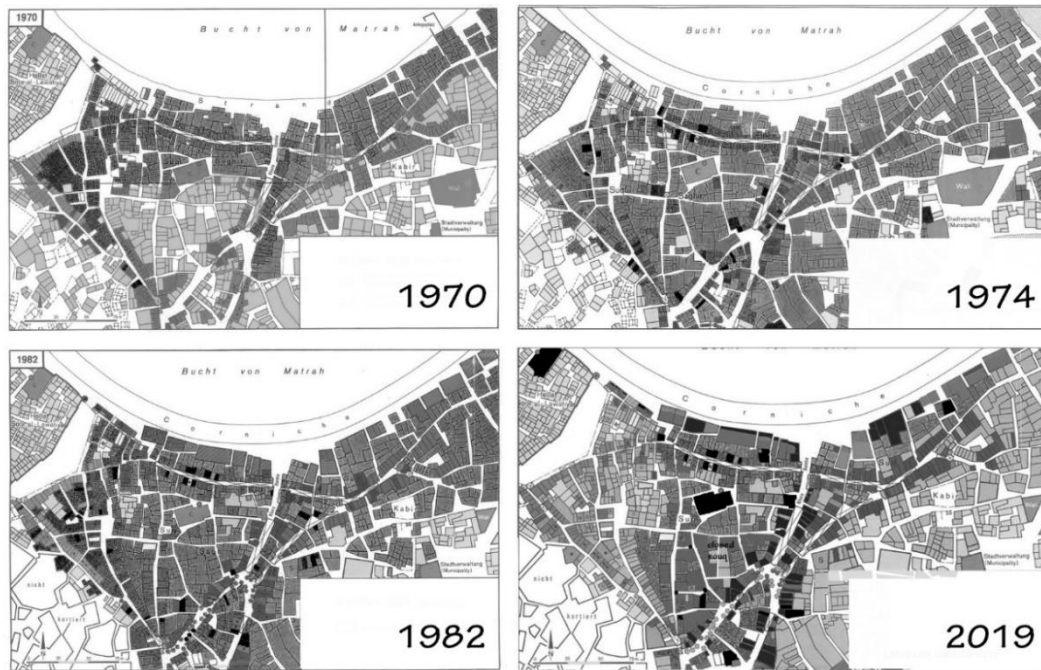
**Figure 72.** Aerial views of the Souq Waqif through 1952, 1966, 1977, 1987, 2003, and 2018 (Qatar Museum – edited by author)



This suggests that most of its current importance in the urban spatial network today derives from its western connections to the rest of the city; not to the north (i.e., coast) or immediately to the direct south. Both souqs are (or were) located adjacent to the water, which highlights the (past or current) importance of their coastal connection. However, the area of Mutrah possesses something different. It consists basically of a large scale topographically-driven circular ring with Souq Mutrah on that ring within a highly localized grid immediately adjacent to the coast. This suggests that Souq Mutrah primarily operates on the basis of centrality in terms of its local path network (loaded onto the souq spine) since it is located at two edges, i.e., at the scale of the metropolitan region and the Mutrah area itself. Conversely, Souq Waqif today operates based linearity through its large-scale street connections to the west of the city (specifically, Wadi Musheireb/Salwa Road and Al Waab Street).

Souq Mutrah, on the other hand, did not go through macro/major changes over time. Since there is a shorter time difference due to the available historical data, the study concentrates more on what changed instead of what has remained consistent. Souq Mutrah's current general state is similar to the way it appeared during the 1970s as seen in **figure 73**.

- The width of Al-Corniche increased, specifically between 1970 and 1974.
- The buildings' footprint towards the southwest and further east became larger.
- The souq spine remained consistent with some changes in the ceiling materials and the addition of outdoor plazas by the main gates.
- The most apparent differences in the souq over time are changes in land uses, which is further explained in the next section.



**Figure 73.** Souq Mutrah building footprint in 1970, 1974, 1982 (NORPLAN and Muscat Municipality - edited by author), and 2019.<sup>31</sup>

With regards to Souq Waqif, the most important connections are Al-Waab and Wadi Musheireb/Salwa Road to the west. Banks Street that also connects the souq to the ring roads and eventually C-Ring Road to the south and southeast of Doha today **(figure 74)**.

Banks Street got wider, and straighter in the 1980s, which also has historical importance as it led to the old port. Historically, there was a weak link to the south until sometime in the 1970s. This segment got straightened out (or driven through) for a better connection to the souq as a part of the modernization of Doha in the 1980s. During globalization and rapid urbanization, it is kept the souq shallow by simplifying the movement pattern and improving the connections to the south and southeast.

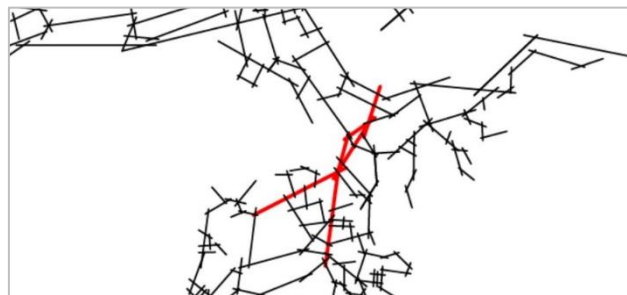
<sup>31</sup> The land use map (decolored for this figure) is a part of the Mutrah Redevelopment Master Plan: Cultural Heritage Stage 2- Conclusions and recommendations, 2011. The legend was in German and so was translated to English.





**Figure 74.** Current development and streets on a simplified 1981 map of Doha (Qatar University Doha-Doha Inner City Development, 1985 – edited by author)

Souq Mutrah, on the other hand, as an area is more an example of pure centrality as everything connects back to its main spine. It has a very localized feed system that connects from Al-Corniche street and promenade through the souq to the other edge of the area (**Figure 75**). The cross-axis route connects eventually to the larger scale circular road, of which the Corniche is a part of. The souq's operation within its context is much more immediate in geographical and topological terms, whereas the context of Souq Waqif is more on the metropolitan scale.



**Figure 75.** Axial lines map representing the feeder system of routes in Souq Mutrah.

### *Level of Integration of Souqs: step depth analysis*

To identify the configurational relationship of these two souqs, we can measure the number of changes of directions necessary from each the souqs to everywhere else in the metropolitan region. We can measure step-depth<sup>32</sup> of all of the internal streets in the souqs to all other streets in the metropolitan area. This will demonstrate how immediately accessible each souq is to the surrounding context or, in other words, how the urban pattern itself ‘reaches back’ to the souqs as old urban centers.

Due to the evolution of metropolitan Doha, Souq Waqif must reach to a much larger scale than Souq Mutrah. Part of the reason for that is that the residents moved out of the old city center area. There is now an attempt to try and lure residents back to the center of the city in the Msheireb Downtown Doha regeneration project. It aims to ‘recreate the community feeling and cultural roots upon which the city was founded’ (**Figure 76**) (Msheireb Properties Subsidiary of Qatar Foundation, 2010; Florian Wiedmann, Mirincheva, & Salama, 2013).



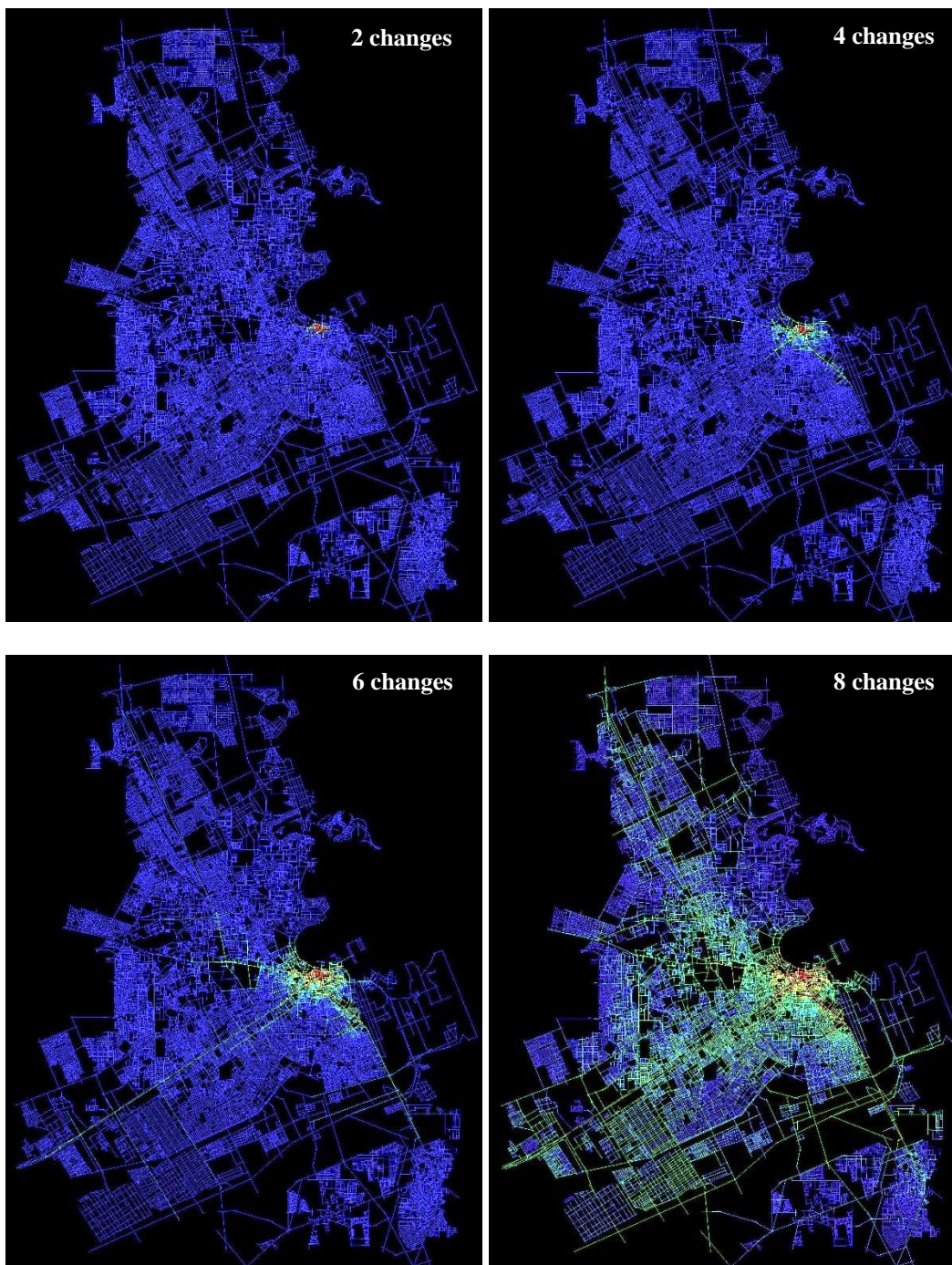
**Figure 76.** Msheireb Project (left) renders and (right) model (Qatar Foundation/*Qatar Living*, 2019).

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<sup>32</sup> Step depth shows the changes of direction from the selected street to all other streets within the system without any one connected lines in the system.

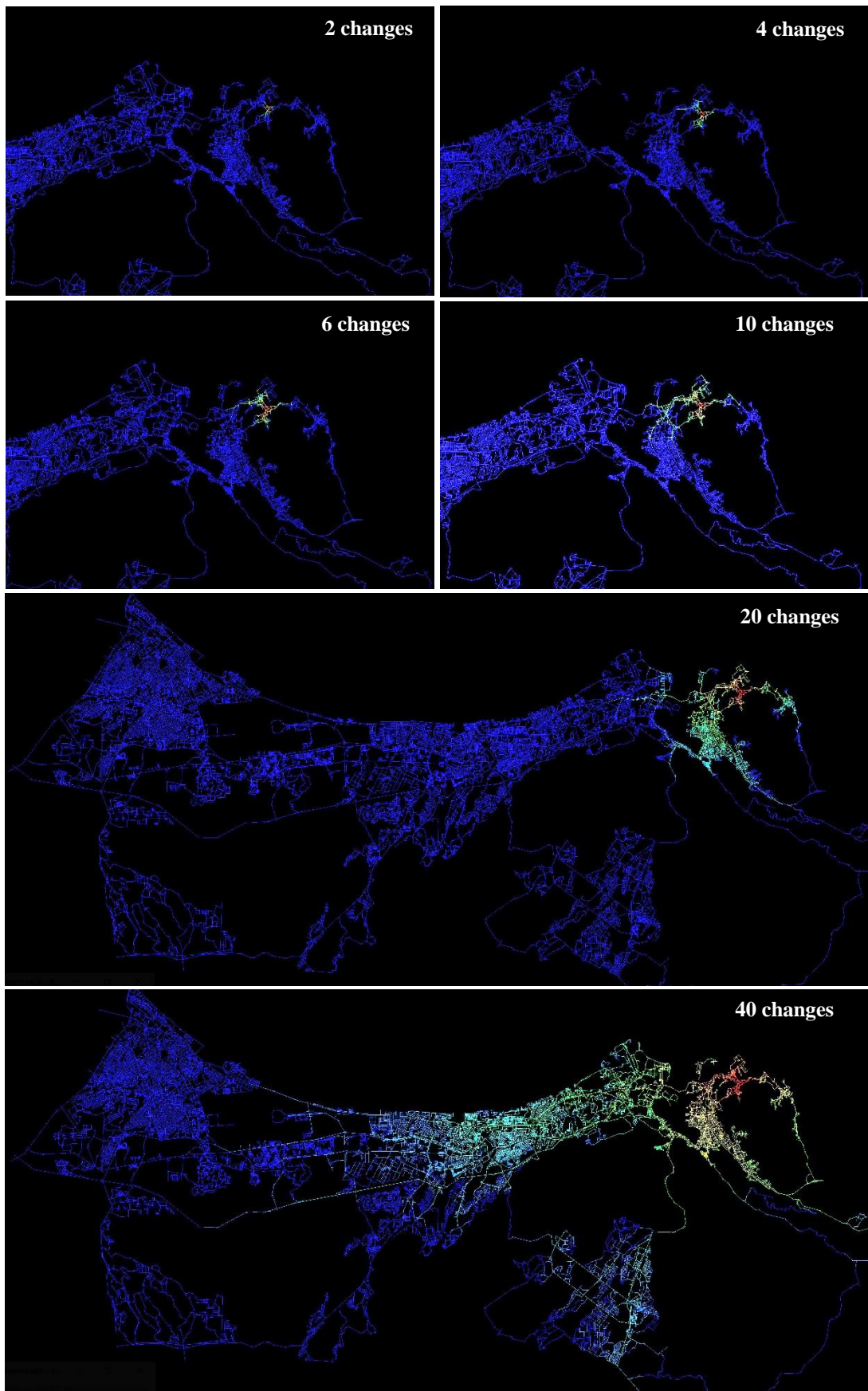
The spatial privileging of Souq Waqif within metropolitan Doha, relative to Souq Mutrah in Muscat, is evident in the step-depth analysis shown in **Figure 77** and **78**. It demonstrates that Souq Waqif lies within 10 changes of direction to almost everywhere else in Doha. However, that same number of changes of direction only connects Souq Mutrah to only its immediate surroundings. In contrast, it takes over 40 changes of direction from Souq Mutrah to reach the almost everywhere else in Metropolitan Muscat in the same manner that Souq Waqif accomplishes in only 10 changes of direction.

