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Tradition, Transformation, and Re-creation in Two Marketplaces: Souq Al Wakrah and Souq Waqif, Qatar

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ABSTRACT

Traditional marketplaces are common in old city centers. Such places have a distinctive ambiance populated by local vendors, shoppers, visiting tourists, and pedestrians on their way to somewhere else. This *genius loci* or 'collective spirit of place' contributes to their character as destinations for people to visit and linger. They often serve as the focus of cultural heritage and historic preservation efforts in rapidly developing cities. The paper focuses on two marketplaces in Qatar: reconstructed Souq Al Wakrah in Al Wakrah and rehabilitated Souq Waqif in Old Doha. Souq is a term from the Arabic "sūq," meaning market, marketplace, or bazaar. We examine their urban morphology and the probable impact on their function as public places today. Both share similarities, including topography, history, culture, and architecture. However, differences arose from settlement evolution in Al Wakrah and Doha. The paper argues these characteristics show the vital role that urban morphology can play in promoting walkability, even in harsh climatic conditions. We conclude by briefly summarizing the potential for urban design enhancements to support their long-term sustainability as cultural heritage districts.

1. Introduction

Markets have served as important centers of trade and interaction since the dawn of urbanization (Kostof, 1992; Tannous, 2020). Souqs have long played this role on the Arabian Peninsula (Alraouf, 2012; Gharipour, 2012). In an era of globalization and rapid urbanization, many people view souqs as necessary for the long-term sustainability of Middle Eastern cities as they continue to serve a social, economic, and cultural need by facilitating the planned and unplanned encounters among diverse users in urban life (Alraouf, 2012; Burdett et al., 2018; Tannous, 2020).

Researchers analyze the morphogenesis, evolution, and scale of patterns in the urban fabric to help inform potential design interventions for promoting sustainable urban development (Chen, 2014). Scholars argue that urban morphology is an essential means for understanding settlements' physical formation and evolution over time (Ahmadi et al., 2012). The aim is to examine the shape, order, and character of settlements based on their constituent parts, such as plot sizes and shapes, urban blocks, building footprints, and land uses. The composition of these physical attributes is critical for generating the pattern of street networks in neighborhoods and cities (Hanson, 1989; Hillier, 1996; Kankol, 2015).

In some ways, the urban morphology of souqs in Arab cities differs from traditional marketplaces in other parts of the world, such as Europe (Kostof, 1992). Scholars view this difference as arising from their historical origin in Islamic societies tailored to the specific physical, climatic, cultural, and topographical conditions of the Middle East (Kiet, 2011; Gharipour, 2012; Tannous, 2020). However, in other ways, Arab cities and souqs appear governed by the same spatio-formal processes arising out of the composition and patterning of the urban grid found in other traditional markets, neighborhoods, and settlements worldwide (Hillier & Hanson, 1984; Hanson, 1989; Hillier, 1996; Major, 2018; Tannous, 2020; Tannous & Major, 2020). It is hardly surprising: no matter where we are still forward-facing, bi-pedal organisms bound by gravity. The dual nature of cities sometimes makes it difficult to discern the role of general and specific factors at work in the morphogenesis and evolution of urban form. There are simultaneously allocentric (general to all settlements) and egocentric (specific to one settlement) variables at work (Carvalho & Penn, 2004; Hillier, 2002). Their nature as physical and social entities make cities easy to use but difficult to discuss (Hillier, 1996). They are continually changing and stabilized patterns over time, chaotic while still ordered, and somewhat strange but comfortably

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familiar all at the same time (Major, 2018).

The same tends to apply to morphological research. The space, form, and location of cities have natural determinants such as geography, topography, geology, and hydrology. There are also human-made determinants such as architecture, infrastructure, and modifications of the natural landscape. We could ascribe the first to what Hillier (1996) calls "generic function, by which is meant the spatial implications of the most fundamental aspects of human use of space, that is the fact of occupation and the fact of movement" (5–6). In settlements, this can also mean "movement and the basic human requirements for occupation, i.e., food, water, and shelter" since people must move to build something, but they do not need to build to move (Major, 2018; 41). Hillier (1989) refers to Type 2 laws of the urban object governing the effects of spatial form on urban function and Type 3 laws governing how the urban object influences society in generating a distinctive spatial culture. In between, serving as a bridge between the general and specific are Hillier's (1989) Type 1 laws governing the generation of the urban object itself (Major, 2018).

Researchers consider the multifaceted nature of the built environment, acknowledging that civic places like souqs simultaneously function as a representation and the results of society. They reflect collective needs at a specific point in the past to the present day. They are also the result of the current requirements to support functions today and, hopefully, in the future. The study of urban morphology provides a link between the physical and social attributes of cities. It can enable better decision-making in urban design and planning and guide economic investments in the quality of the public places where we live, work, and play (Jacobs, 1961; Gehl, 1971 and, 2010; Major, 2018).

This paper presents the findings of a morphological comparison between two souqs in the State of Qatar: the rehabilitated Souq Waqif in Old Doha and reconstructed Souq Al Wakrah in the satellite city of Al Wakrah (Fig. 1). Both case studies are important landmarks in Qatar and the Gulf Cooperation Council (GCC) region. The study uses standard techniques available in morphological research, including figure-ground representations, pedestrian sheds, diagrammatic illustration of morphological evolution over time, and land use distribution. The purpose is to elaborate on the role of urban design and planning in shaping the user experience. Collectively, the paper's goals are to 1) offer a broader understanding of the urban morphology in Souq Al Wakrah and Souq Waqif 2) describe them as urban objects over time, and 3) discuss the probable impact of their morphological characteristics on user experience. We argue that morphology is fundamental in shaping their urban function as public places of civic value to Qatari society. The paper attempts to show the civic value of these marketplaces, intimately tied to their urban design and planning as physical objects. In doing so, we can develop a deeper appreciation of Qatari architectural and urban heritage for the local, regional, and international community and deepen our knowledge about the urban morphology of Arabian settlements.

