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Connectivity in the Old Al-Hitmi Neighborhood

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Abstract

The Qatar National Vision 2030 and the country's readiness to host the World Cup in 2022 emphasize making cities and neighborhoods more sustainable for pedestrians, providing accessibility and street connectivity standards. Therefore, the study aims to explore walkability and connectivity within the neighborhoods to improve livability. The study adopted a literature review, case studies, and an assessment of 19 features for evaluating pedestrian networks from the theory of workable cities. In addition, site visits, observation, photos, data collection, and a questionnaire were employed. The study's findings revealed that overall pedestrian conditions are favorable, but the ability to walk is affected by many factors that make walking unsafe and loveable, affecting pedestrian connectivity networks of high-grade streets.

Keywords: Walkability, Connectivity, Safety Landscape, Green, Neighborhood. The General Theory of Walkability.

Introduction

The study delves into the concept of walking within the old Al-Hitmi neighborhood and its neighboring areas, strategically positioned near the Corniche with connections to prominent tourist sites like the Qatar National Museum and Souq Waqif. Additionally, it is closely linked to commercial districts such as the historic Al-Ghanim, known for ornamental trade, attracting a significant number of young Qataris. The neighborhood is adjacent to Umm Ghuwailina, characterized by towering residential buildings, high population density, and

proximity to the revived Doha International Airport, aligning with the upcoming FIFA Qatar 2022 World Cup. The presence of a metro line, specifically the museum station in Al-Hitmi, significantly influences people's movement, connecting to governmental, social, and economic institutions.

The study emphasizes the sustainability benefits associated with reduced carbon emissions, improved air quality, decreased road congestion, and a decline in accidents and injuries, fostering a more efficient and pedestrian-friendly environment. These outcomes align with Qatar's national development strategies, particularly the

Qatar Vision 2030, aiming for environmental sustainability and an enhanced quality of life for citizens. The study aligns with the national vision's core elements, addressing challenges such as modernization, tradition preservation, economic growth, controlled development, and social and environmental safeguards.

The infrastructure evolution in Al-Hitmi, including street regeneration and sanitation improvements, sets the backdrop for the study, focusing on enhancing walking safety and attractiveness. The research aligns with a growing interdisciplinary task related to urban planning, public health, climate impacts, economics, and social conditions, emphasizing the multidimensional nature of the concept of walking in urban areas.

After the neighborhood's renewal, challenges emerged, such as a decrease in parking lots leading to illegal parking on pedestrian paths and unused urban spaces, compromising walking safety and increasing air pollution.

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Accessibility issues include the lack of visual visibility of the Doha metro station, hindering its identification due to building obstructions. Pedestrians resort to random road crossings due to distant pedestrian paths and limited retail area proximity, as demonstrated by the study's findings.

The study's organization includes a review of relevant literature covering walkability, its definition, importance, connectivity, and neighborhood aspects. The methodology encompasses statistical analysis, case study criteria, and examination of questionnaire survey and site observations. Findings are presented in detail in Chapter 4, leading to recommendations summarized in the final section, encapsulating the principal outcomes of the research.

Literature Review

Pedestrianization, the process of redesigning and prioritizing streets for pedestrians, has garnered attention from city planners and engineers aiming to address urban challenges. Michael Southworth asserts, "We can make places more walkable using 6 key design criteria," which include Connectivity, linkage, safety, Quality of path, variety of land uses near the path, and path context (Dovey & Pafka, 2019).

While the term "walkability" has recently gained popularity, defining it poses challenges (Southworth and Michael, 2005). Designers and traffic experts often associate walkability with the urban layout of neighborhoods and other design elements at a smaller scale (Park and Sungin, 2008). James and colleagues provide a specific definition, describing walkability as "a term to describe and measure the connectivity and quality of pedestrian paths of all kinds, which can be measured through a comprehensive assessment of the existing infrastructure and identification of the necessary needs" (Leather et al., 2014; 2011, p. 9).

This definition emphasizes the significance of evaluating pedestrian paths and the infrastructure to gauge the need for improving the traffic environment. Another approach to defining walkability involves identifying variables affecting the ability to walk. "Burden Dan" outlines variables such as the location of services, extent of communication, route direction, density, land uses, and the location of schools in the neighborhood (Burden and Dan, 2018). Southworth introduces additional variables, including the pattern of land uses, open public spaces, street design, and traffic path patterns (Southward, 1977, pp. 28-44).

Combining these various definitions, researchers arrive at a comprehensive definition of walkability. Studies portray walking as a safe, easy, and enjoyable activity facilitated by accessible environments that meet necessary needs and achieve acceptable levels of service. The encouragement of walking extends to various forms, including recreation and exercise, ensuring accessibility for all groups, including seniors and people with special needs.

Connectivity

The architectural features of building design and the elements of street coordination play a pivotal role in enhancing walkability, aligning with established criteria. A plethora of research delves into the various facets of walkability, with South & Fitzmon's studies serving as pertinent contributions to this discourse. Southworth, in elucidating the societal standards conducive to walking, underscores the significance of Connectivity, defined as "the possibility of providing a network of public streets that allow intersections between them and also to move easily around them" (Steven, 2020).