Doha's entire metropolitan logic is about not leaving behind that old center. Whereas in Souq Mutrah, the residential areas remain within and adjacent to the souq and so it still operates as a localized market. Souq Mutrah does not depend on all of Muscat to function as a local area. It mainly depends on its local residential catchment area and tourism as an additional attractor effect. The topographical constraints play an important role in Souq Mutrah having to operate as a local market.



**Figure 77.** Step-depth maps illustrating different changes of direction from Souq Waqif to the rest of Doha.

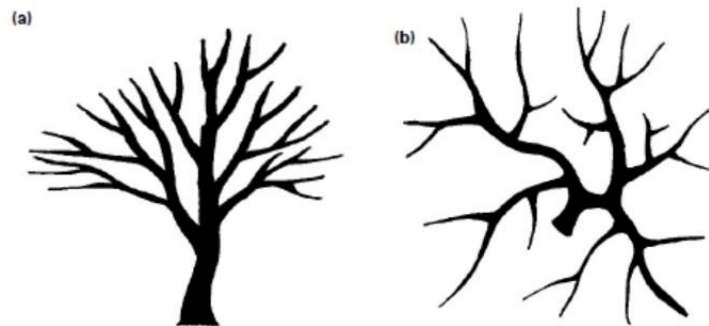




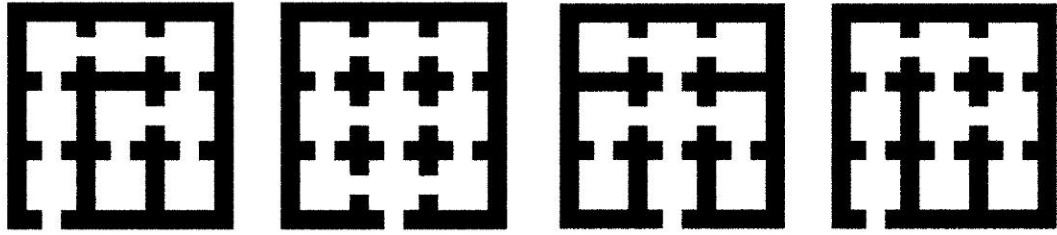
**Figure 78.** Step depth maps illustrating changes of direction from Souq Mutrah to the rest of Muscat.

#### 4.2.1 Formal and spatial context: composition and configuration

As a first and fundamental step, we can make a distinction between two types of formation: those relating to absolute physical geometry as opposed to those referring to abstract topology (Marshal, 2005). Configuration is the way things are arranged or put together to achieve a result. Composition is the proportion of different parts to make a whole. In **Figure 79**, we can see a somewhat typical example of an urban system where the configuration is the same, but the composition is different. In **Figure 80** we can see a building type where the composition is the same (plan of room in a 3 x 3 layout), but the configuration is different due to the threshold connections between the rooms. Composition tends to refer to formal geometrical characteristics, whereas configuration tends to refer to the connective network.



**Figure 79.** Tree patterns showing the same configuration with different compositions (Marshal, 2005).



**Figure 80.** Building level with the same composition but different configuration (Mark David Major after drawings originally by Julienne Hanson).

Street typology can be interpreted in terms of composition and configuration. In terms of composition, we can distinguish between the straight orthogonal streets of typically planned extensions or newly founded settlements versus the sprawling curvilinear patterns of the modern hierarchical layouts in the suburbs (Major, 2018). Alternatively, in terms of configuration, we could distinguish the connective properties of the first type versus the tributary properties of the latter.

In discussing space syntax theory, Bill Hillier draws attention to the importance of the connective topology of street grids, stressing the ‘connectivities ... and their topological arrangement into a network by the geometry of the system, are by far the most important formal attributes of the system from the point of view of movement’; and ‘deviation ... from strict rectilinearity will make no difference provided the connective topology of an orthogonal grid is realized’ (Hillier, 1999: 190; 186) This seems to suggest that it is the abstract connectivity of a system that is important (configuration), rather than the absolute disposition of space (composition) such as street sections and road types; and it implies that continuity of through routes is more important than their strict linearity of alignment (Marshal, 2005). Duany and Talen demonstrate in the Urban Transect that the composition of street sections, road types, and built form does have an important role to play in the urban design of public

places but, as Hillier argues, this is secondary and supplementary to the connective topology (e.g., configuration) of street grids (Duany & Talen, 2002; Hillier, 1999b). It is easier to get the former right if the latter is right. It is more difficult to get the former right when attempting to overcome deficiencies in the latter.

### *Surrounding Context and Land Use*

Changes in land uses tend to be closely related to changes in the movement patterns. Visual permeability and land-uses influence pedestrian movement densities and, accordingly, encounter rates (Hillier, 2002). Movement to and from the land uses, and shops around markets can also be an additional attraction for market users themselves, creating higher densities of movement and activity in the area. The importance of tourism for these traditional markets is also an obvious example of this effect.

A comparison of land use in Souq Waqif from 1985 to 2019 seems to highlight the transition from an active local market before the renovation to more of a nightlife-oriented market afterward, which of course, intensifies its use during the evening. It is currently more heavily used during the weekend than weekday and more heavily used in the evening than during the day. The land use today consists mainly of local food shops, renovated boutique hotel, and retail units. Newly developed land uses include restaurants, an art exhibition center, and hotel buildings. Based on the land use pattern of the 1985 map (**Figure 81a**), the souq was probably more evenly filled throughout the day regardless of the weather before the renovation. Whereas now, with all the restaurants, there is a more obvious temporal shift (**Figure 81b**).



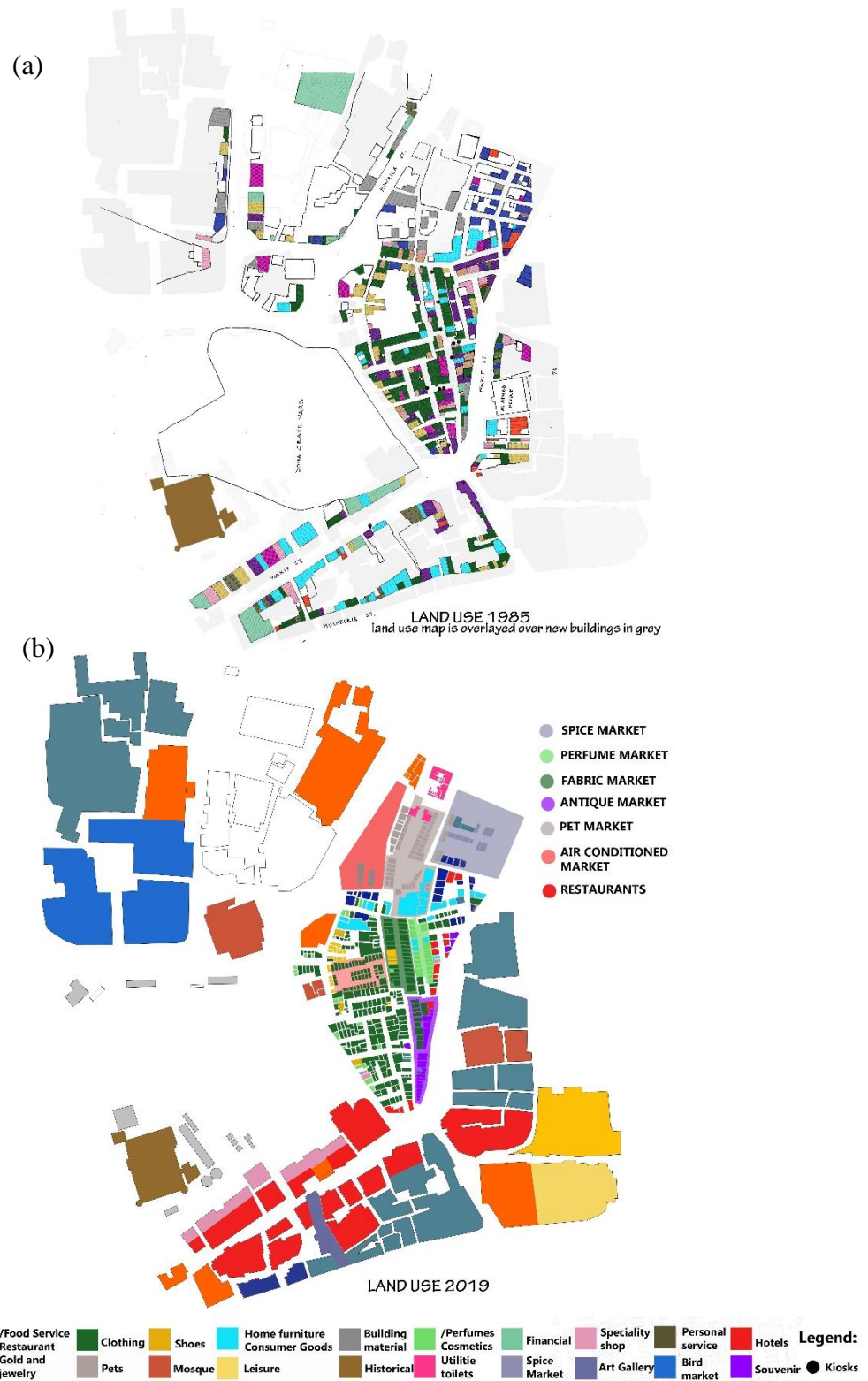
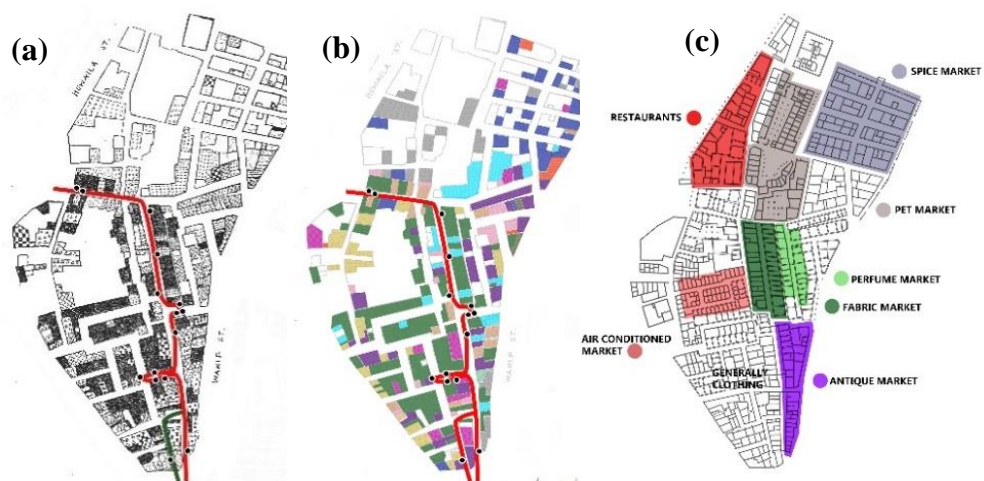


Figure 81. Land use plan of Souq Waqif in (a) 1985<sup>33</sup> and (b) 2019 set to the same scale.

<sup>33</sup> The original plan is attached as Appendix I taken from Doha Inner City Development and recolored by author.

During the test walks, people were observed walking around the souq even during Ramadan<sup>34</sup> and summer evenings (temperature is an excessive 40C°). So, in a way, the basis of the souq is the same; however, it is intensified during the evening. The general retail tends to focus more on the accessible corners and the more external corners tend to be specialty shops. Interior units are mostly clothing shops. The kiosks are usually set up adjacent to the most accessible pathway used by the users (**Figure 82**). There are diverse types of informal and formal seats available in and around the alleyways and plazas of Souq Waqif. However, the number of outdoor seats for cafes have become somewhat dominant.



**Figure 82.** (a) Plan highlighting the way through all the kiosks in Souq Waqif 1985, (b) with land use, and (c) the current specialty areas in 2019 as defined by the author.