2. About Souq Waqif and Souq Al Wakrah

Recent research about GCC settlements still tends to focus on globalization, rapid urbanization, and large-scale mega-projects, usually in Saudi Arabia (Abdulaal, 2012; Salama & Wiedmann, 2013). Al-Hathloul and Edadan (1993) reviewed the historical evolution of settlement patterns in Saudi Arabia three decades ago. Over twenty years ago, Saleh (1998) examined the search for architectural identity for improving the spatial quality of Arabian urban environments, specifically Riyadh, Saudi Arabia. Hamouche (2004) examined morphological changes in Muharraq and Manama, Bahrain, to develop a theoretical framework for urban management and planning. In a similar vein as Saleh, Mahgoub (2004) reviews globalization forces and a loss of traditional identity through standardization of modern construction methods for the built environment in Kuwait. More recently, Al-Shihri's (2016) study narrowly focuses on compiling data about the unsustainable features – exclusiveness, low density, single-family housing, and poor connectivity – of forty-five large-scale residential developments in Dammam, Saudi Arabia. Nahiduzzaman et al. (2020) utilize space syntax to investigate the spatial and social features of ethnic 'third places' for lower-income expatriates in Khobar, Saudi Arabia. Collectively, it suggests a need for more morphological research about Arabian settlements.

Qatar is a peninsular nation on the east coast of the Arabian/Persian Gulf. Attached to the Arabian Peninsula, it shares a common border with Saudi Arabia to the south. Globalization and rapid urbanization characterized Qatar over the last fifty years. The country saw a remarkable economic transformation from a small fishing and pearling nation to a prosperous, diverse economy based on natural gas/oil production and exportation. Today, Qatar "is, by far, the richest country in the world, with a GNI per capita of $116,799 - more than $20,000 higher than any other nation" with more natural gas reserves (13% of total global supply) than all but two other countries (Russia and Iran) in the world (Suneson, 2019; CIA, 2020).[1] It fed rapid economic growth in the country and hosting of mega-events such as the Asian Games 2006 and FIFA World Cup 2022.[2]

Most growth focused on Doha, which grew to encompass the satellite settlement of Al Wakrah to the south. Rapid urban growth changed not only Doha's physical size. It led to a significant population increase over the last twenty years, from an estimated metropolitan population of 492,000 in 2000 to over 2.4 million people in 2020. Over 80% of the national population lives in Doha and its suburbs.[3] As a result, the Qatari government faced significant issues for managing growth, transportation, infrastructure, housing, and protecting the natural environment. It led to investment in – and a radical transformation of – Doha's urban environment (Salama & Wiedmann, 2013; Furlan et al., 2018). Changes included constructing an extensive road network based on road widening and a ring-road/expressway system. There was an almost complete abandonment of traditional low-rise courtyard housing for contemporary – usually three-story – residential villas and high-rise apartment living (Al-Mohannadi et al., 2019). The planning, design, and construction of new satellite business districts, such as West Bay in the 1990s and Lusail City today, changed the popular image of Doha as a city on the rise (Salama & Wiedmann, 2013; Furlan et al., 2018). The transformation fed widespread demolition of large swathes of traditional urban fabric and buildings of cultural significance. Collectively, it led to a growing sense of loss of Qatari architectural and cultural identity (Jaidah & Bourennane, 2010; Alraouf, 2012; Salama & Wiedmann, 2013).

Souq Waqif is the most important heritage site in Qatar today. It marks the original founding of Doha (Radoine, 2010; Alraouf, 2012; Fletcher & Carter, 2017). Dating from the 18th century, it originally included single-story traditional courtyard houses (Jaidah & Bourennane, 2010; Al-Mohannadi et al., 2019). Over time, owner merchants transformed the area into a commercial district selling various retail and wholesale goods (Tannous, 2020). In the late 20th century, Souq Waqif deteriorated as Qataris abandoned the city center for contemporary villas in the new suburban periphery. After a fire destroyed several buildings of Souq Waqif, the Qatari royal family funded the 2004–2008 restoration project (Salama & Wiedmann, 2013). The project included preserving the oldest buildings, demolishing all buildings constructed after 1950, and eliminating most surface parking, replaced by underground parking garages (Aguilar, 2015). Newly built structures adhere to or modernize the local Qatari architectural style. Many incorporate traditional construction methods to reflect Doha's historical origins, including thick masonry walls, mangrove roofs, natural stone, and bamboo poles, collectively acting as insulation against the hot desert

[1] GNI is Gross National Income.

[2] FIFA is the Fédération Internationale de Football Association.

[3] Approximate estimates based on various sources including the Qatar Ministry of Development Planning and Statistics (MDPS).