Connectivity extends to the existence of sidewalks in streets and pedestrian pathways, emphasizing the need for seamless pedestrian paths, minimizing obstructions (Dovey & Pafka, 2019). Further, the integration of pedestrians with other modes of transportation is crucial for creating a well-connected network, not only within residential complexes but on a larger scale, encompassing buses, metro tunnels, and trains (Dill, 2004). The accessibility of stations within a reasonable distance, typically a radius of 400 meters or a 5-10 minute walking period, contributes to the walkability of an area (InfraPlan, 2020).

A comprehensive pedestrian network, facilitating communication among pedestrians and between pedestrians and various modes of transportation, is vital for easy access to metro or bus stations (Dovey & Pafka, 2019). An effective public transport network embedded within mixed land uses further enhances walkability (InfraPlan, 2020).

Mixed land use, characterized by a diverse pattern of land activities, is a hallmark of walkable neighborhoods, allowing residents to meet daily needs within a 20-minute walk or a maximum distance of 2 miles (T. H. E. City and O. F. San, 2017). The quality of pedestrian paths is integral to walkability, encompassing distinct sub-areas such as the front facade, the actual walking area, afforestation, furnishing area, and buffer zone (Minneapolis Pedestrian Master Plan, 2009).

Path context, expressed through different urban characteristics, categorizes areas into centers, neighborhoods, suburbs, and industrial zones (Dovey & Pafka, 2019). Security and safety are paramount in influencing the decision to walk, encompassing aspects like lighting, which enhances visibility in quiet areas (Dovey & Pafka, 2019). The relationship between crime rates and traffic demand underscores the need for security from crime (Dovey & Pafka, 2019).

Safety from traffic accidents, another critical factor, involves considerations like road factors, pedestrian crossing

time factors, characteristics of pedestrians, their behavior, the number of transients, and the number of intersections in residential neighborhoods (Dovey & Pafka, 2019). Security from natural and industrial obstacles, ranging from weather-related challenges to infrastructure issues, is imperative for unimpeded pedestrian pathways (Dovey & Pafka, 2019).

Case Studies

Items	Case 1	Case 2	Case 3
Case Description	A Positive Theory of Network Connectivity Areas. (David Levinson, Arthur Huang, 2012)	MODEL STREET CONNECTIVITY STANDARDS ORDINANCE. (American Planning Association, March 2006)	STREET NETWORK CONNECTIVITY, TRAFFIC CONNECTION, AND TRAFFIC SAFETY. Utah Department of Transportation Research & Innovation Division (2020)
Methodology Adopted	Simulation model on a grid-like land-use layer with downtown in the center, evaluating the degree of tree-likeness in the networks.	Determining maximum block length by examining and measuring block dimensions in residential areas using a connectivity index.	Analyzing global efficiency and relative size of connecting subgraphs in a complex road network, focusing on Lanzhou's connection dependability using bend propensity analysis. Road networks develop through a tree-like structure around the central parcel, extending outward to the perimeter. As accessibility improves, the topology becomes more linked, enhancing overall network connectivity.
Criteria for Assessing Connectivity	Simulating network growth on a grid-like land-use layer with downtown in the center, observing the evolution from a simple tree-like structure to a web-like structure, providing multiple paths.	Developing multiple direct connections in local streets for parks, schools, and shopping without arterial streets, incorporating collector streets, and ensuring pedestrian and cyclist paths for safety.	Social and Environmental Variables: Density, Income, Activity Population, Percent Nonwhite, Percent of Older Adults, Schools, Percent of Commercial Land Use, Number of Miles of Major Roads.
Criteria for Improving Street Network	Proposing a positive theory of network connectivity to explain road network growth from a decentralized perspective, transitioning from a nonredundant structure to a redundant one.	Proposed development must provide local street connections at intervals of no more than feet along adjacent parcels, ensuring future connectivity.	Street Connectivity Index Variables and Factor Loading, Link-Node Ratio, Intersection Density, Percentage of 4-Way Intersections, Median Block Size.

Connectivity in pedestrian traffic not only alleviates congestion and environmental impact but also carries social and cultural significance. Southworth (2005) emphasizes key elements for a successful pedestrian network design, which include (1) ensuring connectivity, (2) fostering collaboration with other modes of transportation, (3) prioritizing security, (4) incorporating patterns of fine-grained land use, and (5) considering the context of the path. In the subsequent Section (3), a case study on pedestrian-friendly cities in Portugal is employed as one of the methodologies for further exploration.

Methodology

The case study of evaluating retail areas, transportation movement, and pedestrian movement in the area, which is an area where the Qatar National Museum is located in addition to multiple government facilities, restaurants, and groceries, and it is an area close to the market area in Doha that includes the traditional Souq Waqif, and this area is connected to the Doha metro line and the public transportation station. We use the same, assessment includes 19 features Accessibility, road design, land use, connectivity, sidewalk amenities, and safety are the six

criteria for the built environment and streets. to case study assesses the possibility of safe walking and connectivity pathways and their impact on making the Al Hitmi district more sustainable and explores the concept of an urban environment that enables walking and connectivity to neighborhoods. We aimed to identify and study connectivity pathways and their importance. (Fonseca et al., 2022).