Due to a relative lack of restaurants and coffee shops in Souq Mutrah, the opposite tends to occur by comparison. Most of the restaurant/café land uses in Souq

<sup>34</sup> Ramadan is the ninth month of the Muslim year, during which strict fasting is observed from dawn to sunset.

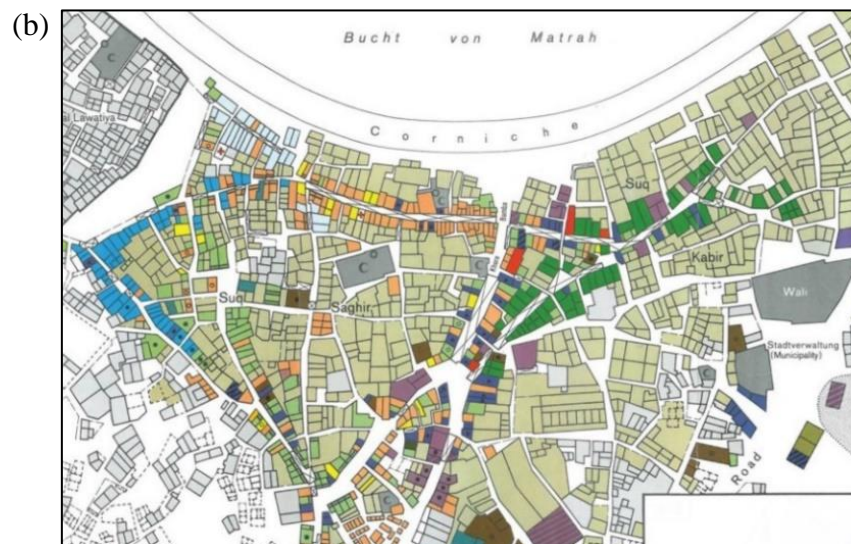
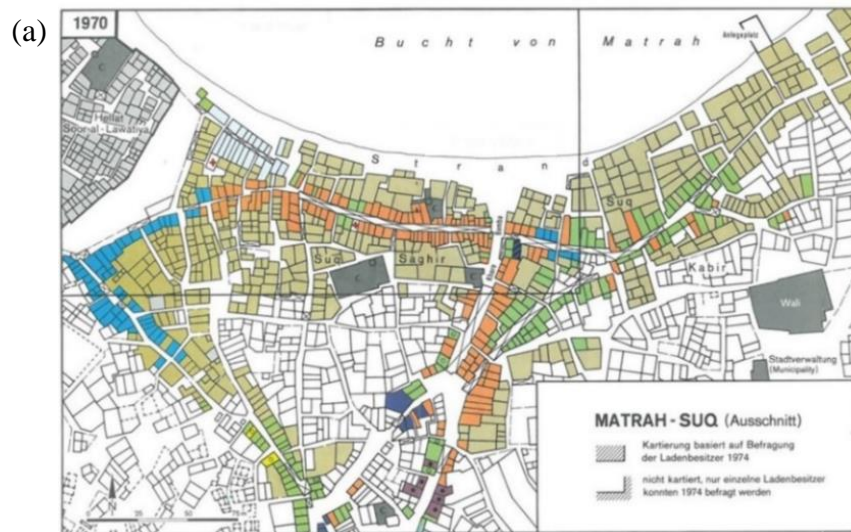
Mutrah are on Al-Corniche at the edge of the market. The land uses within Souq Mutrah consist of shops selling local Omani clothing, antiques and souvenirs, accessories, perfumes and scents, oils and soaps, and household items. Souq Mutrah could be accessed through the main gates to the north and south and several other alleys along the street frontages. The layout of the market itself reflects the surrounding street patterns with several access points and so remains very accessible. The covered market is always physically accessible regardless of opening or closing time (specifically, prayer hours) (**Figure 83**). It, therefore, operates as a covered street. Many people walk through the main spine of Souq Mutrah on their way from somewhere to somewhere else. They are not necessarily going to shop or eat.



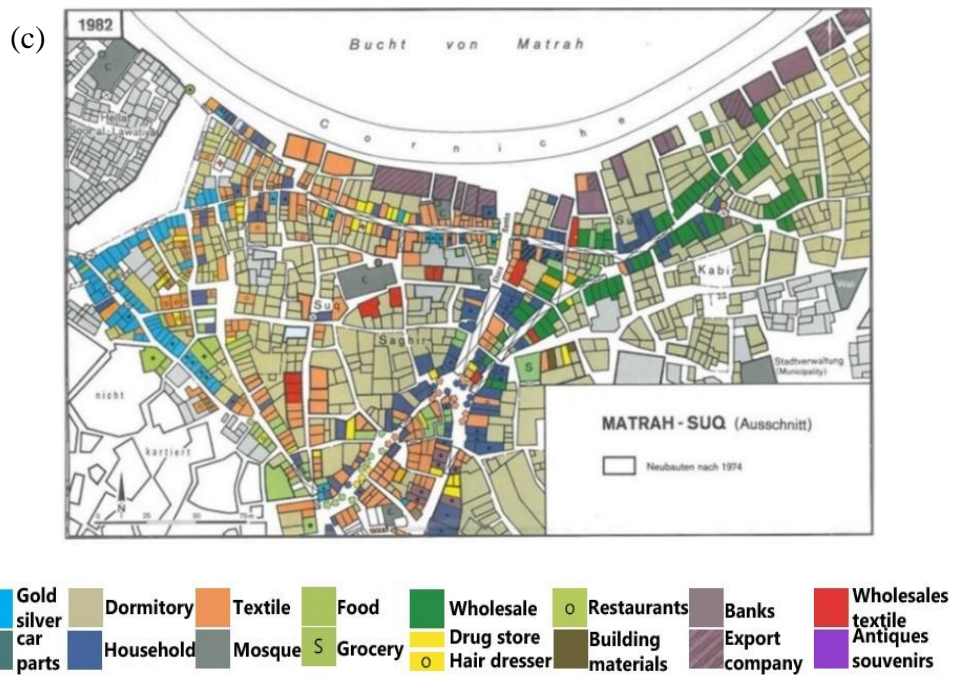
**Figure 83.** Alleyways, during Friday prayers.

With the colorful fabrics and ethnic produce, traders frequently display and advertise products outside the boundary of the retail unit pushing outward from the retail units and narrowing the effective route widths. Such products are also displayed along the alleyways (**Figure 84**). The souq has been one of the main touristic destinations of Muscat and Oman, which explains the large number of souvenirs and antique shops focused along the main spine in 2019. However, as the pathways

continue further away, the products of the retail units tend towards more regular day-to-day shopping for the residents of the neighboring areas. There is also a specialized Gold Souq within Souq Mutrah that sells jewelry and accessories from Oman and around Asia.





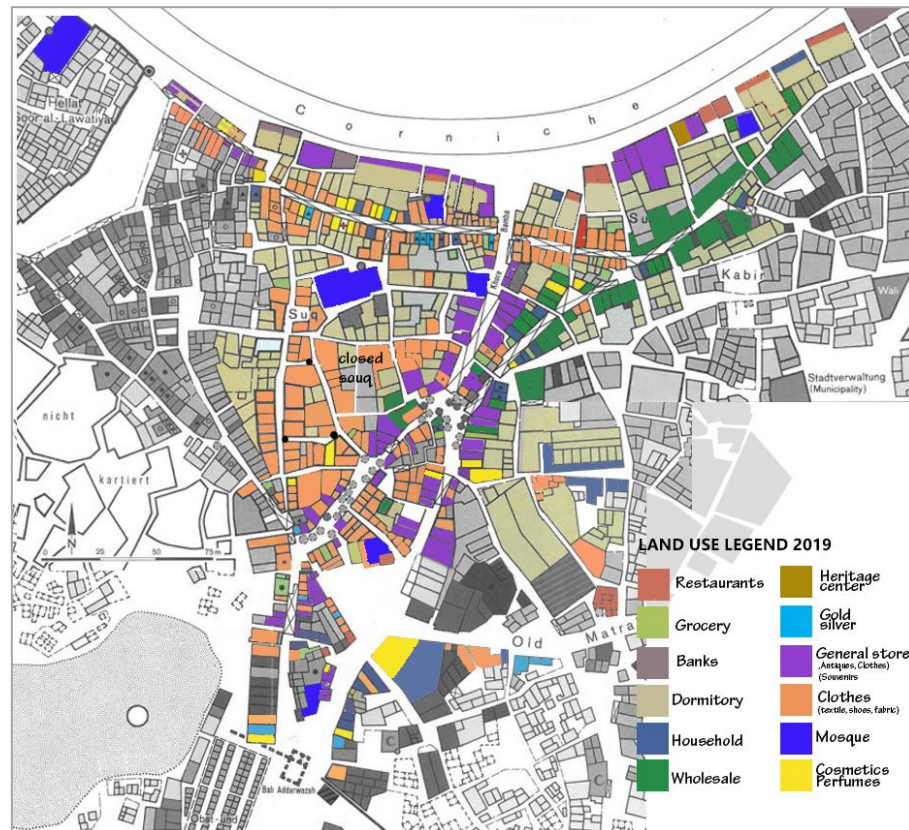


**Figure 84.** Land use of Souq Mutrah in (a) 1970, (b) 1974, and (c) 1982 (NORPLAN and Muscat Municipality<sup>35</sup>).

There are apparent differences and similarities between land uses earlier than 1982 and 2019 in Souq Mutrah. The main spine was mainly clothing/textile retail units through the 1970s. It became mostly household products in the 1980s. However, there is an apparent concentration of general shops and souvenirs along the main spine of the souq in 2019 (**Figure 85**). This shift in sold products highlights the importance of the souq as a touristic destination as retail units are also serving visitors. There are other added land uses like restaurants, antique shops, and heritage center near the main entrance on Al-Corniche. The land uses remained similar in other areas with a concentration of clothing shops in a northern alleyway; gold souq to the west; wholesale towards the east; and companies, banks, and other major buildings on the

<sup>35</sup> The land use map is a part of the Mutrah Redevelopment Master Plan: Cultural Heritage Stage 2- Conclusions and recommendations, 2011. The legend was in German and so was translated to English.

main streets. However, many residential units moved to the upper floors and were replaced by retail units over time especially on the northern and southern areas of the souq.



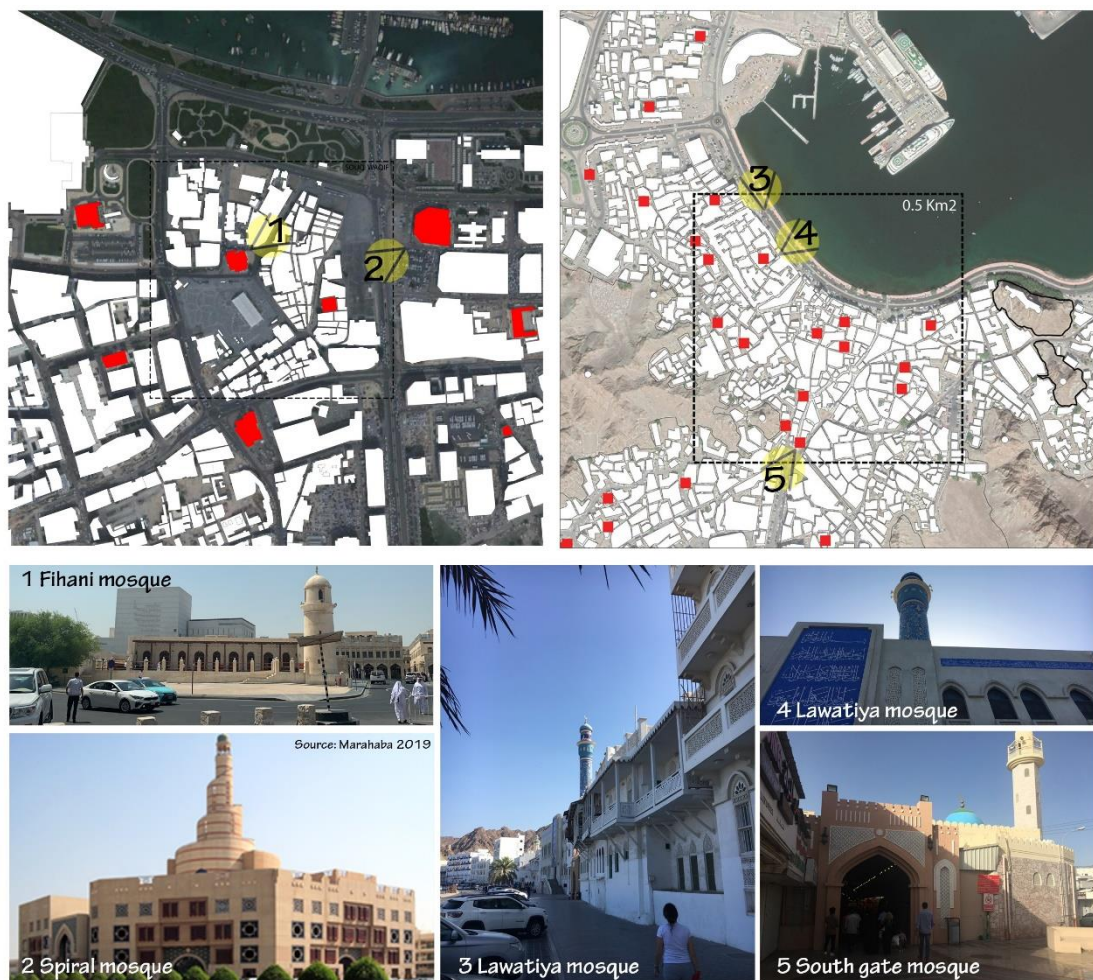
**Figure 85.** Land use of Souq Mutrah in 2019.