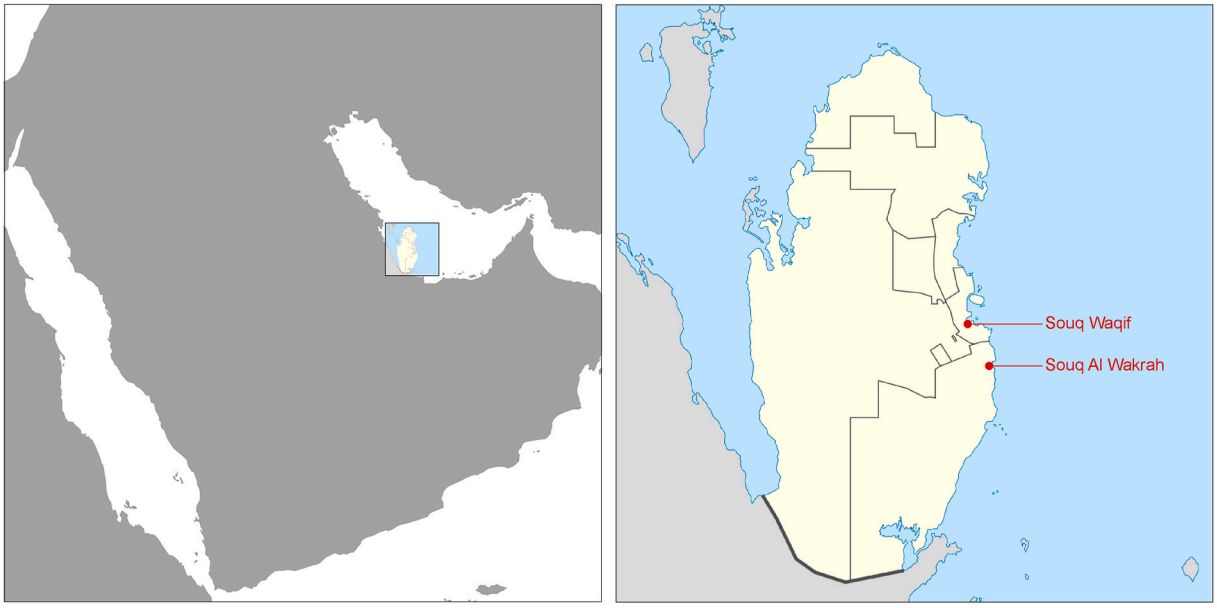

Fig. 1. The location of the (left) State of the Qatar on the Qatari Peninsula in the Persian Gulf attached to the larger Arabian Peninsula and (right) Souq Waqif and Souq Al Wakrah in Qatar (Source: Authors).

climate. The restored souq also features low-rise building elevations, usually 2-3 stories in height, though there are 5-story boutique hotels at peripheral locations. A series of pedestrian routes separate these buildings, including many narrow alleyways (Tannous, 2020). A new civic impetus and historic preservation policy emerged to protect important heritage sites in Qatar, birthed by the restoration of Souq Waqif (Salama & Wiedmann, 2013). To date, it culminated with the recently opened Msheireb Downtown Doha. It adaptively re-used several historic Qatari courtyard houses while keeping the traditional urban fabric in the area west of Souq Waqif, incorporating contemporary buildings that re-imagined the traditional Qatari architecture style (Tannous, 2020).

As part of these preservation efforts, the Qatari government also faithfully reconstructed the historic fishing village of Al Wakrah to become Souq Al Wakrah today (Fig. 2). Souq Al Wakrah (roughly translating as 'bird's nest market') occupies a location on the east coast about 19 km south of Souq Waqif. There is little information available about historic Al Wakrah in the literature. Gharib (2019) investigated the quality of open spaces in both regenerated Souq Waqif and Souq Al Wakrah using behavioral mapping and impressionistic assessments. Behavioral mapping also occurred in our more extensive, ongoing studies of Souq Waqif and Souq Al Wakrah. However, it is not this paper's subject.

Based on archaeological evidence, Jaidah and Bourennane (2010) argue Al Wakrah was the first urban center on the Qatari peninsula. According to records in the British Library, the original village dates to the mid-19th century. It had an active port during the early 20th century (US Hydrographic Office, 1920).[4] In the mid-to-late 20th century, Qataris abandoned and demolished the original fishing village, except for a few historic buildings. It occurred even as Al Wakrah continued to grow around it to become a small city of 90,000 people today. In 2008, the Qatari government announced the new project for Souq Al Wakrah based on reconstructing the original fishing village's traditional urban fabric, officially opening at the end of 2014. Architects designed the reconstructed urban fabric for Souq Al Wakrah based on evidence available in only aerial photography. Many of the design and construction techniques deployed for the restoration of Souq Waqif continued in this new souq. Today, more than a hundred units sell retail and wholesale goods, traditional crafts, and food service in Souq Al Wakrah. Unlike Souq Waqif, surface parking lots continue to serve Souq Al Wakrah, with the primary lot along the western edge of the souq next to Al Wakrah Road. There are also informal, unpaved surface parking areas available in the southern portions of the souq along the coast.

3. Research methodology

The research in this paper combines earlier findings of Souq Waqif and cities of the Arabian Peninsula with a study focusing on the settlement of Al Wakrah and its souq (Tannous, 2020; Khan, 2021; Khan & Major, 2020; Major & Tannous, 2020; Tannous & Major, 2020). All are part of the burgeoning space syntax research program about the Middle East's built environment and urbanism in the Department of Architecture and Urban Planning at Qatar University in Doha. Space syntax is not an explicit part of the analysis in this paper. However, it does serve as theoretical background to the research.

The research also includes data collection such as on-site observations and behavioral mapping of movement and user activities, land use surveys, photographic documentation, and qualitative field notes. It also consists of compiling historical maps, aerial/satellite imagery (where available), and photographs about the Al Wakrah settlement over time (Khan, 2021). Tannous' (2020) earlier methods examining Souq Waqif in Doha and Souq Al Mutrah in Muscat, Oman, served as the methodological foundation (Tannous & Major, 2020; Major & Tannous, 2020).

Qualitative descriptions based on observations of form, function, and design are the primary basis for this paper's study. Basic quantitative measurements supplement this approach based on block size/shape and metric area/distance. We use representational techniques common to the study of urban morphology. These include figure-ground representations set to a standard scale and one (1) square kilometer (km^2) bound to enable direct comparisons between the urban pattern of Souq Al Wakrah and Souq Waqif within their immediate context. Researchers defined blocks based on a typical building line, using the actual building line of attached dwellings forming urban blocks or a virtual one (using compound walls) involving more contemporary, free-standing

[4] India Office Records and Private Papers. (1904) *Persian Gulf Gazetteer Part II, Geographical and Descriptive Materials,* Section II *Western Side of the Gulf* [59v] (121/286). Original records in the British Library, London, UK. Digital records available from Qatar National Library, Doha. Retrieved: 19 July 2020 at https://www.qdl.qa/en/archive/81055/vdc_100023206838.0x00007a.