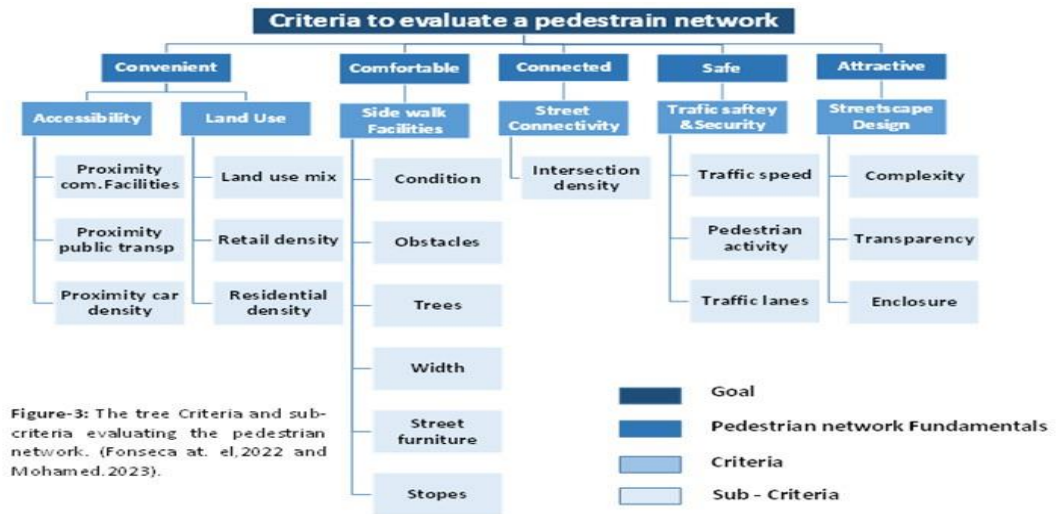


Figure-3: The tree Criteria and sub-criteria evaluating the pedestrian network. (Fonseca et al., 2022 and Mohamed, 2023).



Figure-1: shows the Area of Study locations, main roads, intersections roads and neighborhoods (sources; Qatar GIS & Mohamed, (2023)).

Criteria for Assessing Connectivity

The selection of 19 streets and the corresponding built environment characteristics in the SPN proposal aimed to evaluate the degree of the walkability of pedestrian pathways in Guimaraes. In the current study conducted in the Al-Hitmi neighborhood, a questionnaire survey involving 71 people who live and visit Al-Hitmi neighborhood, and we also used Qatar GIS Figure: 5, and Qatar Municipality land use map figure:4,

Figure -4: A Land Use Map Depicting the Study Area with Neighborhood (Sources: Ministry of Municipality Qatar).

Figure -4: A land use map depicting the Study area with neighborhood (sources: Ministry of Municipality Qatar)

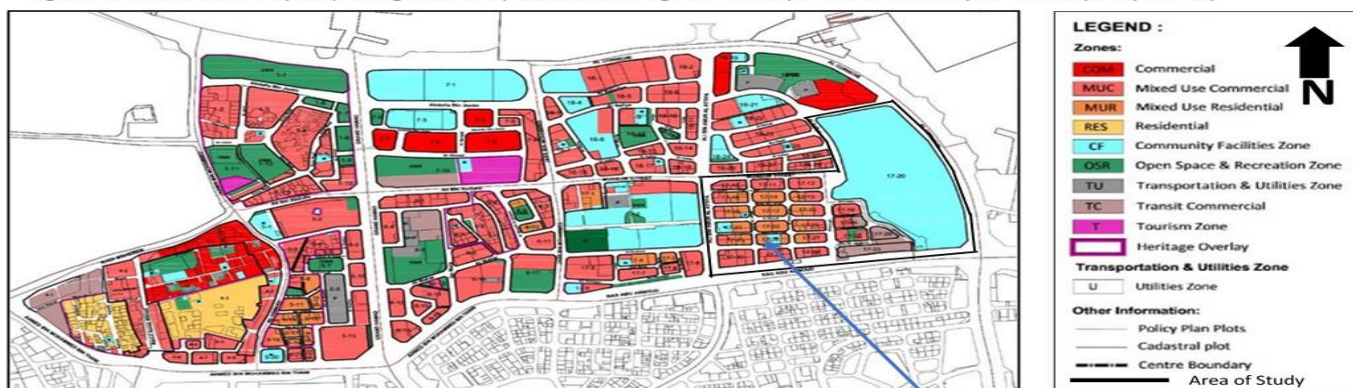


Figure -5: Shows Connectivity, of Metro and Bus stations.800 m,400 m.200m (sources: Q.GIS &Earth. Municipality, Qatar)

and It should be noted that these characteristics are the result of a thorough an examination of the urban fabric's link and street features on walkability. The six criteria are as follows: accessibility, land use, street connection, sidewalk amenities, safety, and security. and boulevards—were evaluated based on these nineteen characteristics. Design that makes the pedestrian network more practical, connected, secure, and aesthetically pleasing (Figure 3). The listed attributes are described below, along with their justification for use, assessment techniques, and data sources. A summary of this data can be found in (Figure 2).