### *The Public Life: Socio-cultural aspects*

#### *Significance of Public Space accompanied with Mosques*

Places of worship remain visible for a long time because of their importance as a component of cultural heritage. The high number of mosques is an important social factor of the souqs in Arabian settlements. The public spaces associated with the mosques also play a significant role as gathering spaces within the souq. They

serve as the center of social life, contributing significantly to the development of the souqs and the city. Both souqs have several mosques and praying rooms, of which at least one is a large mosque with public spaces referred to in the literature review, as seen in (Figure 86).



**Figure 86.** A map locating mosques and a prayer area within 1Km<sup>2</sup> of (left) Souq Waqif and (right) Souq Mutrah (Author, unless otherwise noted).

Both souqs highlight cultural identity by shaping the public realm and attracting locals to the old city center. The created plazas within the souqs provide

gathering areas for users and visitors. The journey within the souqs consists of pathways, narrower alleys in a secondary network, continuing with long and short axes, and ending with two main plazas in the case of Souq Mutrah and reaching the street boundaries in case of Souq Waqif.

Souq Mutrah lies in a strategic location between focal attraction poles (Al Corniche promenade north, residential areas south, Palace, government buildings, and mosques), which enhances its livability through promoting quality of life in public spaces. These buildings support the livability of the souq. However, the lack of resting and eating areas might negatively discourage pedestrians from stopping, occupying, and lingering in the souq's alleys, affecting the concept of the market as a part of the public realm. Due to the density of people in the souq and its narrow alley, this might be purposeful. It could also be unintentional.

Souq Waqif, however, has well-defined boundaries by the surrounding street network as a part of the superblock structure in Doha. This rectangular form of the edges and the lack of overlap between the souq and the adjacent context affects the inter-connectivity of the souq with its surroundings. However, this was taken into consideration by the Qatari government for which several underground passages were created between the main spine of the souq and newly constructed Msheireb Downtown Doha district to the west, Al-Najada to the south as well as connections via elevation changes underneath edge streets such as Al-Corniche and Banks Street shown in **Figure 87**.





**Figure 87.** Primary connections between Souq Waqif and surroundings.

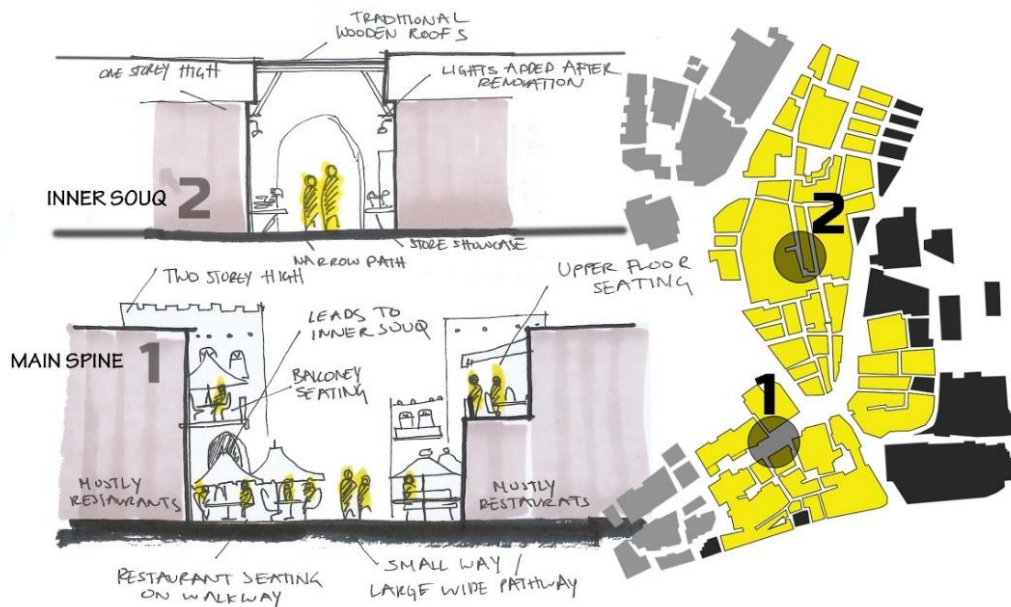
### *Who is walking, and where?*

The author methodically conducted two test walks in each souq: one was to observe who and how people move and use the public spaces for social life and the other to test and estimate the connection between the souqs and the coast for pedestrians. The observations are according to the author’s qualitative survey and perception of both places.

#### **Test walk (1): a walk in the souq**

The test walk was conducted through the main spines of both souqs, as indicated earlier in the thesis. Two specific areas were sketched according to the author’s perception of the place. One is within what was busy during the time of the visit (Souq Mutrah: March 5<sup>th</sup> at 3:00 pm; Souq Waqif: March 11<sup>th</sup> at 4:00 pm). The second location is within the souq’s internal alleyways and retail units. The land uses of both souqs differ. In the case of Souq Waqif, there is an abundance of cafes and

restaurants of different cuisines and prices. The outdoor seating extends beyond the restaurant's frontage, which makes the pathways smaller, however, more alive. The use of the upper floors as restaurants are also successful in creating a pleasant atmosphere. **Figure 88** shows some of the photographs and sketches taken during the test walk in Souq Waqif. They show the high ceiling of the ground floor as mentioned earlier in the study. It also highlights the sense of openness in the souq. The first sketch illustrates one of the narrow alleyways of the souq with some added elements after the renovation like roof support structure and lighting. The second sketch shows a part fo the central spine where restaurant seatings are pushed forward making the pathway smaller.



**Figure 88.** (top) A collection of photographs around Souq Waqif during September 2019. (bottom) Sketches of representative cross-section taken during test walks at two points in Souq Waqif.

There are many successful examples of green elements, seating, and shading along the alleyways and spaces of the souq (**Figure 89**). Users' activities are intimately related to outdoor climate conditions. The provision of trees near pathways and seating areas contribute to climate control and a more comfortable use of space.

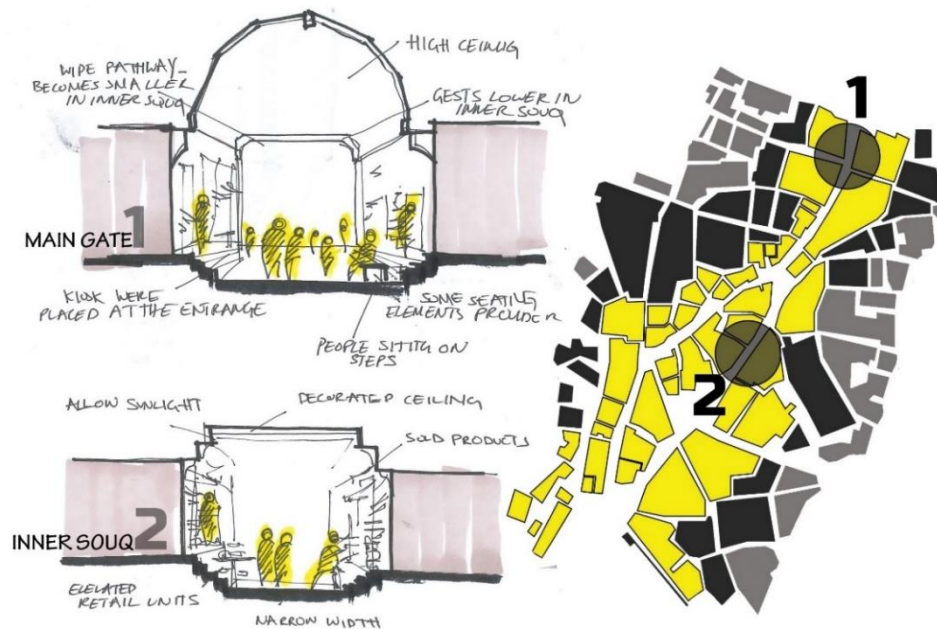


**Figure 89.** (top) Trees providing shaded seatings areas and (bottom) seating elements used for other public spaces around the souq.

Small alleyways, active shop frontages, elevated retail units, and decorative roofs leading to the main squares at the center characterize Souq Mutrah. However, you only get a sense of openness when you reach the end of the main spine in transition to the street and outer boundaries, mostly to the southwest direction. The souq also lacks good quality restaurants, although some small cafes and are serving the outer edges of the souq facing Al-Corniche promenade and an authentic known local restaurant (Bait Al Luban) within walking distance from the north gate of the souq. The sketches and photographs in **Figure 90** show the small retail units with their pushed-forward frontages. The different ground levels are clear in many of the photos as the majority of retail units are elevated at least two steps off the ground. These pictures show the average width of most of the alleyways in Souq Mutrah. The central



alley demonstrated in the first sketch is wider than the rest, given its importance as the main spine.



**Figure 90.** (top) A collection of photographs around Souq Mutrah during March 2019. (bottom) Sketches of representative cross-section taken during test walks at two points in Souq Mutrah.

- Even though Doha and Muscat have become increasingly auto-dependent, both souqs **promote walkability** within their areas. It is more in the case of Souq Mutrah as the souq has no defined boundaries and tends to blend in with the surrounding residential areas, whereas Souq Waqif appears isolated within the surrounding network because of the street layout; hence people tend to drive to it.
- **Active frontages** characterize both souqs. They are lively and have a combination of both moving and stationary activities. Souq Waqif tends to be more active during the evening due to the current land uses.
- There is apparent attention given to tourism, indicating the realization of the touristic potential of cultural heritage by the local authorities. There are also provisions for **safety and security** standards in Souq Waqif with the presence of security personnel, surveillance cameras, and police stations in the middle of the souq. In contrast, Souq Mutrah is mainly dependent on the police station to the south-west of the souq. However, during the walking observations, there was a negligible presence of police.
- Users of Souq Waqif include families with **children**, women, and men of various ages, who come to shop or meet friends during the operating hours of the market. Families with children are often either at restaurants, the park to the north of the souq, or the space to the west of the souq during the seasonal events. They are mostly involved in playing and eating. People of different nationalities use the souq, most of which are from the Middle East and South Asia.
- During the site visit, a large number of users of the souq were **tourists**. Easily identifiable by their maps, travel bags, and clothing, tourists walk the central spine of the souq, main entrance plazas, and the old city center. They are

walking around, taking pictures, eating, shopping, resting, and using public seating around courtyards.

All the following features of users (e.g., tourists and children), activities (e.g., eating, shopping, and walking), and other amenities and functions (e.g., seating, alleyways, and shade) are highlighted in **Figure 91** for both Souq Waqif and Souq Mutrah.



**Figure 91.** A collection of photographs and highlights around (a) Souq Waqif and (b) Souq Mutrah.



### *Walking, sitting, and social activities*

Making a qualitative assessment by counting *how many* people do something makes it possible to measure what might otherwise seem ephemeral: city life (Gehl & Svarre, 2013). Observing users, registering stationary activities, and gathering knowledge about people's behavior in public spaces can be used in decision-making processes. Mapping behavior in this study is merely mapping what happens on a plan of the areas investigated. It indicates where users are standing, sitting, and interacting to envision the use of space throughout the day better. The areas in which the author conducted behavioral mapping are as follows:

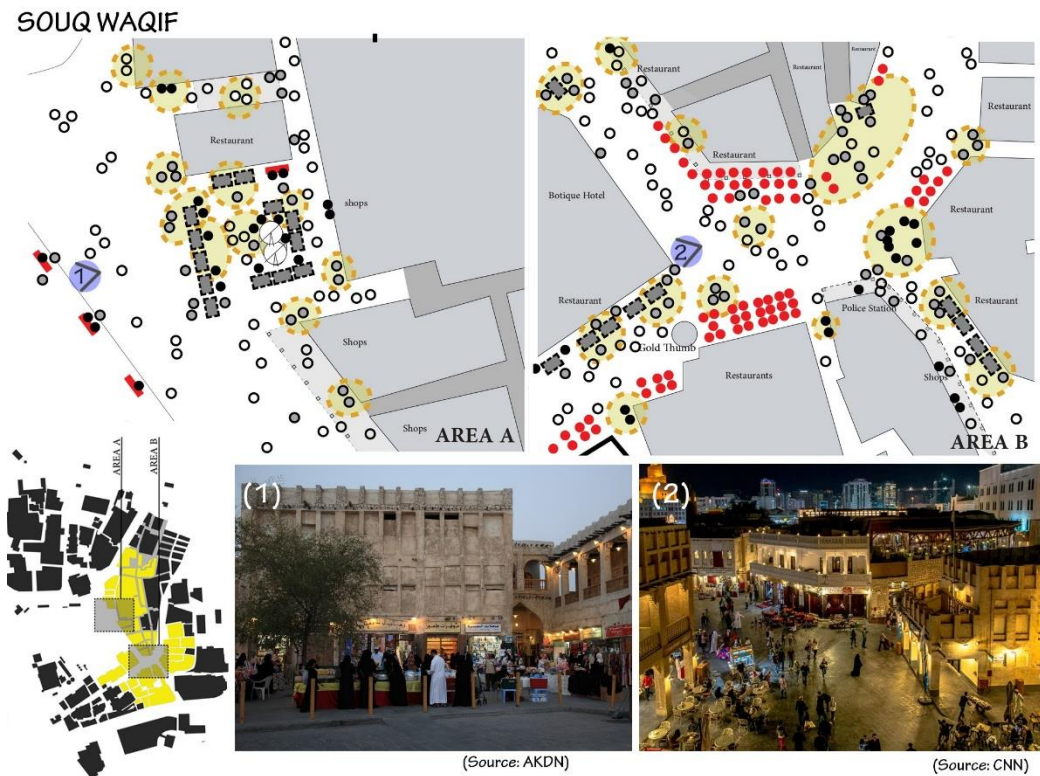
- Souq Waqif
  - (a) Area A: local food selling square
  - (b) Area B: the area associated with the center of the souq and middle of the main spine
- Souq Mutrah
  - (a) Area A: plaza associated with the south gate and mosque
  - (b) Area B: open plaza near the center of the souq, associated with the southeast entrance and mosque

Both these areas of Souq Waqif are active (**Figure 92**).

