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How Do Socio-Cultural and Built Environment Characteristics Influence Urban Vitality and Walkability in Bahrain's Commercial Streets? Insights from Muharraq

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ABSTRACT

Shopping streets serve as vital socio-economic and cultural hubs, fostering urban vitality and enhancing liveability. In Bahrain, however, limited attention has been paid to how socio-cultural dynamics and built environment characteristics shape walkability within commercial avenues. This study investigates these interrelationships through a case study of Shaikh Hamad Avenue in Muharraq, one of Bahrain's oldest shopping streets. Employing a qualitative research design, data were collected via 135 structured questionnaires, systematic on-site observations, and GIS-based mapping of pedestrian movement patterns. The findings reveal that walkability perceptions are significantly influenced by five determinants: imageability, enclosure, human scale, complexity, and safety. Elements such as shade provision, shop diversity, and spatial connectivity were found to encourage pedestrian activity, whereas inadequate crossings and climatic constraints hinder walkability. Results highlight the importance of integrating culturally sensitive design, pedestrian-oriented infrastructure, and micro-scale amenities into planning strategies. The study contributes evidence-based insights for policymakers and urban designers to enhance commercial street environments, promoting inclusive, dynamic, and sustainable urban spaces in Bahrain and similar Gulf contexts.

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Highlights:	Contribution to the field statement:
- User satisfaction with commercial streets increases with diversity of shop types and human-scale design features. - Overall urban vitality is enhanced by integration of socio-cultural activities and pedestrian-oriented infrastructure. - Pedestrian perception of walkability is strongly influenced by shade provision and climatic responsiveness. - Pedestrian movement patterns vary significantly with spatial arrangement, connectivity, and street enclosure. - Perceived safety and willingness to walk are affected by the availability of crossings, pedestrian signals, and traffic management.	By identifying key walkability characteristics that are driven by local needs and behaviours, the study offers evidence-based recommendations for planners and designers to create inclusive, dynamic, and sustainable commercial streets. The results would contribute to the ongoing discussions about urban vitality and have an impact on Bahrain's future urban planning regulations.

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1. Introduction

Shopping streets are community interaction spaces, cultural hubs and business corridors within the spatial structure of the cities (Bertolini, 2020). The dynamism of shopping streets is among the features that characterize most of the process of urban evolution (El Hama & Helmy, 2024). Bahrain's economy is currently becoming more diverse and urbanized (Ministry of Sustainable Development, 2025); therefore focusing on user engagement and interaction is the foundation for raising local businesses' sales, attracting tourists, and improving the standard of living for kingdom dwellers. Finding all the components that characterize the vibrancy of commercial streets is the responsibility of the urban planner and policymaker in their endeavour to establish an environment that is appropriate for various demographics.

This study explores the vitality of shopping streets in Bahrain by investigating how the socio-cultural and built environment factors affect the walkability of these streets, which is a vital attribute of urban liveliness (Q. Li et al., 2022). The aim is to establish standards for the design of Bahrain's retail avenues in order to provide a more sustainable environment for users and enhance the socio-economic context of the urban environment in Bahrain. This is accomplished by thoroughly investigating the literature on what constitutes "life" in cities and the different elements that give shopping streets their socio-economic vibrancy. The research is driven by the following inquiries, which are incorporated into its primary goal:

a) How do the sociocultural traits of Bahraini citizens affect how walkable the country's business streets are?
b) Which aspects of the built environment have the biggest impact on whether or not these streets are considered walkable?
c) What aspects of walkability might be used as helpful guidelines for Bahrain's dynamic commercial planning and design?

In order to address these issues, the study used Shaikh Hamad Avenue in Muharraq, one of Bahrain's oldest and busiest commercial areas, as a case study. By examining user sociocultural behaviours and the physical architecture of the area, the study investigates pedestrian perception levels of walkability and how it reflects larger urban dynamics.