The six criteria, as depicted in (Figure 3), were evaluated as sub-criteria: Convenience, land use, street connection, infrastructure for sidewalks, safety, and security, as well as boulevards. The assessment aimed to establish a more practical, connected, secure, and appealing pedestrian network. Land use (Figure 4) and accessibility and connectivity (Figure 5) were visually represented.

Accessibility was evaluated based on two categories. Firstly, proximity to public transportation stops and stations was assessed using GIS Euclidian buffers of 400 m from bus stops and 800 m from train stations. The binary evaluation indicated a lack of parking in the Al-Hitmi neighborhood, with scores of 74.6% for bus stops, 91.5% for the Metro station, and 43.7% for car parking. Secondly, proximity to community amenities was assessed through a survey and GIS, covering six types of facilities. Scores ranged from 62% for education to 90.1% for religious facilities.

Land use considerations included land use mix (74.6%), residential density (88.7%), and retail density (84.5%). Sidewalk width was evaluated based on the Federal Highway Administration's standards, receiving a score of 95% for meeting the minimum width requirements.

Pedestrian comfort, safety, and security were assessed based on sidewalk pavement conditions (95% for reasonable condition), sidewalk obstructions (85%), trees on sidewalks (no, 85%), and slopes (yes, 95%). Street furniture, including lighting, benches, pedestrian signs, and signage, scored 70% for no furniture on sidewalks.

Street connectivity and density of intersections were evaluated based on intersection density, scoring 78.9% for higher density. Ensured

traffic safety considered a 30 km/h speed limit (95% yes), and the preference for two-lane roadways (85% one lane).

Enclosure, representing the relationship between vertical and horizontal elements, scored 92% for enclosure. Complexity, assessed through outdoor dining, public art, building colors, and architectural designs, scored 90% for no complexity. Streets with visual transparency were evaluated based on the proportion of transparent doors, scoring 90% for no transparency issues (Figure 3).

Observation Study Analyzing the Old Al-Hitmi Neighborhood

The examination of pedestrian paths in the historic Al-Hitmi neighborhood reveals several challenges to walking spaces. Instances include the placement of lighting transformers in the middle of corridors, municipal rubbish bins obstructing pedestrian paths, dense trees causing complete blockages, and a disconnected pedestrian path due to haphazard car parking on sidewalks—resulting from the removal of some lane barriers. Additionally, scooters and bicycles are randomly lined up, contributing to the obstruction.

Furthermore, it has been observed that certain pedestrian paths and roads in the old Al-Hitmi area are inaccessible due to the installation of random tents, rendering the streets unused and hindering proper maintenance. In the older residential areas, there is a notable deficiency in street furniture, with its occasional presence serving more as an aesthetic element. Lighting inadequacies are evident in some streets, and the neighborhood heavily

relies on tall buildings for shading. The number of trees contributing to the overall landscape is significantly diminished, with only a few having been recently planted (refer to Figure 5).

Data Collection and Analysis



Figure-6: Shows connectivity of secondary intersections roads with the main roads, surrounded neighborhoods and the random car parking between the museum and the end of Al-Hitmi (source: Qatar Gis)

Figure -7: The lack of easy access to the metro station is evident in the permanent and illegal erection of a tent in the middle of the road, parking lots that impede traffic, and the permanent presence of stones and hashish. (Source: The Author).

Figure-8: The new design of the street by widening the pedestrian path led to traf- fic jams all the time, which increased air pollution (Source: The Author).

Figure-8: The new design of the street by widening the pedestrian path led to traffic jams all the time, which increased air pollution (Source: The Author).



Figure-10: Shows Food waste, recycle materials (Source & Author)



Figure -9: The pedestrian crossing line diverges to the outskirts of the neighborhood at the traffic light, which makes pedestrians cross the road randomly, exposing them to danger, although there is an underground crossing at the metro station that connects Al-Hitmi neighborhood with Umm Ghuwailina, but pedestrians take (17) seconds to cross the street randomly, while It takes 4 minutes and 17 seconds to cross underground (time measured by author) (Source: The Author).

While efforts have been made to enhance walkability in the old Al-Hitmi neighborhood through measures such as expanding pedestrian paths to 1.5 meters, introducing recycling waste facilities, installing electric car charging stations, placing furniture along certain roads, and improving road lighting, several challenges persist, particu- larly in the sidewalks and roads.



Figure -11: A large number of trees obstruct the pedestrian path, and most of these trees were planted randomly, and some of them have been modernized and are present in the roads, and others are neglected in the operations of shortening the branches. (Source: The Author}.

Figure -12:



The presence of signboards in the middle of the pedestrian corridor hinders safe walking. (Source: The Author}.

Figure -13: The area lacks sufficient furniture, as we find some people sitting on barriers or sitting on the ground, which affects the process of encouraging walking. (Source: The Author}.