- Fixed seatings are more dominant in the central area of the souq (Area A) as it consists mainly of restaurant frontages.
- The local food selling square (Area A) is more casual in terms of interaction of users and set up.
- Many of the users are walking through area b as it is incorporated with the main spine. The seating and interaction mostly occurs at the edge of the area along

the restaurants, kiosks, arcades, and the entrance to the interior souq retail unit frontages.

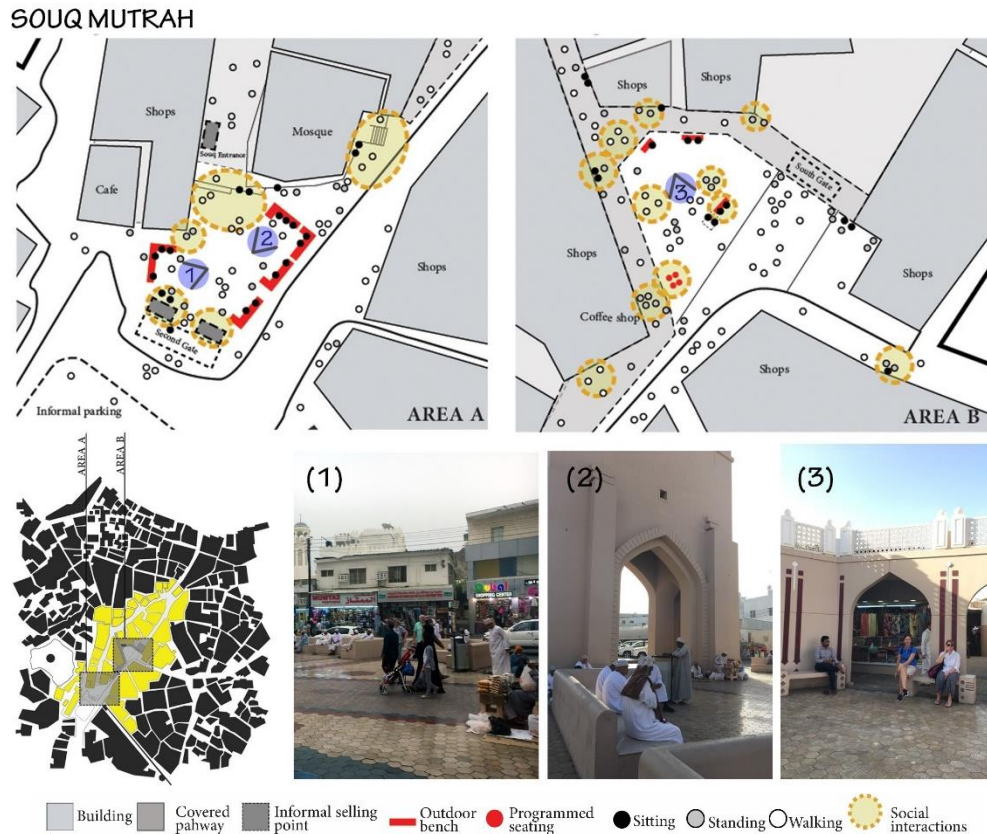
- In contrast, users of Area A are either walking past the square or are using it. The area is contained by three building frontages of retail units. The kiosks consist of women selling local Qatari food, and so most of the users are either sitting or standing to buy their order. Most of the interaction was between people standing together waiting or between costumers and the kiosk owner.



**Figure 92.** Behavioral mapping in two plazas within Souq Waqif (Author, unless otherwise noted).

The areas within Souq Mutrah are also active; however, they respond to the retail units' frontages, and land uses available (**Figure 93**).

- The area near the south gate and mosque (Area A) was active. There is available seating along with the ledge that allows people to lean on or sit.
- A few men set up small selling units on the floor and used the gate structure as a shaded place to sit under. Most of the interactions were between people sitting down on the floor or near the mosque.
- The area is directly next to the street. Many people were seen walking along the sidewalks and streets as the traffic moves slow.
- Similar to Area A is Souq Waqif, the plaza near the center (Area B) in Souq Mutrah is also contained by three sides of retail units (textile, clothing, household, and souvenir shops). This explains why most users were walking.
- There are only three available seating that were continually in use. Hence, most of the users were either walking around, going to shops, entering the interior souq, or moving towards the sidewalks.
- There is a small coffee shop/cafeteria at the edge of the plaza that provides some seating for the costumers.



**Figure 93.** Behavioral mapping in two plazas within Souq Mutrah (Author, unless otherwise noted).

### **Test walk (2): from the souq to the coast**

A second test walk was conducted to evaluate the time required to go from the geometric center of both souqs to reach Al-Corniche promenade and coast accounting for people, vehicular, and traffic lights. This test walk is important to understand changes in the historical relationship and connection between the souqs and the coast today. This assessment is more critical for the case of Souq Waqif as Souq Mutrah has a more direct connection with the coast by merely crossing its narrower Al-Corniche.

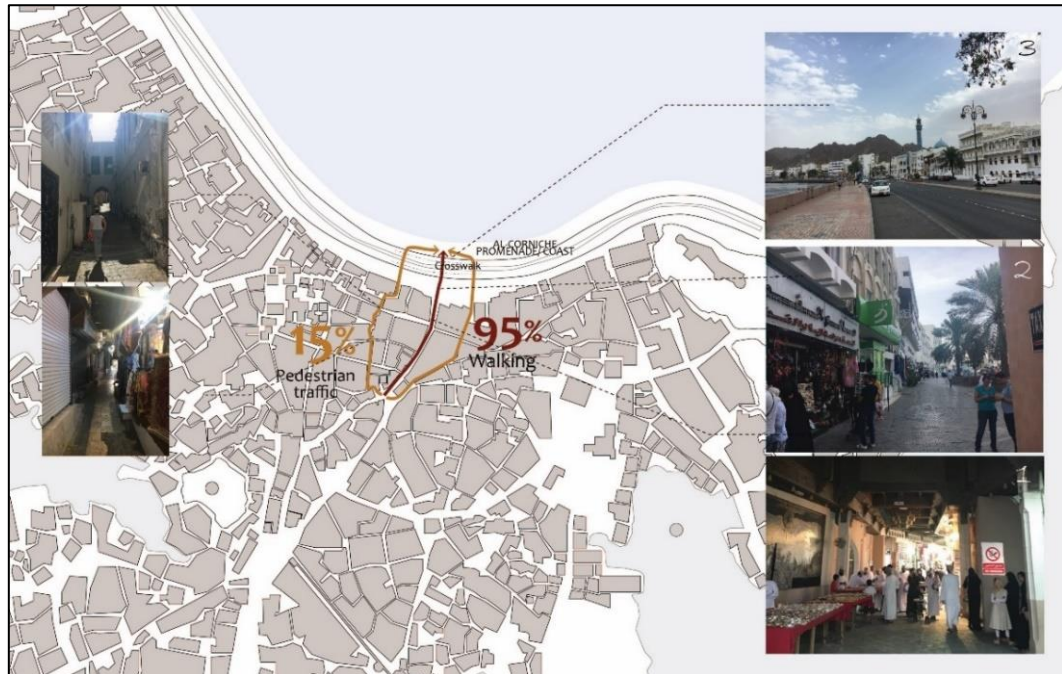
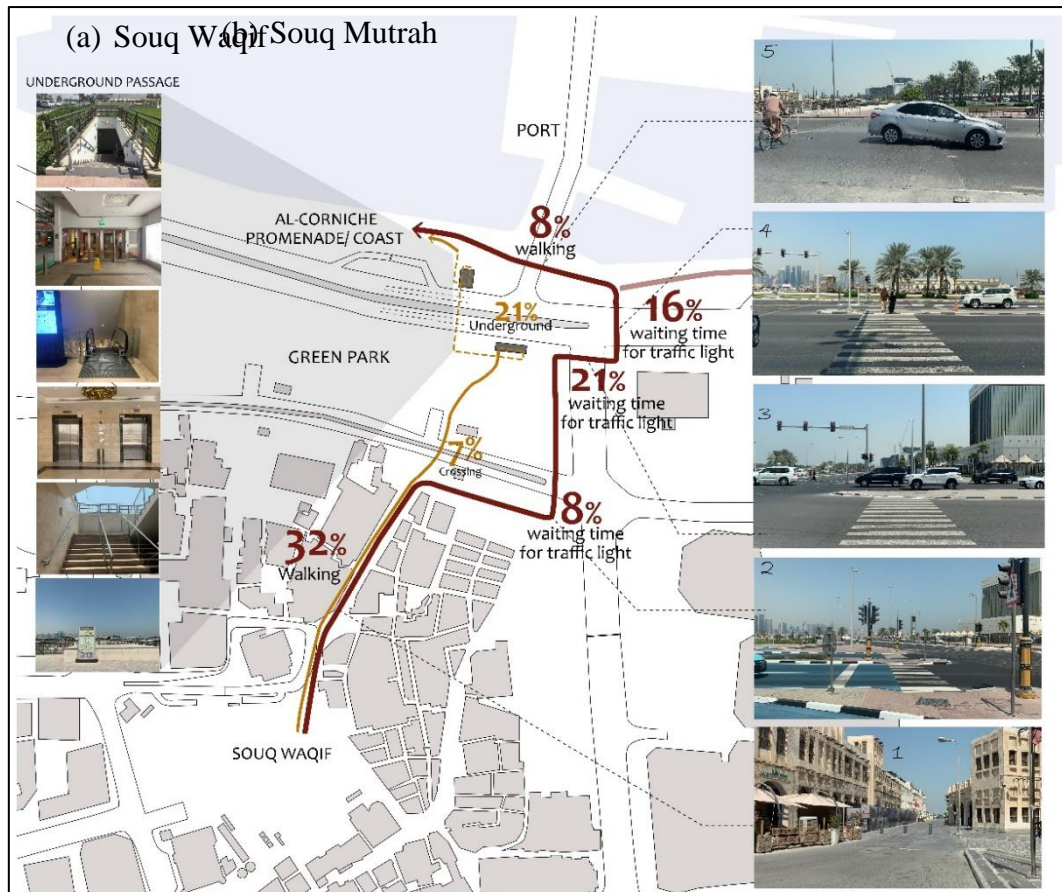
(1) Souq Waqif (Figure 94a):

- Using traffic lights: About 800 meters for a 30-minute trip.
- Using underground passage: About 600 meters for a 23-minute trip.
- Considering the actual distance for directly and freely crossing the streets:  
About 400 meters for a 15-minute trip.

(2) Souq Mutrah (Figure 94b):

- By crossing the street: About 150 meters for a 7-minute trip.





**Figure 94.** Test-walk from (a) Souq Waqif to Corniche promenade showed up to 21% of total walking time was spent waiting for traffic lights, and (b) Souq Mutrah consisted mostly of walking.

The connection between the market and the coastline is more apparent and successful in Souq Mutrah, which can take 3 times as less in terms of time and distance. The street between the souq and Al-Corniche promenade in Souq Mutrah consists of narrow lanes with relatively slow traffic. Crossing the street at any point was easy, especially from crosswalks available facing the main gateway. It is much harder (or practically made impossible) to cross perimeter streets in Doha, going from Souq Waqif to Al-Corniche as it consists of up to 8 lanes of high-speeding vehicles. There are also wide medians and central median dividers to prevent any crossing except at the crosswalk. To reach the Al-Corniche in Doha, a person has two options. Pedestrians can go to the eastern or western street of the souq and follow the four traffic lights for about 800 meters. However, the traffic lights require long waiting times and open for a short amount of time (approximately 20 seconds with the pedestrian green light flickering a warning after only 10 seconds) with no shading elements provisions due to the weather of Doha. The other way is by going through the park to the underground passage. However, the passage causes a loss in the sense of one's direction with unclear wayfinding options and requiring many steps and staircases to reach a place less than 50 meters and highly visible from street level. The streets and connections around the souq prioritize vehicles, whereas things could be made easier for pedestrians.



## **Chapter 5: Conclusion and Discussion**

### **5.1 Revisiting the Concepts from the Literature Review**

Traditional markets are complex and continually evolving in the context of the city's rapidly changing urban environment. The study takes for its core subject the Arabian traditional markets referred to in the Arabic language as souqs. The thesis highlights the importance of these souqs and their manifestation as an integral form of dwelling for ancient and contemporary Arab societies alike. The urban and architectural representation of the Arabian souq, conceived historically as a market, embodies the totality of people's social, religious, and political understanding of communal space, transforming its apparent commercial activities into an orchestrated series of spatial rituals.

The thesis focuses on the two souqs in the Arabian Peninsula: Souq Waqif in Doha, State of Qatar, and Souq Mutrah in the Sultanate of Oman. In this investigation, the focus was to assess the urban public environment within the souqs and understand the historical development, use, and current situation within the urban context. The conclusions draw together the results of the research to offer some broad reflections on the way forward for these souqs.

#### **Key findings**

Through the methodology of space syntax, the research study presents a comparative assessment of the two souqs and their surrounding metropolitan regions on the Arabian Peninsula. Both the cities of Doha and Muscat have undergone dramatic population growth and movement from slow high-density outward growth to fast low-density, auto-dependent development of hinterlands. However, the

topographical differences in both cities appear to play an important role in their growth patterns.