The street's vitality is thoroughly examined using a qualitative approach that entails comparing observable spatial qualities evaluated by on-site observation with user impressions obtained through questionnaires. Visualizing pedestrian activity and identifying spatial patterns linked to walkability are accomplished by GIS mapping. When combined, these techniques allow for the comparison of many factors and reveal the advantages and disadvantages that affect the street's general activity. In addition to assessing pedestrian mobility levels and physical settings, the research technique looks at the "human element" of street use, which includes user engagement, behaviours, and perceptions. A more thorough knowledge of how lived experience and urban design interact to create walkable settings is made possible by this dual viewpoint.

The ultimate goal of this research is to close the gap between academic knowledge and practical planning by offering recommendations that are based on empirical evidence and customized for Bahrain's urban setting. The study provides evidence-based recommendations for planners and designers to construct more inclusive, engaging, and sustainable commercial streets by identifying important walkability variables that are motivated by local needs and behaviours. It is anticipated that the results would influence future urban planning laws and commercial street restrictions in Bahrain and add to the current conversations regarding urban vibrancy. Figure 1 demonstrates the structure of the research.

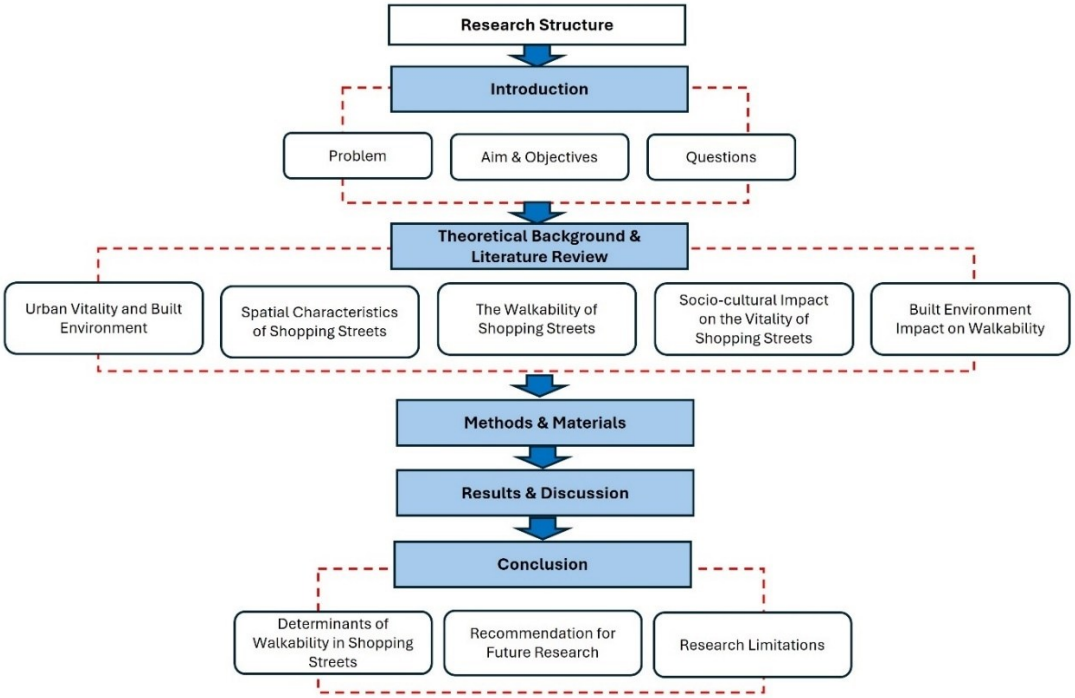

Figure 1. Structure of Research.

1.1 Background and Context

This review seeks to identify gaps and work to provide insight for further research and utilitarian implications for the development of urban environments by critically evaluating this body of existing knowledge. The co-occurrence map on bibliometric data from studies on walkability and urban vitality in cities is presented in Figure 2.