Fig. 2. Views of the (top) coastal promenade and perpendicular route to the coast in Souq Al Wakrah in March 2018, and (bottom) northern segment of the main spine and southern route to Ali Bin Abdullah Street from the main spine of Souq Waqif in June 2018 (Source: Authors).

buildings. Most building types like this occur in the surrounding areas, more so in Al Wakrah than in Old Doha. The paper also includes pedestrian sheds as an indicator of 'as the crow flies' walkability. We limit pedestrian sheds to radii of 300 m and 400 m or a 3-to-5-minute walk.[5] Qatar has a hot desert climate. There are long hot summers, typically May to September with average high temperatures around 40 °C (104 °F), and short, pleasant winters from November to March with average high temperatures of 25 °C (77 °F). October and April serve as transitional months between the seasons.[6]

Morphological analysis in the paper also includes examining the grid logic consistency in both souqs over time, even as interstitial areas – both individual dwellings and routes – evolved in the urban fabric of Souq Waqif or reconstruction occurred in the entire area in Souq Al Wakrah. Hillier's (1999a-b) earlier findings on the 'hidden geometry' of deformed grids patterning a pervasive centrality into European urban patterns is the basis of this analysis (Major, 2018). We also examine the land use pattern with particular interest given to the location and distribution of mosques and prayer areas. Finally, in the discussion section, we make design enhancement recommendations for both souqs.

4. Morphological evolution and spatial logic

Free-standing buildings characterize much of Al Wakrah today (Fig. 3). It reflects most urban development occurring during the late 20th and early 21st century. Most are contemporary residential villas sitting centrally within a yard, surrounded by walls forming a compound (Al-Mohannadi et al., 2019). The only places where this is not the case are Souq Al Wakrah itself and two large, free-standing buildings directly to the west. These are the historic early 20th-century Al Wakrah Fort and a preparatory school for boys slightly further to the west.

In Souq Al Wakrah, the re-creation of the traditional urban fabric uses a courtyard house typology. It internalizes an outdoor space surrounded by a ring of rooms to form the house (Al-Mohannadi et al., 2019). Because these courtyard houses (now serving as retail units) attach using common walls, the urban blocks appear larger than the reality on the ground. The ample open space of the surface parking lot at the western perimeter is clear, forming a wedge-shaped area with broader depth in the north compared to the south from Al Wakrah Road. The effect of modern transportation planning appears straightforward, especially for Al Wakrah Road itself. The right-of-way for Al Wakrah Road is 40 m (m) for a four-lane road and a wide central median (about 12 m) with a posted speed limit of 80 km/h.[7] Finally, Souq Al Wakrah maintains a direct relationship with the coast due to its beachfront promenade.

The latter is not the case for Souq Waqif, where the direct relationship to Doha Bay disappeared due to land reclamation for Al Corniche Road during the late 1950s/early 1960s. Al Corniche Road shifted the coast about 335 m further north from its historical location bordering Souq Waqif. Today, this area also includes a northern expansion of the souq itself, Abdullah Bin Jassim Street, and Souq Waqif Park. The coast is now about 215 m (or one-eighth of a mile) away from the northern edge of Souq Waqif. Slightly more than 25% of this distance is dedicated right-of-way for vehicular movement on two streets. It includes 20 m for a four-lane road with a central median with a 40 km/h posted speed limit on Abdullah Bin Jassim Street at the northern edge. It also includes 35 m for an eight-lane road with a large central median – transitioning into single or double left-turn lanes on some road segments – with a posted speed limit of 80 km/h on Al Corniche Road. The distance is not

[5] Cervero (2000) and others such as the Congress for New Urbanism (CNU) argue for radii of 400 m and 800 m (or ¼ mile and ½ mile) representing a comfortable 5-to-10-min walk, which is standard industry practice in most of the world. It is valid for five months of the year in Qatar. However, radii of 300 m and 400 m is more practical for walkability throughout the year due to climatic conditions on the Arabian Peninsula.

[6] Based on data available from the US National Oceanic and Atmospheric Administration (NOAA) and the Qatar Meteorological Department.

[7] There is on-going road construction on Al Wakrah Road.

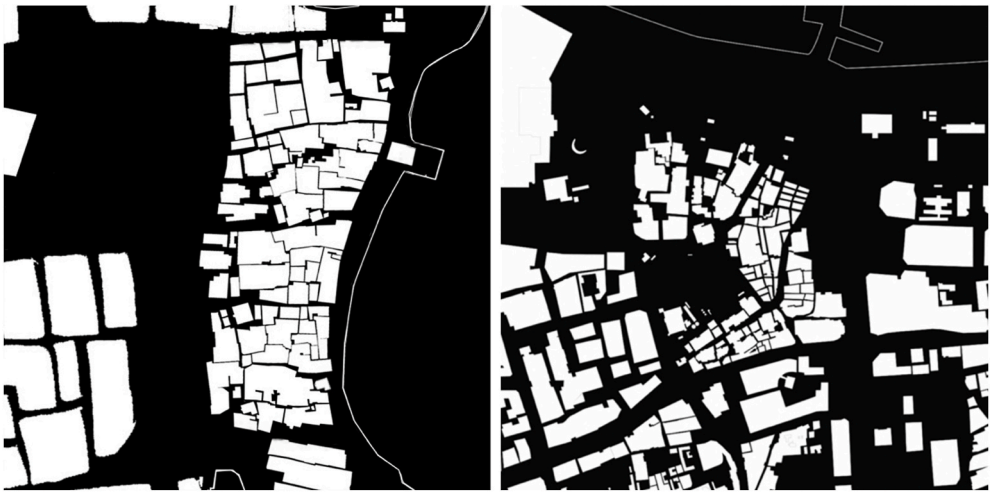

Fig. 3. Figure ground representation (space in black, blocks/buildings in white) of a 1 km^2 area focused on the (left) central portion of Souq Al Wakrah and (right) Souq Waqif set to a common scale (Source: Authors).

far, about a 2-to-4-minute walk if pedestrians could move freely. However, signalized crosswalks and underground passageways turn it into a 10-to-15-min journey, as if two or three times the actual distance (Tannous, 2020).

The superblock structure arising from modern transportation planning is also plain in Al Wakrah and Old Doha. However, the urban fabric of Souq Waqif and older areas of Old Doha, such as Al-Najada to the south, have smaller urban blocks than Souq Al Wakrah. In large part, this reflects the differing evolution in Old Doha, originating as courtyard houses later converted into retail and commercial land uses over time. Larger urban blocks characterize the contemporary developments of the areas surrounding Souq Waqif. It includes the large Amiri Diwan (royal palace of the Emir of Qatar) northwest of the souq, moderately sized urban blocks of Msheireb Downtown Doha to the immediate west, and the New Gold Souq across Ali Bin Abdullah Street to the immediate south.