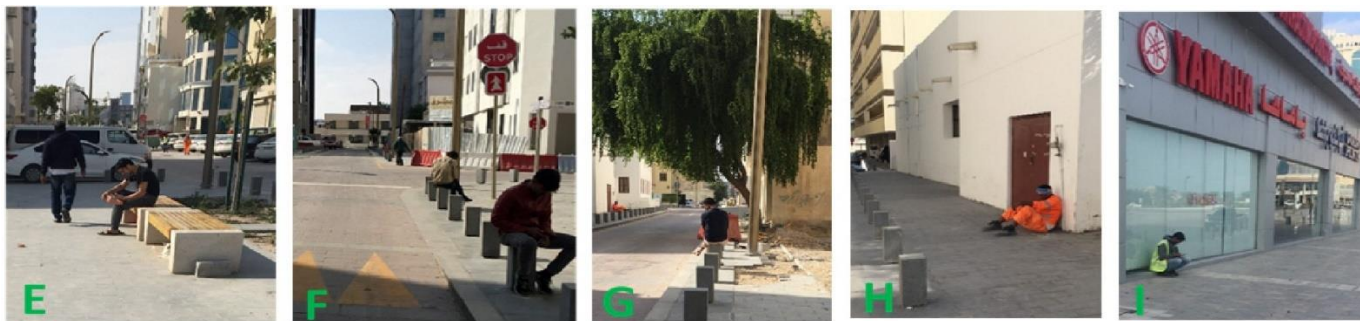


Figure -14: Electricity infrastructure transformers sometimes impede pedestrian movement, and their presence in these blocks, despite being covered with decorative boxes, affects the beautiful visual vision... (Source: The Author)

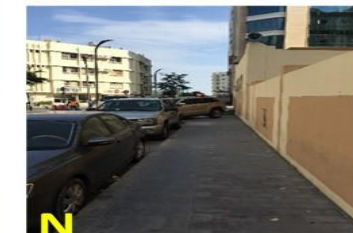


Figure -16: Wrong parking on the sidewalk Suddenly interrupts the process of pedestrians, which forces them to descend into the road of Cars, exposing them to danger and disrupting the flowing movement of cars. (Source: The Author).



Figure -15: Stopping bicycles, motorcycles and scooters in a barbaric manner negatively affects the sidewalk and safe walking (Source: The Author).

Parking in Neglected Lands in The Old Al Hitmi

The modernization of the old Al-Hitmi area made it a permanent pedestrian area. However, it caused a shortage of parking lots in front of the buildings because many of the buildings are old and do not have a ground floor for parking, this made many residents of the neighborhood and visitors search for neglected areas to park their cars. There are two spaces between the Qatar National Museum and the border buildings of the neighborhood, which have become used as alternative parking lots, knowing that this area is not paved. As a result, pollution has spread effectively by stirring up dirt, dust, and carbon, and the land has become a swamp for rainwater. The following figure shows the parking lots

Figure -17: Neglected lands that are used as random parking lots. (Source: The Author)



Figure -17: The effect of rainwater on neglected lands that are used as random parking lots. (Source: The

Factors Affecting Connectivity Around the National Tar Museum Path

The recent transformations in the historic Al-Hitmi neighborhood are intricately linked to the construction of the modern National Museum of Qatar. The neighborhood is connected to a pedestrian path encircling the

museum, providing an excellent area for both athletes and pedestrians. However, numerous communication and connectivity challenges persist, as illustrated in Figure No. (19). This figure depicts various obstacles surrounding three sides of the museum, leaving the fourth side with a pedestrian walkway on Sheraouh Street connected to the walkway crossing the museum's main entrance, denoted by the color purple (J). This path is distinctive and relatively obstacle-free, except for minor intersections with pedestrian lines.

On the side parallel to the Pearl of the East restaurant, shown in red (A), the presence of numerous trees planted haphazardly in the middle of the path poses hindrances to pedestrian movement. The uneven surface and lack of a designated bicycle lane further contribute to the challenges in this area. The side facing Corniche Street, depicted in yellow (B), features obstacles such as furniture in the middle of the path and numerous signboards for hotels, neighborhoods, and municipalities. This has led to a narrowing of the path, potentially causing closures, with no designated bicycle lane. The last section, represented in blue (C), includes a parking lot for police cars that occupies the entire path, with broken flooring and interlocking hindering pedestrian movement. The area is overgrown with green weeds, further impeding access. In the last side, shown in orange (D), although there is a well-designed pedestrian path and a discontinuous bicycle path, obstacles such as the metro station and electric- ity stations persist.

Location of Qatar national Museum, in Old Al-Hitmi (Sources google earth, by the Authors).

Figure -18: Show the walk side around Qatar national Museum, in Old Al-Hitmi (Sources by the Authors).





landscape and green areas.

The Al-Hitmi neighborhood, one of the older residential areas, was not initially equipped with a green infrastructure. Historically, it relied on nearby green spaces, such as the gardens in the Salata area and the museum garden. In recent times, the supervisory committee for the beautification of roads and public spaces has undertaken efforts to modernize the neighborhood. These initiatives include afforestation, implementation of modern

lighting, and greening of selected pedestrian corridors. These steps aim to transform Al-Hitmi into a sustainable and green neighborhood. Despite these improvements, the neighborhood still lacks a dedicated green public space. Furthermore, addressing the issue of random parking areas presents an opportunity to explore the implementation of green parking lots with a new landscaping design tailored to the site. The following figure illustrates various landscape and green public space models:



Figure -19: The Museum Road showing good landscape.