Doha appears denser than Muscat by looking at the ratio of population to area density of both cities. However, it is an artifact of the differences in topography. With the exclusion of the mountainous terrain and unbuildable area Muscat through the research, Muscat is denser than Doha in terms of the ratio of street per metric area. The street density is also remarkable, considering the number of one-connected streets in both cities. There is a high presence of cul-de-sacs in Muscat, accounting for 25% of the streets, whereas Doha consists of 8%. This difference is primarily an effect of the edge conditions due to the mountainous topography in Muscat.

The study also argues that these topographical differences lead to distinct strategies for spatial structure to resolve the paradox of Hillier's principles of centrality and linearity during urbanization. The planning of metropolitan Doha prioritized compactness and density for balancing centrality and linearity in spatial structure at the macro- and micro-scale of its ortho-radial grid. This occurs despite the availability of abundant land in all directions. The planning of metropolitan Muscat, on the other hand, prioritized linearity in its spatial structure at the macro-scale to overcome topographical conditions in the area. To compensate, Muscat privileged centrality and density at a more localized, micro-scale level based on buildable area in generating a distinctive spatial structure based on morphological polycentrism. The use of space syntax helped to better understand these morphological differences and address an important gap in our knowledge about cities on the Arabian Peninsula. This is tied back to how the city of Doha grew in respect of Souq Waqif as a part of the city center, whereas Muscat grew linearly to the west, adjusting to topographical constraints.

Understanding the growth of the cities in respect of the two souqs highlighted the difference in degrees of accessibility of these souqs to their urban context. The step-depth analysis highlights the accessibility of Souq Waqif to the rest of Doha. It requires about 10 changes of direction to reach the souq from almost all regions of Doha. However, Souq Mutrah appears to be more isolated, at least in terms of scale. It requires over 40 changes of direction to connect the souq to the rest of Muscat.

The research also focused on comparing the current situation of the two souqs in terms of spatial context, land use, public spaces, and social variables. The findings from the fieldwork research revealed the complex nature of souqs as traditional markets. Within the souqs' juxtaposed political, social, and cultural importance encrusted within the alleyways, shops, and public space provide us with an intricate geometrical pattern, closer in its conception to a shell formation ('contained within itself as an experience') than any known modern-day street (Shahin & Maphil, 2016). Despite the typological similarities of different souqs, there exists a distinct phenomenological flair that shapes the experience in each of the markets.

## **5.2 Revisiting the Main Research Question(s)**

The study reviewed the

- The urbanism in the Arabian Peninsula and the Gulf Region.
- The growth of Doha and Muscat.
- The historical research of background, origins, and evolution for Souq Waqif and Souq Mutrah.
- The morphological characteristics of the two souqs.
- How the two souqs compared as Middle Eastern markets in how they related to their immediate and metropolitan context.

- Site assessment and generated data like maps, land use surveys, figure-ground, and many others including space syntax analysis of the urban spatial network which helped to illustrate the morphological similarities and differences arising out of the historical evolution of the souqs as well as the different topographical settings.

Studying the syntactical and configurational properties of souqs and their relationship with the city allows for a deeper understanding of the historical origins of the cities' centers, which generates a more complete picture of these souqs as public spaces existing within their changing urban context. This allows us to better plan their future within rapidly developing countries.

What we learned about these souqs can help us understand not only souqs in the Gulf region but also generally in the Middle East, as it highlights an understanding of how even though each souq is unique, but urban context matters.

As the set of main questions guided the research. Briefly answering them can set the guidelines for further future research on the subject and enhancement of the souqs.

**(1) What are the morphological characteristics of the two souqs in terms of land use and configuration?**

- In the process of urbanization, the physical characteristics of Doha and Muscat are gradually changing, as empty land and water bodies are converted into a built-up area, especially in the case of Doha.
- The organic character in the old city centers and around the two souqs is still evident. Both souqs possess a lot of formal similarities like patterns of typically narrow streets, two-story buildings, irregular rectangular blocks, and smaller

building footprints and retail units selling similar products like clothing, textile, perfumes, jewelry, and household products.

- Souq Waqif has undergone renovation where the traditional morphology like courtyard houses and pedestrian street patterns were renovated and preserved with limited modifications. However, Souq Mutrah has only undergone some development projects to enhance specific areas with additional seating, gateways, and other similar amenities, but more new development is further afield in the Mutrah district.
- Even though it had undergone modernization, there is a continuity between the inherited morphology and the recent urban structure of Souq Waqif. However, rapid urbanization led to changes in the social, cultural, and economic fabric and use of the souq. Morphological changes in the structure of the traditional marketplace have been manifold like: frequently divided by modern highways, changes in land use, and expansion and addition of new building structures.

**(2) How are the two souqs similar or different to each other both as similar souqs in terms of Middle Eastern markets, but also in terms of how they relate to their metropolitan region?**

- Although both souqs promote walkability within their area, Doha is a city craving to be a pedestrian city that lacks the amenities at the micro-scale to prioritize pedestrian movement such as appropriately located sidewalks, elimination of fence barriers, and shading elements. It is generally designed to prioritize the movement of traffic and not people. Where on the other hand, Mutrah is a pedestrian area that accommodates vehicles, but it is primarily about walking and directing people easily toward and through the souq, especially its

central alleyway.

- Considering its location and connections within the metropolitan region and the current land uses, Souq Waqif has become a regular type of trip for the residents of Doha. Whereas, with the way Muscat is growing towards the west to adjust to topographical constraints, Souq Mutrah appears (at least in terms of scale) to shift from being at the center of the city towards the edge to become a destination trip or localized market catering to residents in the immediate area.

### **5.3 Recommendation: The Way Forward for Traditional Market**

Understanding these two souqs allows for more understanding of the historical origins of the cities' city centers. Both Souq Waqif and Souq Mutrah are similar, yet very different. Understanding these two souqs within their context, history, and current uses allows us to better plan for their future within rapidly developing countries. What we learned about these souqs can help us understand not only souqs in the Gulf region but also generally in the Middle East. It highlights an understanding of how even though Arabian souqs have a similar pattern, each of them is different and so should not be renovated or restored in necessarily the same manner.

Due to the mountainous terrain in Mutrah, the renovation of the souq cannot occur using the same planning principles as Souq Waqif. It is a localized market that suggests specialty shops catering to the immediate needs of the residents and its current state as a touristic attraction rather than big restaurants. Ultimately, what this means is even with their many similarities, there are all types of souqs and each is different in its own way.

This research contributes to our understanding of traditional marketplaces and public spaces that exist within their changing local contexts into the Arab city. It

addresses methods to understand the development and uses of these spaces to assess their current state and try to anticipate future needs. It analyses and synthesizes the social city context with the physical city to generate a more complete picture of traditional souqs in Doha and Muscat.



## **5.4 Reflecting on the Research Process and Outcome of the Research**

Many Middle Eastern and Arabian Peninsula traditional markets are evolving. They are complex environments reshaped by interactions between processes of use, sociality, and physicality. A holistic understanding of these complex urban environments contributes significantly to a better appreciation of the Middle Eastern cities. The role of these souqs as public places is critical in cities where economic development influenced by globalization tends to raise concern for communities about the increasing privatization of the existing public realm.

The research study outcome deals with different aspects to enhance the socio-spatial conditions of the souqs in the case of Souq Waqif and Souq Mutrah. This study could be further expanded to incorporate other souqs within the MENA region and the world. Other fields, such as sustainable development, market management, quality enhancement, can be further included and applied with this research.

### **At the municipal and local level:**

#### ***Understanding their location within the context for better management***

Achieving responsive cohesion between the souq and its context is as important as achieving responsive cohesion among the souq's internal spaces. The key to managing Souq Waqif and Souq Mutrah as complex urban public spaces lies in understanding the form and function of these souqs as a significant step in further enhancing them. Traditional souqs should always add value to their context, and this requires much more than just fitting in.

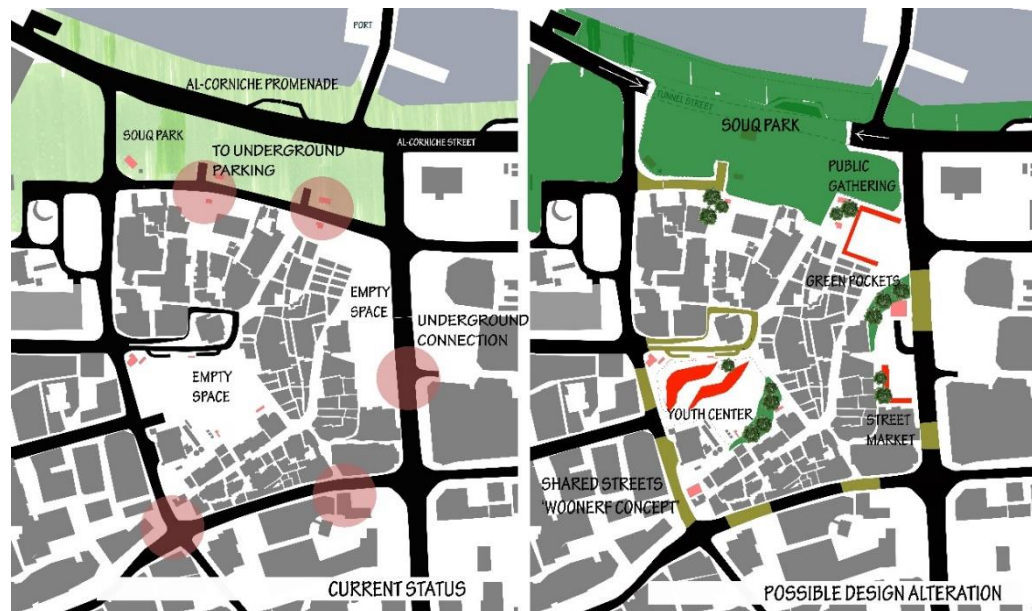
Both souqs originated adjacent to waterfronts as pearling and fishing villages to support sea trading at that time. However, both souqs lost their direct contact with water throughout time to one degree or another. Even though it is easy to reach the

coast from Souq Mutrah, the area accompanied by the souq's gate on Al-Corniche could be enhanced. Souq Waqif, on the other hand, is no longer on the coastline. The souq lacks a clear connection – and has become somewhat isolated from – to Al-Corniche promenade and coastline, which was apparent in the test walks conducted in Chapter 3.

Extending the green park further north to connect to the Al-Corniche promenade will decrease the distance to (400m), allowing for a more comfortable and shorter 15-minute walk from the center of the souq to the promenade. To allow for this change, Al-Corniche street could be re-constructed as a tunnel connecting to the edges of the area associated with Souq Waqif. It could also connect to the underground parking to help in relieving some of the pressure on the other parking facilitates and drop-off areas within the souq (**Figure 95**). Green pockets along this main route can also promote walkability, create shade, and promote well-being (Tannous & Furlan, 2018). These areas can support other uses to encourage a different demographic of users, e.g., youth activities and/or children's playground.

Instead of building these underground connections, the streets around Souq Waqif could also become more accessible to cross and promote a more natural connection between the souq and its immediate surroundings. The way around this could be as simple as changing the asphalt to slow down the traffic, eliminating central median fencing, and providing more generous, well-timed crosswalks. The streets between Souq Waqif and Msheireb Downtown Doha could also become shared streets where cars, bicycles, and pedestrians travel safely. Moreover, introducing new interactions with the contextual surroundings through redesigning the accesses of the souq, especially at the ends of the spine, will increase the connection to strategic points more efficiently. This will attract more visitors back to the traditional souqs and city

centers and enhance the walkability towards the souq from the surrounding environment.



**Figure 95.** Suggestions for possible design alterations as imagined by the author.

### *Enhancing the infrastructure*

Souq Mutrah has the potential for continuity and rehabilitation. One of the vital solutions is the upgrade and conservation of the retail units to become more attractive within an overall policy to preserve the souq's area. There were projects and proposals regarding upgrading the infrastructure of the souq and immediate surroundings and introducing integrated development zones. The re-development of infrastructure enhancement in the souq is also necessary to prevent any further deterioration. There are currently some proposals for the Master Vision of 2050 and Vision of Corniche, of which Souq Mutrah is a part of several companies like Norplan Consulting Engineering and Planning and Sering Ingegneria (**Figure 96**). It should not include road widening schemes. The right intervention by the municipality can

control these enhancements without alteration to the traditional structures. Public awareness is also vital for the success of such a project.