Souq Al Wakrah capitalizes on its adjacent location to the coast by extending linearly in a north-south fashion, covering a total area of 0.31 km^2. In contrast, Souq Waqif emphasizes compactness in its shape, which is square-ish and covers an area of only 0.19 km^2. However, most of the added area in Souq Al Wakrah is the northern and southern extensions, including a large park to the north.[8] The metric size of the middle portion of Souq Al Wakrah (0.16 km^2) is more comparable to Souq Waqif, representing only about a 19% difference. These differences become less pronounced when accounting for the open plazas in Souq Waqif to the northeast and associated with the old cemetery/Al Koot Fort in the west-central area.[9] The metric area of Souq Waqif without these plazas is about 0.15 km^2, only about a 7% difference. Despite this, the middle part of Souq Al Wakrah still accentuates its shape in a north-south direction related to the coast. There are many pedestrian routes easing inter-connectivity in both souqs, some of which are narrow passageways. However, the available width for some routes in Souq Waqif is more generous. In part, this is a result of the 2004–2008 Restoration Project. However, it is also due to the evolution of Souq Waqif over time, giving rise to a more traditional deformed grid layout in European terms (Hillier & Hanson, 1984).

Five long, straight-ish routes with generous widths in Souq Al Wakrah run perpendicular to the coast. Two define the northern and southern edges. It gives rise to an urban pattern composed of five superblocks due to a shorter north-south route subdividing the northernmost area parallel to the coastal promenade. The superblock pattern appears to be a modern interpretation to create well-defined edges to the narrow, labyrinthine-like passageways composing these blocks' interstitial areas. However, as we will see below, there is a historical precedent for these routes. The interstitial regions are complete reconstructions of the labyrinthine-like, blank wall passageways arising from the restricted random aggregation of dwelling units in the historical settlement (Hillier & Hanson, 1984; Hillier, 1996; Major, 2018; Major et al., 2019; Tannous, 2020). The walls of the reconstructed courtyard houses and compounds define these passageways, which helps cross-circulation from area-to-area – retail zone to retail zone– in the souq today (Fig. 4).

The re-creation of the old Al Wakrah fishing village for the new souq was so faithful that construction crews built the courtyard houses' compound walls in their entirety. They later cut through these walls (refer to the background of Fig. 4, top middle) to create a series of interconnected courtyards linking various retail areas together. They tend to cluster together by type based on land use planning, i.e., fabrics, pets, jewelry, household goods, etc. The patch repairs for these cuts in the masonry remain visible. It suggests adaptive re-use of the built environment to create an impression of authenticity about the souq for users. However, it is not. It is a historical re-creation. It does mean there are more routes available via these cuts in common walls from courtyard-to-courtyard in the souq than visible in the figure-ground. Since we treat the courtyards as part of the urban block in the figure-ground representations, the courtyards are clearer in a contemporary satellite view.

Both souqs offer a representative cultural identity of the traditional Qatari public realm. However, Souq Waqif is a historic rehabilitation and represents the evolution of the existing urban fabric. In contrast, Souq Al Wakrah is a historical re-creation of an urban fabric that mostly disappeared in the late 20th century. These souqs incorporate elements that are mostly consistent over time; specifically, some buildings but primarily routes associated with their main spine. In Souq Al Wakrah, this is the route next to the coast (now the promenade), 5–6 routes running perpendicular inland from the coast, and a north-south route at the western edge of the historic settlement and contemporary souq (Fig. 5). Though the exact alignment and number of the routes vary slightly over time, the macro-scale grid logic is a consistent parallel-perpendicular relationship to the coast. The perpendicular routes and the superblocks they define also tend to become more geometrical in

[8] The northern built areas of Souq Al Wakrah are not open to the public yet, except for the park. The southern is open to the public but mostly vacant at the time of this study.

[9] The main part of Souq Al Wakrah is the study's focus due to its metric area comparability to Souq Waqif. From this point forward, references to Souq Al Wakrah in the paper refer to this middle part of the souq unless otherwise noted.

Fig. 4. Views of (top left) through passageways defined by the blank walls of courtyard houses, (top middle) exterior gate in the foreground to an internal courtyard with a cut into a compound wall visible in the background connecting two courtyard houses to form retail zone compounds, (bottom left) shaded courtyard interior of a retail area, and (right) satellite view of Souq Al Wakrah from 1 km in 2020 (Source: Authors/Google Earth/Maxar Technologies).

Fig. 5. Aerial views of the route evolution in Al Wakrah illustrating major route consistency (with east-west routes in red and north-south ones in yellow) in (left-to-right) 1947, 1966, and 2019 (Source: Authors with base images of MME/Qatar Museums/Google Earth).

alignment and shape from 1947 to 2019.

Th establishment of the main spine of Souq Waqif, forming an open-angle 'L' alignment, occurred before 1952, with one arm of this spine later extending northward due to land reclamation (Fig. 6). By 1966, the alignment of the contemporary spine was present. The same is true for a secondary spine, forming a modified 'F' alignment for cross-circulation at the scale of the entire souq. Souq Waqif Mosque lies at the center of this secondary spine. It defines near-right-angle connections at its principal intersections with a route running northwest-to-southeast becoming straighter over time. This route connected directly into a southern residential area before urban renewal for the New Gold Souq sometime between 1987 and 2003. Construction of the north-south Banks Street in the 1980s also made this historic connection somewhat redundant. Three segments of the main and secondary spines are routes parallel to each other and running perpendicular to the modified coastline. The macro-scale grid logic of Souq Waqif is remarkably consistent since the mid-20th century, even as interstitial and peripheral areas of the Old Doha underwent drastic redevelopment.