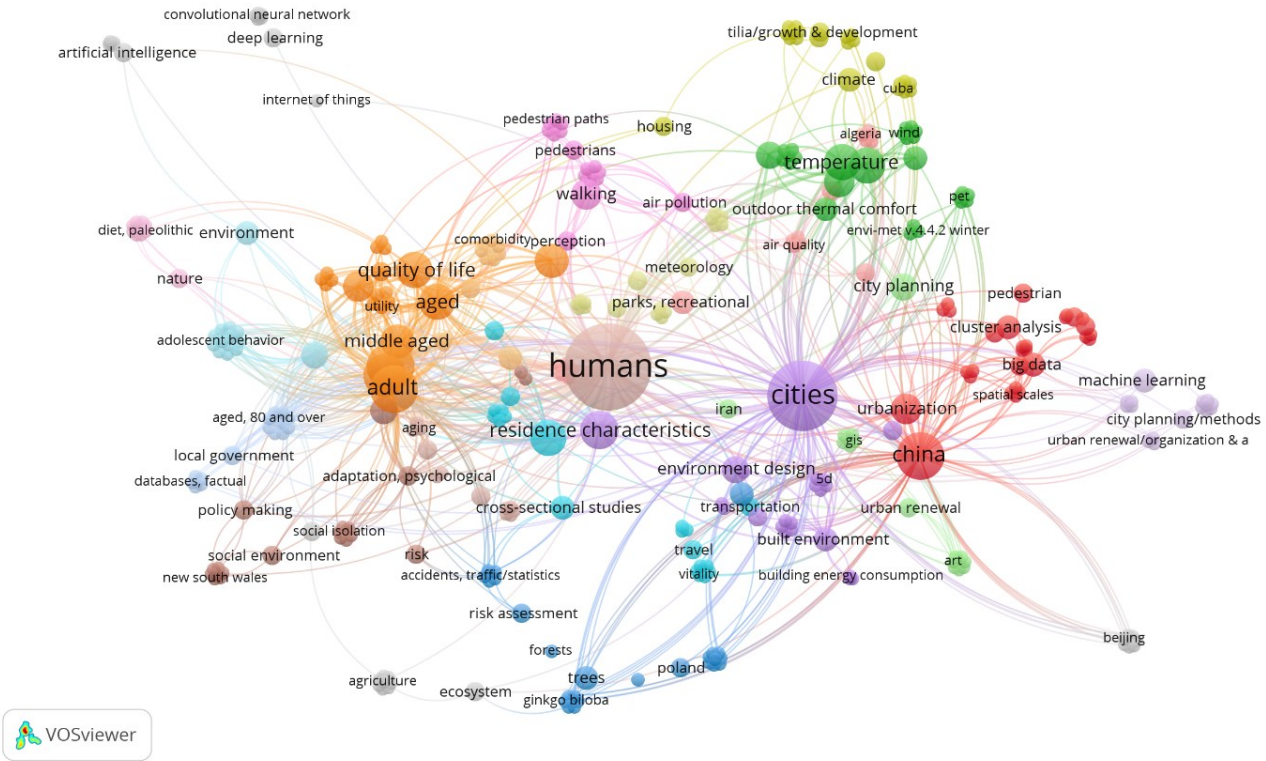

Figure 2. Co-occurrence analysis of bibliometric data from studies on walkability and urban vitality using VOSviewer.

1.2 Urban Vitality and Built Environment

The 2030 Agenda for Sustainable Development (United Nations, 2015) points towards sustainable urban transformation, particularly SDG 11. Overall health is probably going to gradually improve in modern cities. Compact infill development, as opposed to sprawl, is the goal in order to be more sustainable. Defined by several centres and population density, a revitalized built environment, rather than new construction, and pedestrian and multipurpose transportation are its main characteristics. Enhanced usage of digital technologies is integrated into all facets of cities, and modified activity indicator profiles (Guimarães, 2023).