Figure -20: Ras Abu Aboud Main poor landscape.



Figure -21:

The green areas from the extension of Abu Aboud Street to Hamad International Airport are an excellent example of green infrastructure. (Source: The Author)

Findings

This study adopts a comprehensive methodology, structured around six standards categorized into 19 key aspects. The methodology encompasses items such as the questionnaire, designed with inspiration from prior studies that explore the overarching theory of walking, along with the most recent observational study conducted within the study area. Through these methodological approaches, the study aims to draw conclusive insights.

Table: Proposed criteria, sub-criteria, and corresponding evaluating procedures are listed in the table. (Fonseca et al., 2022 and Mohamed, 2023).

User accessibility is a distance and proximity measure to community facilities, public transportation, and parking. To a large extent, access to the three sub-criteria studied was good. Community services Almost all of the schools, health care, public services, and urban parks are among the services considered.

Criteria	Sub-Criteria	Measure	Result	Source	
Accessibility	<input type="checkbox"/> Proximity to public transport.	Bus stops	Near museum 400-800 m (74.6%)	GE	
	<input type="checkbox"/> Proximity to car parking	Train stations	Near museum 400 m (91.5%)	GE	
		Car parking	500 from random parking (43.7%)	GE	
		Educational	Schools close to 800 m (62%)	GE	
<input type="checkbox"/> Proximity to community facilities	Health	Cultural services	Museum 400 m (97.2%)	GE GE	
		Government sector	400 m (90. %)	GE	
	Recreational	Very near 200 m (90.1%)	GE		
	Religious	Mosque 200 m (78.9%)	GE		
Land use	<input type="checkbox"/> Land use mix	land uses	Many mixes use (74.6%)	Survey	
	<input type="checkbox"/> Residential density	average density	average density (88.7%)		Site visit
	<input type="checkbox"/> Retail density	average density	average density (84.5%)		
Sidewalk facilities	<input type="checkbox"/> Sidewalk width	Width	1.5 m yes (95%)	Survey	
	<input type="checkbox"/> Sidewalk condition	Situation	Good (95%)		
	<input type="checkbox"/> Obstacles on side-walks	Yes more	yes (85%)		Site visit
	<input type="checkbox"/> Trees on sidewalks	No trees	No (85%)		
Street connectivity	<input type="checkbox"/> Slopes	Presence of 4 elements = 1 No (shops (yes) (95%) No more furniture (70%)	Survey	
	<input type="checkbox"/> Street furniture				
	<input type="checkbox"/> Intersection density		Many intersections (78.9%)		Site visit
Traffic safety and security	<input type="checkbox"/> Traffic speed		30 km/h0 (65%)	Survey	
	<input type="checkbox"/> Traffic lanes	Interlock	Only one lane (55%)		Site visit
	<input type="checkbox"/> Pedestrian activity		Pedestrian activity (60%)		
Streetscape design	<input type="checkbox"/> Enclosure	Design for pedestrian	Good design for walking (62%)	Survey	
	Complexity Transparency	No Complexity Good transparency	No (59%) Good transparency (50%)		Site visit

Assessment of Land Use, Connectivity, and Walking Environment

This helps to explain the wide range of urban functions and land uses in the old Al Hitmi neighborhood. Walking becomes shorter and more convenient as a result. The distance to public transportation is where performance varies. All street paths are 400 meters or less from the bus stop, 500 meters from the train station, or 500 meters from the metro station, encouraging people to walk. Regarding parking, Al-Hitmi relies on lots in underutilized areas, close to areas where residents are in desperate need. Land use: The neighborhood has a mix of land uses, including cultural and tourist areas such as museums and the Qatari Book House, as well as several governmental and economic institutions. Regarding sidewalks, it has an ideal width of about 1.5 meters and is defined by barriers to protect pedestrians from cars. The sidewalk floor is excellent, flat, and paved with interlocking until several problems impede pedestrian movement, such as the spread of power transformers, trees, billboards, motorcycles, bicycles, and scooters. In terms of street furniture, despite some furniture in various locations, some pedestrians and road users sit on barriers and on the ground. There is no suitable pedestrian crossing area on Abu Aboud Al-Kabeer Street, which connects Al-Hitmi and Umm Ghuwailina. The crossing points are based