Hillier (1999b) argues the deformed grid layout of organic cities, such as in Europe, tends to have a strongly consistent geometric logic in their axial structure. This geometrical logic is open-angle connections (within 15° of a direct 180° continuation) between principal routes to ease through movement. Right- or near-right angle connections (within about 15° of 90°) tend to ease to-movement for accessing lots, usually

Fig. 6. Aerial views of route evolution in the Souq Waqif illustrating major route consistency (with secondary spine routes in red and the main spine ones in yellow) in (left-to-right) 1952, 1977, and 2018 (Source: Authors with base images of MME/Qatar Museums/Google Earth).

residential dwellings. Street connections at 45° tend to happen less often, except in clear-cut cases of radial planning (Hillier, 1999b; Major, 2018). The main spine of both souqs tends to follow this logic. Long lines of movement connect using open angles in composing the spine, with shorter routes usually connecting at right- or near-right angles to access local land uses. These shorter routes tend to have various lengths and widths for structuring the street hierarchy of the urban grid, especially in Souq Al Wakrah. In both souqs, this grid logic arises from their actual or historical relationship to the coast.

The main spine of Souq Al Wakrah stays at the edge of the area, so the grid logic is merely a consequence of the topographical conditions of the coastline itself or human-made modifications over time. The only place that does not maintain this grid logic is the southern area of the souq. There is a near-right angle connection of two routes to each other at a drop-off zone to manage vehicular traffic. The routes connect to the coastal spine at a 45° angle due to the modified coastline's curving shape at this location. Otherwise, a perpendicular relationship with the seaside promenade to access inland land uses pervades the urban grid. We will review the probable effect of morphological evolution and reconstruction on the spatial logic of block sizes, land uses, and walkability in both souqs in the next section.

5. Urban walkability, and land use

A pedestrian shed provides a simple walkability measure 'as the crow flies' based on metric distance from each souq's geometric center. In Souq Al Wakrah, the geometric center is a central entry plaza, next to the surface parking in the west. In Souq Waqif, the geometric center is a drop-off zone next to the Souq Waqif Mosque at the intersection composing the secondary spine. While the pedestrian sheds show that both souqs are very walkable, they also indicate varying contextual conditions (Fig. 7).

Souq Al Wakrah's relationship with the coast is clear again. Most of the souq lies within 400 m of its geometric center, except the extreme opposite corners of the northern and southern blocks on the coastal promenade. However, the surface parking and Al Wakrah Road to the west isolates the souq from its surrounding context. It includes only the facades of blocks defining the edge of a northern residential area, vacant due to a future urban regeneration project. It also consists of a few buildings on the opposite side of Al Wakrah Road, which is problematic to cross due to high-speed vehicular traffic. The northern and southern extensions of Souq Al Wakrah lay entirely outside the 400 m radius. A 300 m walking distance from this geometric center encompasses most of the western surface parking, about half of the coastal promenade, and

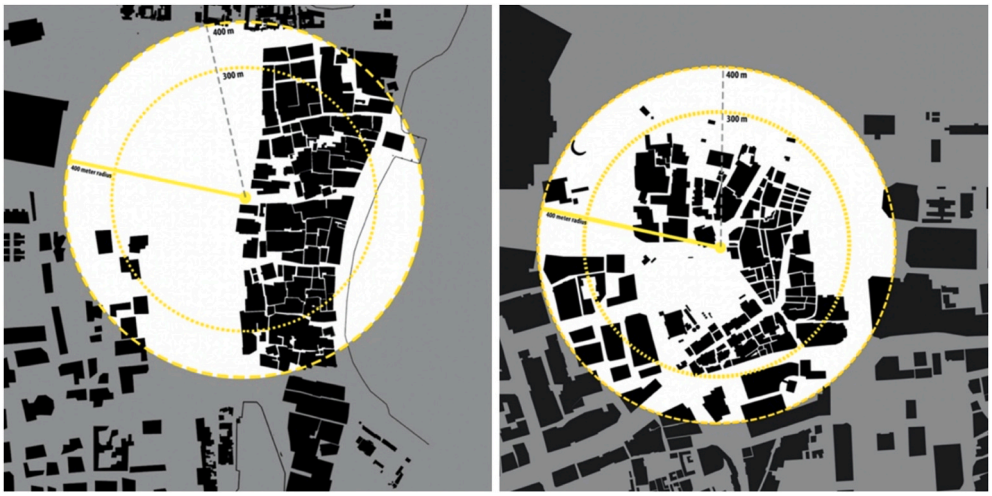

Fig. 7. Pedestrian shed of a 3-to-5-minute walk (300–400 m) from the geometric center of (left) Souq Al Wakrah and (right) Souq Waqif (Source: Authors).

most of the significant, authentically historic structures in the souq.

In contrast, Souq Waqif strongly relates to its immediate surroundings but poorly to the modified coastline of Doha Bay. This relationship persists despite a large amount of open space allocated around its perimeter due to modern transportation planning, Souq Waqif Park to the north, and the Amiri Diwan to the northeast. Notably, Al Corniche Road's pedestrian crosswalks do not fall within 400 m from souq's geometric center. It further accentuates the souq's separation from the coast for end-users. However, Souq Waqif Park to the north, part of the Amiri Diwan complex including Al Shouyoukh Mosque, part of the Al Souq area to the east, and the entrance to the Souq Waqif station on the recently opened Doha Metro to the southeast are all within a 400 m distance. Also, it also includes a part of Msheireb Downtown Doha to the west, most of the New Gold Souq to the south, and even the opposite street corner of the Musherib/Al Najada area (intersection of Wadi Musherib Street/Al Asmakh Street) to the southwest. Souq Waqif's compactness arises due to the historical origins of Doha as a settlement reliant on walking and domesticated pack animals, i.e., camels and horses. The result is small block sizes. Almost everything inside Souq Waqif lies within a 300 m walking distance from its geometric center, except for the southeast corner at the Banks Street/Ali Bin Abdullah Street intersection. However, this street corner is only a short distance (~150 m) from the souq's main spine.