As pointed out by Lee & Kang (2022), urban vitality is an index that reflects a given city's quality of development. This indicator is often employed to define various meanings of vitality in architecture, city planning and design, sociology, and environmental psychology (Xia et al., 2022). According to Jacobs (1961), interactions between individuals or between people and places generate life, and she defines it based on the interactions between people on the streets. This is known as vitality, which Lynch (1961) defined as the degree to which a person may draw from the immediate environment the nourishment, protection, and tools he needs most, above all, his bare existence. Locations, activities, and people - the basic fabric of the urban environment - are revealed as the sources of spatial dynamics, as Gehl (1987) suggests. Kordi & Galal Ahmed (2023) mention that a vibrant urban environment contributes to the availability of multifunctional human activities, social interaction, and communication among residents, as well as improving their level of security and perceptions of place. All these help to support the lives of people living in cities and promote sustainable urban development. It is, as a result, important to identify that urban vitality entails several aspects, including the economic, social, and cultural life of people (Wang et al., 2025). The characteristics of urban dynamics are now significantly useful for measurement and analysis for urban designers and policymakers and are emerging as a significant part of national agendas for city health and quality of life enhancement (Mohamed et al., 2022). The analysis also established by Jabbari et al. (2023) was useful identification of the fact that the overall street vitality results in elevated activity by pedestrians. Urban dynamics have been primarily measured in terms of pedestrians and activities they make on streets, which can be distinguished by quantity, variety, or spatial density/attraction (X. Li et al., 2022). Therefore, there is no absolute measure of street activity intensity. Jacobs (1961) defined socio-economic as the capacity of a place to generate and support appropriate socio-economic activities across the diverse categories for collective use. According to the findings of the study by Istrate (2023), pedestrian interaction with the built surroundings becomes crucial in studies of vitality; nevertheless, greater specificity and clarity regarding the patterns that are established are still required, particularly in environments with various cultural backgrounds.

Fewer studies have examined the micro-level vitality of street spaces in urban areas; instead, most research on urban spatial vitality has concentrated on the macro-urban level (Zhang et al., 2024). However, inhabitants' daily experiences are closely connected to smaller street spaces (Bertolini, 2020). Commercial pedestrian streets, being highly active micro-urban contexts, are placing more emphasis in their spatial renewal plans on promoting street life (Liang et al., 2022). It is now acknowledged that boosting street vitality is an essential tactic for enhancing spatial quality. Several empirical studies have shown that the functional characteristics, spatial shape, and amenities of streets can attract activities (Wu et al., 2021). In these studies, subjective assessments and qualitative descriptions were the main sources of information used on spatial vitality in small-scale urban settings. Zhang et al. (2024) state that improved awareness of the impact of spatial features on the vitality of retail pedestrian streets is gained by considering a variety of spatiotemporal attributes and analysing these elements' effects on street space vitality. This understanding is important when planning commercial street environments and improving the standard of street experiences. Using the shopping activity density, which assesses vitality by considering human perception, and land use diversity, is paid considerable attention at the macro scale in order to investigate elements that influence and comprehend the significance of street vitality (Guo et al., 2021).

Through the application of well-established research methodologies, researchers are still examining the impact of street features on spatial vibrancy. Zhang et al. (2024) developed a street vitality rating index for commercial areas using field surveys and open-source networks. Shop types, shop density, ground floor interface permeability, and pedestrian width are among the critical variables they found to have a major impact on spatial liveliness in the micro-spaces of commercial streets. Research on the macro-level vitality of commercial districts has generally reached a reasonable degree of maturity; nevertheless, further development is still required for the micro-level vitality of commercial streets.

1.3 Spatial Characteristics of Shopping Streets

It is in realizing the various street features that the demands of the users must be considered. It should be accessible to everyone of different ages, genders, and classes of the user. The majority of research studies substantiated the fact that the core values and principles of commercial streets should inform the arrangement of the physical features of streets. Rui & Othengrafen (2023) state that innovative urban streets make provision for 'intense interaction' between the automobile and the pedestrian. Therefore, shopping streets should also accommodate both to cater to pedestrian needs. As a result, car lanes should be designed in accordance with standards to enable "enlightening travels for the drivers or passengers." However, to encourage walking and foster direct communication between all road segments and functions, pedestrian pathways must also be created (Mu et al., 2024). It was also demonstrated that a common pattern of commercial streets was a linear layout of shops encircling central vehicular lanes (Huang et al., 2023). Accessibility and visibility of commercial spaces for a range of people along the whole street are other important characteristics of shopping streets. Lian & Li (2023) also underlined in their study the significance of these components for enhancing a business street's performance, attractiveness, and visibility in addition to streamlining traffic flow and providing a range of enjoyable experiences.