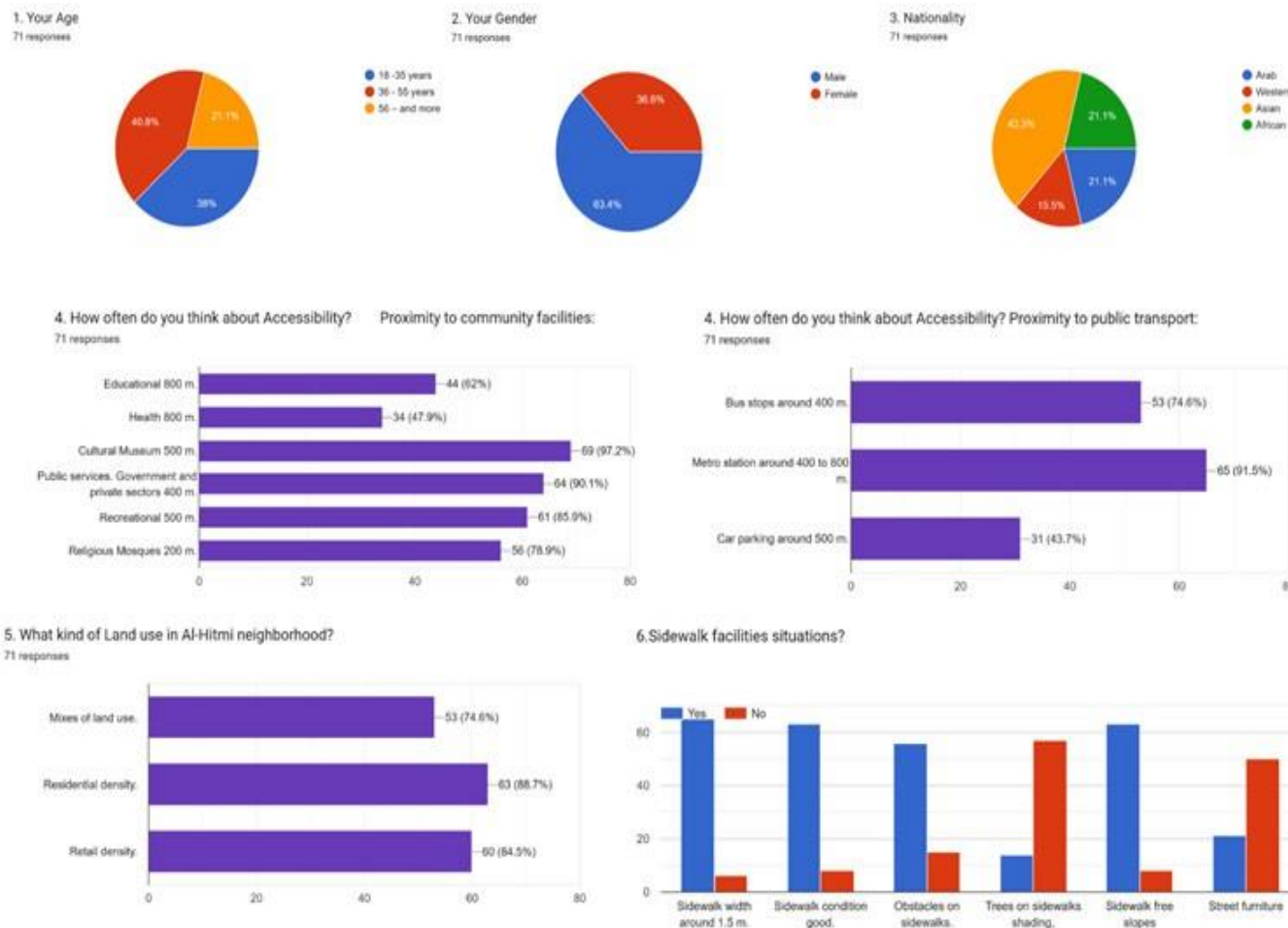
on traffic lights located far from the main Shearough Street, making crossing the road dangerous. Because of the new design of the

street as a single lane and for interlocking, the traffic speed within the neighborhood is appropriate and does not exceed 30 km. The Al-Hitmi neighborhood depends on the lengths of the buildings in the process of shading the street to some extent, though some areas require street shading to suit the various climates. The need for large green spaces Al-Hitmi.

Assessment based on Questionnaire Survey of Al-Hitmi Neighborhood

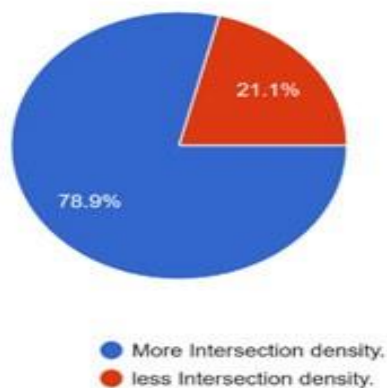
This questionnaire aimed to verify users' perception of walking in the Al-Hitmi area according to the six criteria in the case study, which were distributed into 19 items. Whereas the target audience in this survey included individuals from various backgrounds and races, including neighborhood residents, and visitors to recreational, cultural, religious, health, and service areas, allowing the evaluation to take into account the various topics concerned. For more accurate measurements, a user survey should be used. This is due to the impact exerted by the recently updated services and infrastructure in preparation for the Doha World Cup 2022 event on the quality of life, specifically with its efficiency, accessibility, and use, in addition to several intangible side factors that have a significant impact on user perception. As a result, the primary assessment tool created for this purpose was "The 19 Items," in which users were asked about their personal experiences in various areas of the old Al Hitmi neighborhood. The interview was split into two sections: Personal questions: To learn the identities of the neighborhood's residents, neighborhood users, and visitors were asked about their age and gender. The second part of the questionnaire was about their walking and accessibility experiences and practices in the Al-Hitmi neighborhood. It primarily addresses their personal opinions about the neighborhood, what it lacks, and their suggestions for future improvement.