Generally, Souq Al Wakrah and Souq Waqif share a similar block pattern profile. However, more urban blocks are available within 300 m from the Souq Waqif's geometric center (+35%) than Souq Al Wakrah. There are sixty-one urban blocks and free-standing buildings within 300 m of the geometric center of Souq Al Wakrah. In Souq Waqif, there are eighty-two urban blocks/buildings. These figures translate into an average block size of 2623 m^2 (or 51 m × 51 m if square-shaped) in the central portion of Souq Al Wakrah and 2317 m^2 (or 48 m × 48 m) in Souq Waqif, indicating only a marginal difference in average block size (~13%).[10]

Land use patterns tend to initially emerge based on pedestrians' natural movement as shaped by layout and visual permeability, affecting encounter rates among various users (Hillier, 1996; Hillier et al., 1993). Attraction in the clustering of similar land uses such as commercial retail can then produce a multiplier effect above natural movement levels in the urban grid (Hillier, 2002). Regulatory agencies in Qatar classify both souqs as commercial land use. However, land use designations such as 'commercial' in modern planning parlance are often inadequate descriptions for the richness, diversity, and character of traditional marketplaces in the real world. Detailed mapping of ground-level land use is more valuable (Fig. 8).

The land use pattern in both souqs tends to reflect the effects of modern land-use planning by clustering similar types into zones. Only the oldest area of Souq Waqif (most central superblock) appears indicative of its historical origins with a diverse mixture of retail types. The effect of contemporary land-use planning seems plain in the clustering of restaurant land uses along the southern segment of the main spine and the boutique hotels' peripheral locations with larger footprints. In Souq Al Wakrah, several land uses cluster together with hotels again occupying outer areas with larger footprints at the main souq's northern and southern edges. However, there appears to be a different strategy for restaurant land uses in Souq Al Wakrah. There are a distribution of restaurant land uses throughout the souq. The coastal promenade is the most prominent location for such uses. Souq Al Wakrah also shows much higher vacancies, approximately 25% in the central portion of the souq. All units are operating in Souq Waqif.

Another difference in land use strategy pertains to the provision of mosques and prayer areas (Fig. 9). Worship areas are a notable characteristic of traditional marketplaces in Islamic societies. The Friday Mosque often forms a settlement's heart, with the adjacent souq serving to support people's everyday activities. Friday prayer has religious significance as the Qur'an invokes its importance as a sacred day for worship when people gather and pray together in the main mosque (Gharipour, 2012; Major & Tannous, 2020; Tannous, 2020). In Souq Al Wakrah, there are nine mosques and prayer areas within the middle part of the souq, so one worship location for every 17,778 m^2. There are another five within the souq's vicinity but only two within 400 m of the geometric center. In Souq Waqif, there is only one mosque and two prayer areas, representing one worship location for every 63,334 m^2. This provision is over three-and-a-half times less than Souq Al Wakrah. However, Souq Waqif Mosque occupies a strategically and symbolically key position at the geometric center, meaning most everything lies within 300 m of this mosque. There are another four mosques in the surrounding areas to the east, west, and south, all within 400 m from Souq Waqif's geometric center. The nearness of nearby worship areas persists despite modern transportation planning interventions around Souq Waqif.

It indicates the socio-cultural resilience of Souq Waqif as a historic district, primarily arising from small and compact, outward-facing urban blocks and ample route choices. It also illustrates Souq Waqif's strong relationship to the immediate surroundings and the extended nature of Souq Al Wakrah in a north-south direction along the coast. The provision of worship areas in the former relies on the quality of accessible routes to nearby locations. In contrast, the provision of worship areas in the latter depends on a quantity of options to various locations within the souq.

6. Discussion

Souqs are essential to study because so much about them permeates the cultural identity of the people who live, work, and shop in the contemporary cities of the Middle East today, much like traditional marketplaces in cities in other parts of the world. They offer a public realm model designed and planned to attract diverse users, such as citizens and residents, retailers and shoppers, and regional and international tourists. They promote formal civic gatherings and casual social interactions among these different users.

The socio-cultural aspects of these two souqs as physical objects seem similar in many ways, especially architectural style. However, there are some critical differences in terms of urban design and planning. There is a well-defined main and secondary spine, a series of secondary passageways, narrow alleyways, and open plazas characterizing the pedestrian-only nature for much of Souq Al Wakrah and Souq Waqif. These spaces consist of a series of long and short axes carefully designed, either through morphological evolution or re-construction, to generate a street hierarchy in the urban pattern. It might appear labyrinthine in the plan. However, closer examination shows a sophisticated spatial logic, enabling readability and ease of use on the ground for the people who visit and linger there.

In terms of urban experience, the main spine of both souqs is generous in width but feels smaller through the abundant provision of outdoor restaurant seating, which constrains available pavement width for pedestrian movement. It also occurs due to temporary retail displays outside many shops. It brings static occupation with restaurant patrons and shop customers inspecting potential purchases closer to pedestrian movement flows. Collectively, this makes the main spine and other spaces of the souqs feel smaller, more populated, and busier. It is especially true of Souq Waqif due to its nature composed of outward-facing blocks. Retailers use both sides of the route to hawk their goods and serve their customers. Souq Waqif features lively activity and busyness along many of its pedestrian corridors due to these active frontages. The restaurants along the main spine add to the effectiveness of generating a buzzing atmosphere for visitors.

Such a description is less accurate for the coastal promenade of Souq Al Wakrah due to its one-sided nature at the edge of the area. It does not

[10] These calculations are illustrative and do not account for metric area allocated to circulation spaces.