Mohamed (2023) categorizes the street as an urban unit and divides it into three segments, known as the composition of the street. First, street features are mostly related to the look and appearance of the street and the surrounding buildings (LI et al., 2021). Second, this intangible portion comprises the culture, society, and economic functions of the land use and activities, adjacent usages, and behavioural patterns that define the street (Gerike et al., 2021). Third, people's past and present impressions or reactions to its material and non-material attributes shape how they use the street (Rezvanipour et al., 2021). Thus, the street reflects the quality of living in the city; it is a current that supports and permeates the life streams in the city. If this is not achieved, then the general population is left with a perception of the street as being ugly and insufficient for habitation, for providing inhabitants with liveliness, attractiveness, and satisfaction feeling of happiness (Alamoush et al., 2022).

1.4 The walkability of Shopping Streets

One component of a larger set of urban traits is walkability; however, this term excludes several environmental traits that may have negative health effects. Numerous variations in the literature indicate that there is currently no widely accepted theoretical concept of walkability. According to the review and bibliometric analysis conducted by C. Fang et al. (2024), Walkability is the extent to which cities' built environment promotes, improves the lives in the city and the health of citizens through encouraging walking. Although some of these definitions may be valid, none capture all essential environmental components that might promote active living and provide suggestions on how they can be measured. In addition to promoting physical activities like recreational walking, cycling, and skating, qualities that make a community "walkable" can also support behaviours connected to health, including socializing and eating healthily (Tobin et al., 2022).

According to De Vos et al. (2023), walkability is the degree to which a location is pedestrian-friendly within a city setting. They asserted that the standard of the walkway environment may be examined quantitatively by planners to have more objective, effective, and comprehensive walking-related policies and measures. Other than that, walking is also a way to get to activities that most people use to get to by car, thus it can also be seen as a foundation for a sustainable city because of social,

environmental, and economic benefits. Additionally, it gives streets life, and safe streets lead to safer urban areas. Given that pedestrian access has continuously decreased in most cities over the past century, the role that walking plays in promoting community safety, accessibility, and social inclusion has become increasingly important in urban environment design.

1.5 Socio-cultural Impact on the Vitality of Shopping Streets

Retailing, as one of the main reasons people flock to cities, also influences citizens' well-being and triggers city evolution (A. E. Mohamed & Allani, 2024). The continuing trends of city growth and change, however, have produced significant alterations over time to the industries, sizes, and varieties of both cities and of the industries to which they are home. A retail store is one of the easiest places for residents to quickly and freely access goods and services, and the characteristics of these environments either make residents happy and content with their lives or not (Lu et al., 2023). Consequently, the examination of layouts and development in the urban retail sector can be a crucial element of the urban retail model, contributing to the improvement of the urban spatial framework and the optimization of economic gains (Y. Fang et al., 2021).

Individuals of different cultures interact with the architectural environment in as many ways as they develop (Han et al., 2022). Ethnic variation in social interactions can also affect other aspects of life, including the street and walking. The cultural differences and the kind of activities that people in different cultures engage in are the key to the intriguing and pertinent look of urban areas. Due to the many impacts observed in the social context, relating to community affiliation and interaction, the behaviour of people in public areas has been studied (Fonseca, Papageorgiou, et al., 2022), in addition to the sociocultural context, which influences people's behaviour and limitations in space (Yunitsyna & Shtepani, 2023).