**Figure 96.** Redevelopment project of the Mutrah area and Souq Mutrah. Source: Municipality Mutrah; Norplan; Sering Ingegneria)

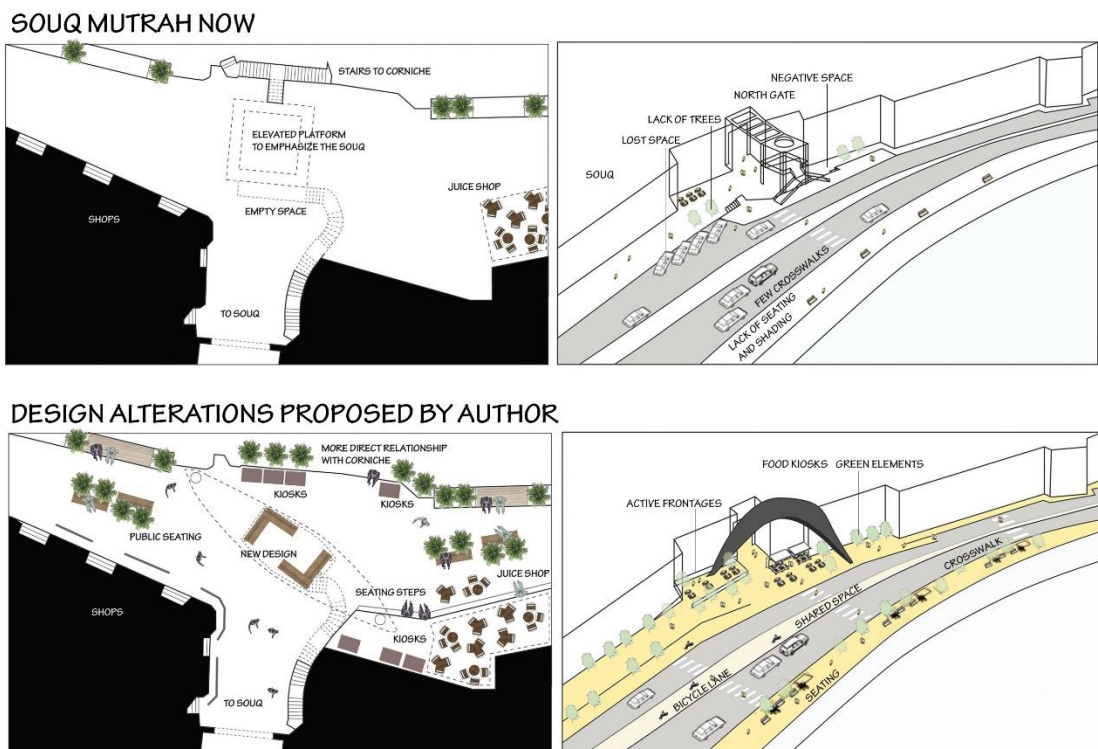
Other infrastructure amenities like water supply, electrical grids, and road infrastructure exists at both souqs, however, need enhancement for Souq Mutrah. Only after the development in 2005 did the government develop Souq Mutrah's infrastructure like electrical cables, ceiling materials, firefighting hydrants, and other safety and security measures (Al-Maimani, 2013). However, the souq still holds the threat of fire. In this case, Souq Waqif can be a lesson for Souq Mutrah because the Qatari government updated the infrastructure and safety regulations of Souq Waqif during renovation in 2004-2007.

#### **At the market space level:**

##### ***Enhancing social sustainability***

Focusing on the importance of providing quality social interactions and local services allows visitors to share social space and activity within the souq. There are

two main outdoor plazas on the two south gates in the case of Souq Mutrah. There are some juice shops adjacent to the main northern entrance. However, the souq does not provide much of an opportunity for visitors to gather or socialize in a public plaza. There is excellent potential in transforming the area from a mere gateway leading to the souq into a lively social space through simple addition of benches, greenery, and the removal of the elevated gateway that was constructed to highlight the entrance of the souq. A more straightforward structure could replace it and serve the same purpose while also re-emphasizing the historical connection of the souq to the coastline and port (**Figure 97**).



**Figure 97.** Suggestions for possible design alterations as imagined by the author.

Both souqs should also be more responsive to different genders and age groups like children and the elderly to add more value to the public space. There is a large empty space within Souq Waqif, which can be re-designed to adapt to all the users. Given the nature of the climate, other spaces within both souqs can be enhanced by adding appropriate shading or trees, especially the wide outdoor pathways and plazas. The addition of landscape in these spaces can also be essential to cast shadows and reduce the high temperature.

### *Diversifying land uses*

The land uses of both souqs differ; in the case of Souq Waqif, there is an abundance of cafes and restaurants of different cuisines and prices in addition to clothing, antiques, souvenirs, furniture, food, and many other shops serving locals and tourists. There is also a traditional local food section to support traditional homemade Qatari food as a reflection of the culture. There is currently an art museum/center, cinema, auditorium, hotels, cultural even and concerts, and many other facilities that attract different types of users, which benefits the economy and enhances the livability of the souq. While Souq Mutrah, on the other hand, lacks good quality restaurants. Some small cafes are serving the outer boundaries of the souq facing the Corniche promenade. As mentioned earlier, the public space by the main gate of the souq has a high potential to become a social gathering space, which highlights the entrance of the souq and emphasizes the connection to the coast.

There is an excellent potential for the space accompanied by the main mosque in Souq Waqif to become a vital social space for gathering. The area sits at a significant location at the center of the souq facing the markets and restaurants, adjacent to the mosque, the falcon souq, near underground parking, drop off area, and

boutique hotels (**Figure 98**). Another suggestion could be changing the road pavement in the car drop off near the space to slow down traffic and accommodate bicycles and pedestrians. Such a change will enhance the quality of the area to becoming a shared-space. The design of the space could be simplistic in a similar manner to other public gathering spaces at the souq; it can increase the quality of life and livability of the place. Adding trees similar to the existing ones can also allow for climate control and enhance the user's experience and well-being.



**Figure 98. (top)** The areas associated with the main mosque at Souq Waqif; **(bottom)** seating elements used for other public spaces around the souq.

### 5.5 Avenues for future research

The findings revealed the complex nature of souqs as traditional markets. By understanding the growth of the cities in respect of the two souqs, it highlighted the difference in degrees of accessibility of these souqs to their urban context. Complemented by a focus on current situation of the two souqs in terms of spatial context, land use, public spaces, and social variables.

This research can be used to expand the case studies to include more souqs as



historical city centers, both in terms of the literature review and the analysis. This could also be expanded to examples of markets in Europe, Asia, and the Americas. The land use can be tied to the space syntax model and by using segment and angular choice analysis. More quantitative observation can be conducted of space use and movement like a survey of the users, and direct observation of moving and stationary space use in further contributing validation of the theory of natural movement and cities as movement economies arising from space syntax research.

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## APPENDIX

**Appendix A:** The following papers related to the author's master's thesis were published, and accepted for publication:

### **Journal Papers (Published):**

**Tannous, H.O.**, Furlan, R. (2018). Livability and Urban Quality of the Souq Waqif in Doha (State of Qatar). *Saudi Journal of Engineering and Technology (SJEAT)*. 3(6), 368-387

### **Conference Papers:**

Major, M.D., **Tannous, H.O.**, Mirincheva, V. (2019). "Urban Transformations: From restricted random aggregation to designed cultural intent in Middle Eastern cities," *12<sup>th</sup> International Space Syntax Symposium Proceedings*. Beijing, China: Beijing Jiao Tong University, 8-13 July 2019, 282: 1-15.

Major, M.D., Indraganti, M., Ahmed, A.M, **Tannous, H.O.**, Al-Marri, A., Al-Noami, L., Al-Obaidan, M. (2019). "Comfort and Use in Building Evaluation: Information Modelling and post-occupancy in the built environment," *12<sup>th</sup> International Space Syntax Symposium Proceedings*. Beijing, China: Beijing Jiao Tong University, 8-13 July 2019, 283:1-14.

Major, M.D., **Tannous, H.O.** (2019). "The Body at the Center of Our Design Universe," *Game Set Match IV Conference*, 6-7- February 2019, Qatar University, Doha, Qatar.

Major, M.D., Fadli, F., **Tannous, H.O.**, Mirincheva, V. (2018). The Spatial Logic of Doha: Using Space Syntax to Enhance Safety in Designing for Vehicular and Pedestrian Networks at the Macro- and Micro-scale of the Urban Environment (Abstract Only). *International Traffic Safety Conference*, 26 November 2018, Doha, Qatar.

**Accepted for publication:**

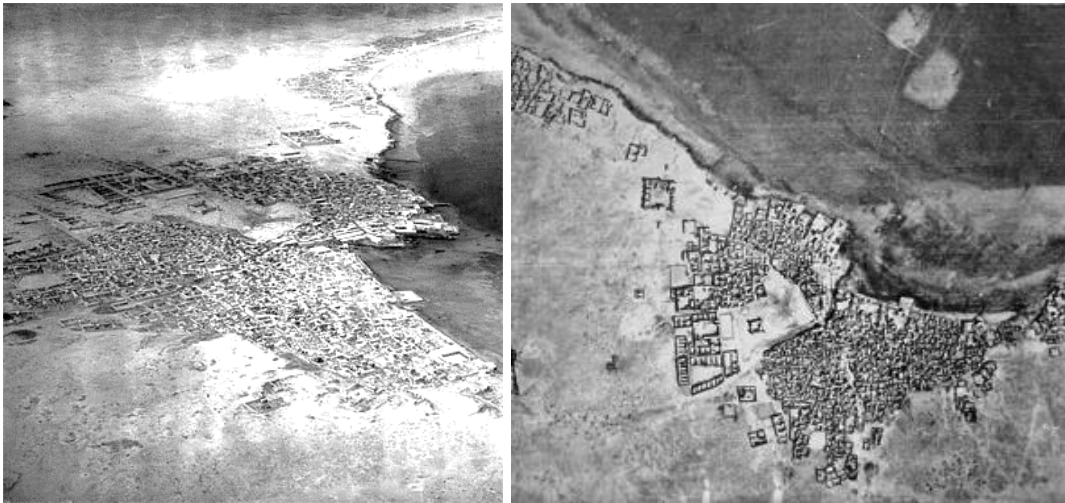
Major, M.D., **Tannous, H.O.**, Mirincheva, V. (2019). “Urban Transformations: From restricted random aggregation to designed cultural intent in Middle Eastern cities,” *Urban Design*. Beijing: Tsinghua University Press (in Chinese and English), [Expected to be published in December 2019].

**Tannous, H.O.**, Major, M.D. (2019). “The Spatial Logic of the Arabian Coastal City: The Case of Doha, State of Qatar and Muscat, Sultanate of Oman,” *5th ISUF Italy International Conference*, International Seminar on Urban Form-Italian Network, Rome, Italy, 19-22 February 2020, [Expected to be published in February 2020].

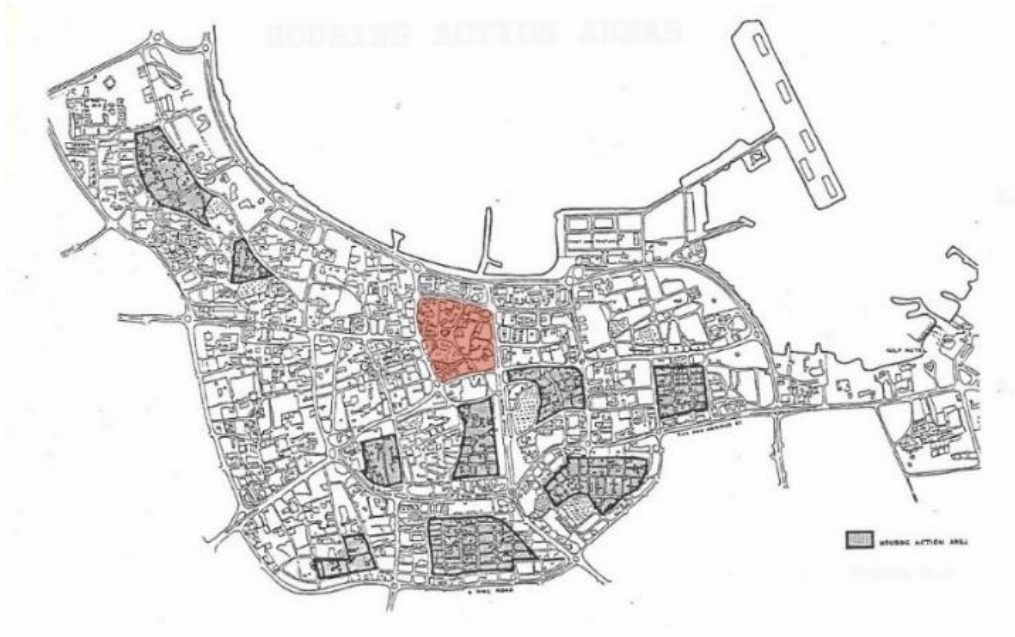
**Tannous, H.**, Major, M., Furlan, R. (2020). “Souq Waqif Neighborhood as a Transit Oriented Development.” *Journal of Urban Regeneration and Renewal*. London: Henry Stewart Publications [Expected to be published in February 2020].

**Tannous, H.O.**, Major, M.D., Furlan, R. (2020). “Rethinking Doha’s Green Urbanism: Creating Urban Design Strategies of Sustainable Form-Based for Accessibility Of Museum Of Islamic Art Park,” *Applied Geography*. Amsterdam: Elsevier [Expected to be published in March 2020].

**Appendix B:** City of Doha in 1952 (Qatar Museums).



**Appendix C:** Souq Waqif in the context of the city of Doha (Qatar University Doha- Doha Inner City Development, 1985).



**Appendix D:** Old and new souq detailed map in 1985 (Qatar University-Doha Inner City

Redevelopment, 1986.