71 people filled out this questionnaire. The graphs and figures below are the questionnaire responses of the respondents:

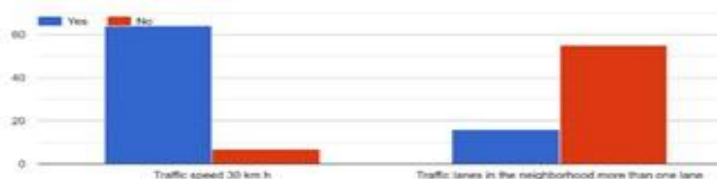


7. What do you think about Street connectivity

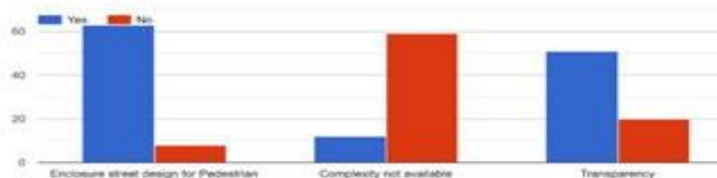
71 responses



8. What do you think about Traffic safety and security.



9. Streetscape design:



Discussion

The observational study delves into the walkability and accessibility of the old Al-Hitmi neighborhood, renowned for its strategic location in a tourist-centric area near the Corniche. Surrounded by notable landmarks like the Qatar National Museum, various hotels, the former Doha International Airport, and prominent dining establishments such as the Orient Pearl restaurant, the neighborhood boasts proximity to retail areas, including groceries and the green salad area. Positioned within an 800-meter walking radius from the old Souqus area, and in close proximity to Souq Waqif, Al Najada area, the old Doha stadium, and the Qatari Book House, the neighborhood is also adjacent to the densely populated Umm Ghuwailina district, housing Al Meera, airlines, and

expansive commercial complexes. Multiple access points, including traffic lights and an underground metro station, connect the neighborhood to its surroundings. However, the presence of a large eight-lane street prompts a significant number of pedestrians to cross randomly, posing risks to their safety. The neighborhood is also near the old Al-Ghanim area, approximately 600 meters away, known for housing car accessories companies that attract a substantial number of Qatari youth. Despite infrastructure modernization efforts, such as expanding pedestrian paths to over two meters, implementing barriers for pedestrian protection, and restricting car lanes to a single lane in both directions, challenges in the neighborhood persist.

The evaluation was based on his six criteria distributed over 19 specific features of the built environment and roads. These standards mean pedestrian spaces are safe, connected, comfortable, and responsive, enhancing the joy of walking every day. The goal of this essay was to look into the SPN method's spatial transferability and to assess the walking ability supplied by the Guimares walking routes. In terms of the first distinction, spatial transferability reflects scales' ability to explain walking ability. This research demonstrates the SPN method works and evaluates multiple sub and GIS processes used to judge walking ability through an audit. The current study used a criteria-based questionnaire completed by 71 participants, with varying responses and perspectives forming the percentages used to assess 19 criteria. These results suggest that the assessment methods for walking ability and accessibility described in other districts can be used. Demonstrated sidewalk accessibility, walkability, and road connectivity (road design and land use).

Conclusion and Recommendation

Connectivity is a critical component of creating sustainable neighborhoods and cities. Through this study, we assessed accessibility in the old Al Hitmi district of the Doha municipality using several methods, including the six criteria. Furthermore, this research can contribute to the methodological basis of accessibility assessment tools, in various ways. This has led to a focus on accessibility, as well as the impediments to pedestrian criteria of the case study, showing the diversity of the perspectives of the participants. Finally, researchers and planners can use this method to assess walkability and connectivity to pedestrian networks in neighborhoods and cities.

Recommendations

Allocate special parking spaces on Sheraouh St. for school and emergency buses in the street so that there is no traffic jam because the road has become a single lane back and forth.

- Create a large pedestrian link connecting the old Al-Hitmi neighborhood to the Umm Ghuwailina neighborhood to communicate the walking process between the two neighborhoods and to keep pedestrians safe from traffic accidents.
- Creating a visual and spatial vision by shading Sheraouh St. Street on one side with umbrellas or designs reproduced from the Qatar National Museum.
- Work on connecting the Doha Metro Station (Al-Mathaf Station) to Sheraouh St. Street so that pedestrians and metro passengers can see it.
- Removing the power transformers from the sidewalk's center.
- Advertising and guidance boards must be reinstalled in such a way that pedestrian movement on the sidewalk is permitted.
- More street furniture (benches) is needed in the area so that pedestrians do not sit on barriers
- Removing trees that obstruct pedestrian movement on an island and replanting them following landscape designs.
- Guiding and directing users of bicycles and scooters to park them in designated areas.
- Work to find alternative parking lots so that pedestrians do not block the pedestrian road by parking illegally.
- Creating a green space interspersed with car parks in the neglected spaces between the museum and the neighborhood.
- Modifying and circularly linking pedestrian and bicycle lanes linking the old Al-Hitmi neighborhood to the Qatar National Museum by removing all obstacles and considering redesigning the tree planting site, placing furniture, billboards, and police parking lots.

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