Cities were planned for the conventional environment, for the provision of the physiological, social, cultural, and spatial requirements and needs of the community, and for the dynamic street configuration compatible with social and cultural behaviour (Zhao et al., 2023). In Bahrain, the urban setting has evolved from a similar idea to Arab Cities. In addition to the other features that shaped people's activities in open areas in particular using walking, a range of socio-cultural factors, including geographical context, religious beliefs, demographics, and history, affected urban development and streets (Al Hammadi, 2023). Urban real estate projects concerning foreign users of the urban built environment are influenced by the social agreement between the state, the citizen, and the expatriate. These foreigners come with their own cultural beliefs and practices. Several attributes, such as gender, age, income, location, education level, and employment status, are important in the roles they play in explaining the uses of urban spaces (Rausell-Köster et al., 2022). In Arab countries, gender is a social attribute that influences users' behaviors. In Muslim countries, Women are restrained more than men in going out and socializing (Almatar, 2024). (Jalalkamali & Doratli, 2022) examined the effects of the presence of women in urban environments or other organized congregations in as inasmuch as they help to 'animate' the physical sphere they occupy. They came to know that women are less present in the new Iranian urban environment when the relation between environmental and spatial context to the voluntary women's social interactions is given a minor importance. Hence, the research priorities of their study were the examination and comparison of the communal and shared living spaces of the women in traditional Iranian bazaars, the identification of the design values of the related communal contexts associated with women, and the presentation of some recommendations that can be applied to current markets.

1.6 Built Environment Impact on Walkability

In a study by Vichiensan & Nakamura (2021), an understanding of the comparison of walking requirements within the Asian setting between Bangkok and Nagoya is offered. The research proved that convenience is a fundamental necessity of walking, while comfort and fun, as well as safety, are secondary traits; whereas in Bangkok, safety is a multifaceted need. This may be attributable to Bangkok's even worse street conditions, where poor quality and narrow sidewalks remain a problem,

while pedestrian-car encounters are made unpleasant by the city's sharp traffic congestion. A general requirement for walking is attained through enhancements on the streets because activities may be associated with higher-level demands, and therefore encourage more walking within the city (Fonseca, Ribeiro, et al., 2022).

In his study, Almatar (2024) found that Tahlia Street in Riyadh, Saudi Arabia, complies with the majority of the aspects of the comprehensive street regulation, except for the deficiency concerned with the lamentable absence of aesthetic landscaping and protection from severe weather. The study conducted by Alnaim et al. (2025) also confirms that the quality and the extent of the walkable street space affect the quality of the environment. Therefore, future designs should clearly indicate how important greenery is to improve the thermal comfort of pedestrians in hot temperature regions.

Due to changes in lifestyle brought on by globalisation and other associated socioeconomic shifts, many Bahraini extended families now require large homes. The country is extremely densely populated, with approximately 90 out of 100 inhabitants living in the cities and a population density of 1627 people per km^2 (Bahrain National Portal, 2024). The face and imageability of the urban space were given a new perception when low-income immigrants, particularly single Asian males, occupied the traditional areas. Mohamed (2023) explains that Bahrain's cultural and economic setting makes physical activity challenging.The relationship between walkability and vitality in small-scale, commercial street situations that are culturally distinct, especially in Gulf nations like Bahrain, is still little understood, despite growing study interest. Local sociocultural dynamics and climatic variables that characterize urban life in the Gulf region are frequently overlooked in existing literature, which has a tendency to generalize findings from other cities in the world. This study highlights the significance of accessible, high-quality retail spaces and essential public streets as components of prosperous commercial city marketplaces.

2. Materials and Methods

Due to the contextual complexity that characterizes shopping streets, there is a need to go further than quantifying particular characteristics and observing patterns of behaviours to get a full sense of or understand the diverse experiences and the specific behaviours happening in these commercial settings (Creswell & Guetterman, 2024). This research utilizes a qualitative approach, exploring the impact of socio-cultural and built environment factors on walkability in commercial streets in Bahrain (Figure 3).