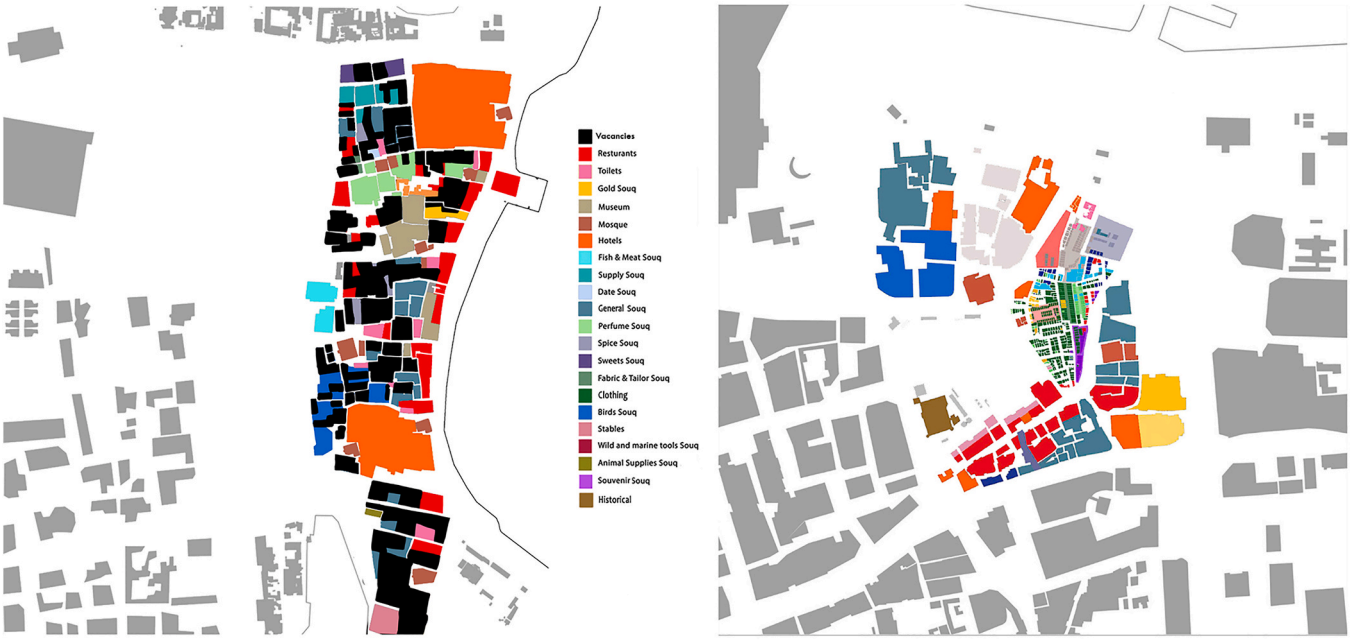

Fig. 8. Survey of ground-level land uses in (left) Souq Al Wakrah including vacant units (in black) and (right) Souq Waqif in 2020 (Source: Authors).

Fig. 9. Location of mosques and prayer areas in (left) Souq Al Wakrah and (right) Souq Waqif (Source: Authors).

occur at all within the internal areas of Souq Al Wakrah. Its interior passageways often feel quiet. While walking through the souq, one can hear the noises of retail activities behind the compound walls. It provides a sense of 'hidden activeness' in the spaces where you cannot necessarily see what you can hear. It is a direct consequence of its courtyard house typology. However, these courtyards supply a more intimate sense of openness and natural shading due to tree landscaping often lacking in Souq Waqif.

In terms of walkability and contextual relations, the general profile of the block pattern is similar in both souqs. There is only a marginal difference in average block size. Both souqs promote walkability using small-ish block sizes, even though Souq Waqif's are predominantly outward-facing and Souq Al Wakrah's inward-facing on courtyards. Souq Waqif's compactness prioritizes nearby locations, as most everything lies within a comfortable walking distance of everything else. In contrast, Souq Al Wakrah's rectangularity emphasizes its relationship to the coast in a north-south direction. These characteristics lead to contrasting contextual conditions. Souq Al Wakrah strongly relates to the coast but weakly relates to the immediate surroundings of Al Wakrah to the north, south, and especially west. Souq Waqif lost its historical connection to the coast during the late 1950s. However, it possesses strong area-to-area relationships to the west, east, and south to this day.

Both originated on the coast, reflecting their historical morphogenesis in Qatar's fishing and pearling industry. However, urban expansion in Doha and morphological evolution over the last half-century transformed Souq Waqif into the commercial hub of a growing metropolis. Souq Waqif's importance grew, and its morphology adapted to the increasing importance of Doha itself as a major metropolis in the GCC region. Souq Al Wakrah's reconstructed morphology faithfully keeps its coastal relationship. However, provisions for moving and stationary vehicles isolate the souq from the growing Al Wakrah settlement. It suggests different potentials for future urban design and planning interventions in both souqs. In Souq Al Wakrah, it is crucial to set up better area-to-area connections to the north, south, and especially west to the larger settlement. In Souq Waqif, there is a long-term potential to re-establish its northern relationship to the coast while keeping, even enhancing area-to-area connections to the west, east, and south. The latter could occur via traffic-calming measures and shared space

initiatives in strategic locations around its perimeter.

Opportunities for future research include detailed 'before and after' morphological examination of Souq Waqif. It could utilize a 1952 survey compared to today. There is also a possibility of gathering extensive demographic data about users in Souq Al Wakrah to compare with such data already available to the researchers for a recently completed grant involving a detailed study of movement and space use in Souq Waqif. Researchers will look to exploit further opportunities for research, building on this study and several others about souqs in the GCC region (Major & Tannous, 2020).

7. Conclusions

The paper studied two marketplaces in Qatar of the GCC region: the reconstructed Souq Al Wakrah in the satellite town of Al Wakrah and the rehabilitated Souq Waqif in Old Doha. We researched these two souqs' urban morphology and discussed the probable impact on their functioning as public places today. Both shared similarities, including topography, history, culture, block size, and architecture. However, morphological differences arose from the evolution of urban form in Al Wakrah and Old Doha. It included Souq Al Wakrah's maintenance of a clear relationship to the coast but a weak one to its urban surroundings, and vice versa for Souq Waqif. Their characteristics collectively pointed to the critical role that urban morphology can play in promoting walkability, even in the harsh climatic conditions of the Arabian Peninsula. Namely, carefully tailored design and planning of the street and block pattern related to the urban context can play a key role in promoting walkability and end-user experience in such places. The research also helped to demonstrate souqs' nature as a reservoir of significant cultural heritage and social identity in rapidly developing societies, to one degree or another. We can describe and understand aspects of *genius loci* or the 'collective spirit of place' of traditional marketplaces as morphological objects in old city centers. These characteristics of place are significant for making traditional marketplaces and old city centers into destinations for people to visit and linger, wherever in the world. The urban design and planning of a city's morphology can play a fundamental role in giving rise to the distinctive ambiance of places like souqs, which retain significant civic value today and possess an 'urban buzz' for the people who live, work, and play in our cities.

Author statement

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