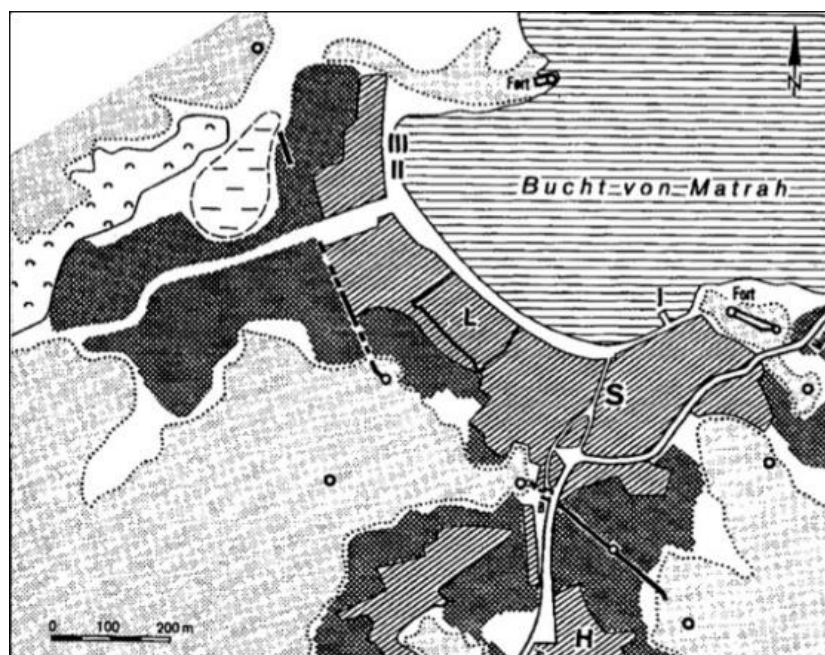
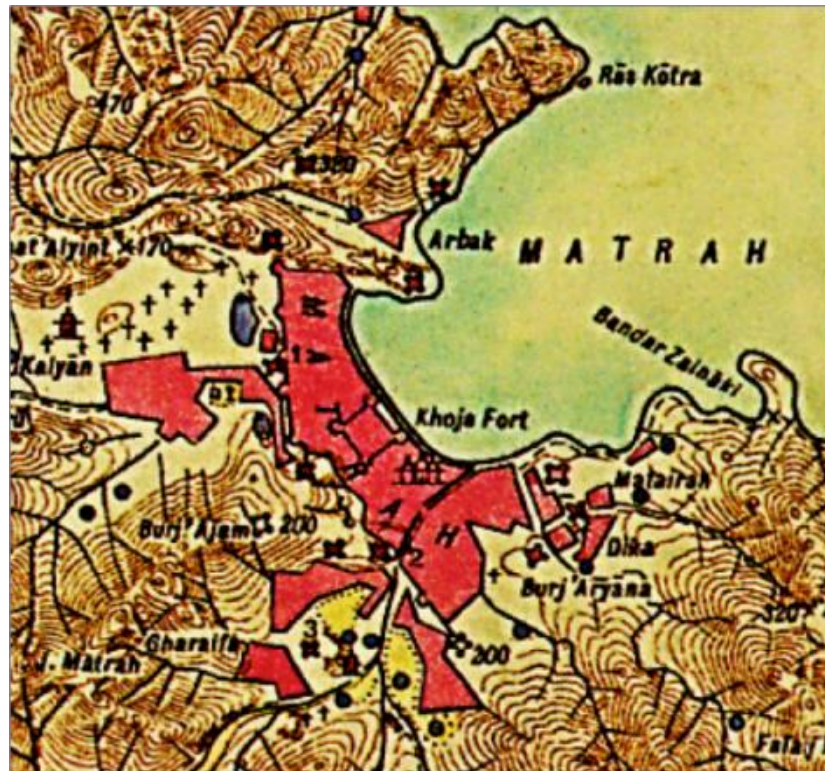


**Appendix E:** Doha ans Souq Waqif in 1959 (stepfeed, 2015)

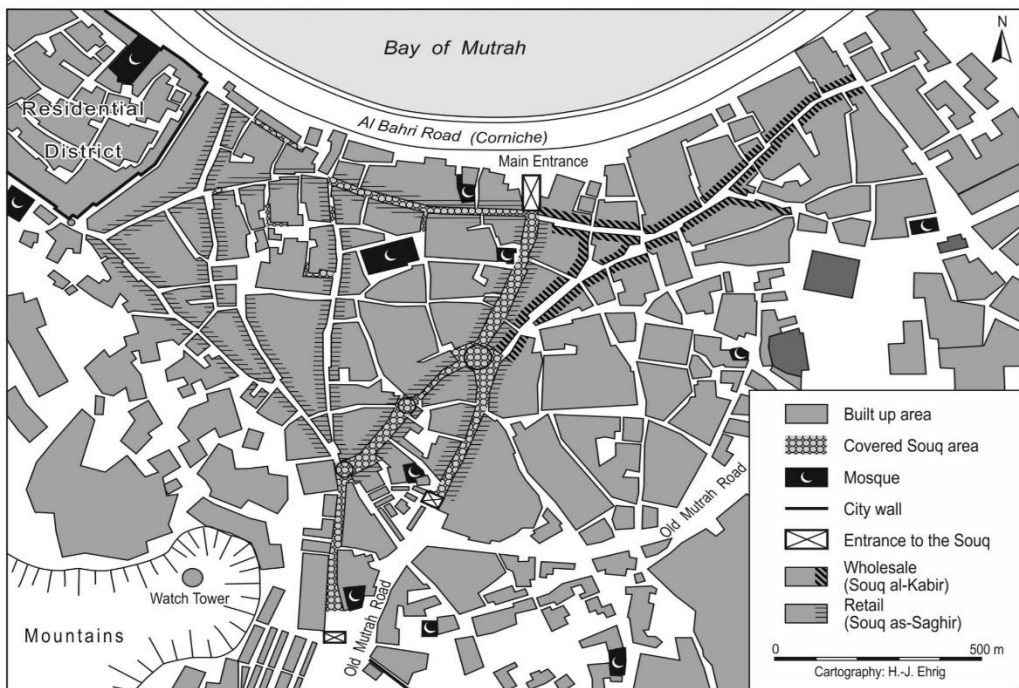
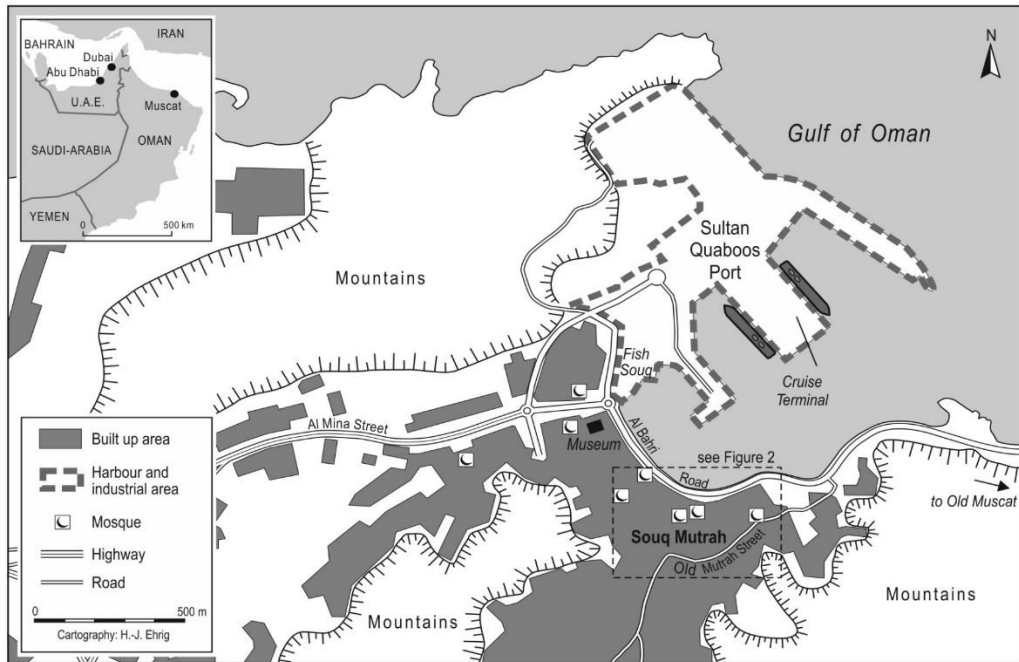




**Appendix F: (top)** Map of Mutrah by the Indian Survey 1904-1905. **(bottom)** The built-up area before 1970. The hatched areas mark the areas with stone buildings exclusively, and the dotted areas mark the Barasti huts (NORPLAN and Muscat Municipality, Mutrah Redevelopment Master Plan: Cultural Heritage Stage 2 – Conclusion and Recommendations, 2011).



**Figure G:** MapS of the district of Mutrah showing (top) Sultan Qaboos Port and (bottom) Souq Mutrah and surroundings (Scholz, 2014).





Appendix H. 1974 Land Use Plan of Souq Mutrah in Muscat, Oman (Scholz, 2014).

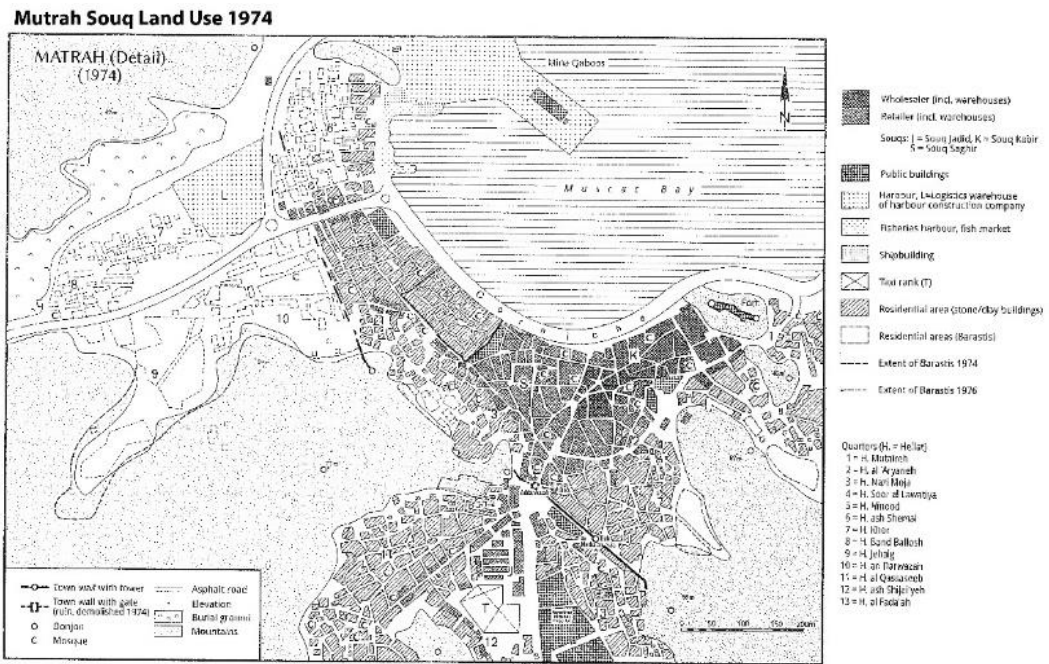
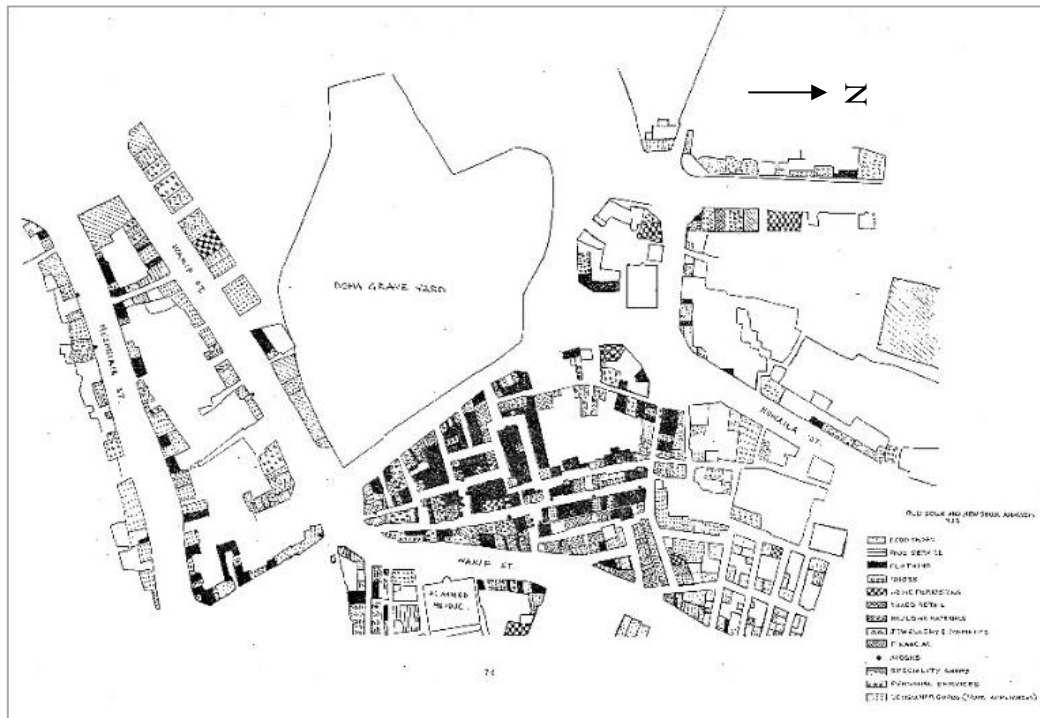


Fig. 46 – Matrah: Functional territorial structure, 1974  
Source: Author, from aerial maps (A.d.V.) and own cartography

**Appendix I:** 1985 hand drawn Land Use Plan of Souq Waqif (Doha Municipality, 1985).



# TRADITIONAL ARABIAN MARKETPLACES IN CONTEXT

## A COMPARATIVE STUDY OF SOUQ WAQIF IN DOHA, QATAR AND SOUQ MUTRAH IN MUSCAT, OMAN

**<SEATING>**  
Seating integrated within the walls. Benches are often found along the alleyways of the souq.

**RESTAURANTS>**  
Users of the souq are often coming to eat or sit with friends.

**<CHILDREN>**  
Families and children are common users of the souq.

**<SHOPPING>**  
Shopping around the gateway to the inner souq.

**SEATING >**

Both programmed and casual seating is found around the public areas of the souq.

**<People tend to sit under the shade either provided by the buildings of the souq or trees.**

There is a high presence of tourists around the souq.

There are many people on the souq.

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