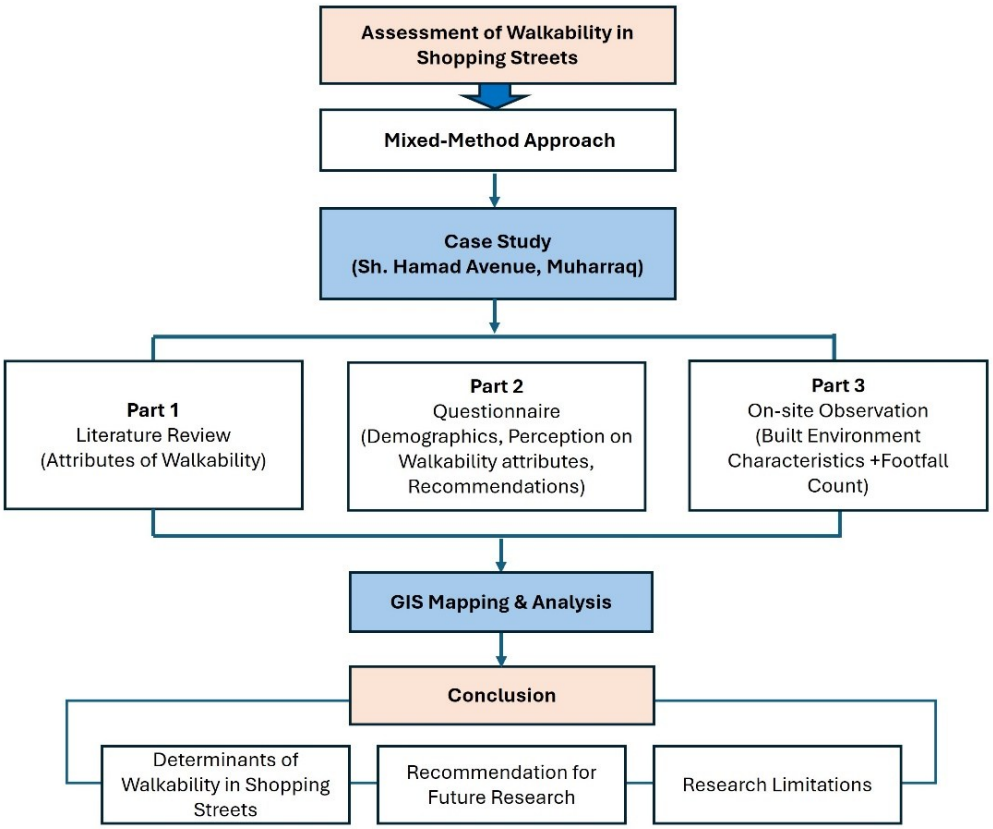

Figure 3. Research Methodology.

The study aims to assess shopping streets in Bahrain to gain insight and perception into commercial street walkability in relation to the existing built environment characteristics. Therefore, Shaikh Hamad Avenue in Muharraq city was chosen to be a case study in this research. The avenue is a historic shopping street (Souq) in Muharraq (BACA, 2024), which was recently developed to enhance the infrastructure of the street by upgrading the services, providing wider sidewalks, increasing plantation, for the purpose of enhancing the walking culture in the area (Figure 4).

Figure 4. The location of Shaikh Hamad Avenue in Muharraq City.

To achieve the research objectives, the methodology consisted of three parts in this study:

2.1 First part: The idea of walkability and its effect on the vitality of urban environments were the main topics of a thorough literature review. Analysing the many results of earlier research, from which key characteristics and elements influencing street walkability are identified, this phase also examined how cultural background and feelings of place contribute to the understanding of more individualized aspects of walkability and how they relate to Bahraini urban settings.

2.2 Second part: A qualitative technique was used to conduct a survey among a sample of Bahraini citizens aged 18 and older who resided in various governorates and localities in Bahrain. In Arabic and English, the survey was posted through an online link, and the recipients were encouraged to invite their friends and family to participate in the survey. People of different ages, genders, and occupations filled out the survey for a week, and 135 responses were received. Three sections made up the survey instrument: the first included demographic information which were assessed as follows: gender (male and female), governorate of residence (Capital, Northern, Southern, and Muharraq), and age (five age groups: 18–24, 25–34, 35–44, 45–54, and 55 and above). The second section consisted of 14 statements that assessed the residents' beliefs about the five qualities influencing walkability in urban spaces. Five Likert scale was employed, where 1 represents strongly agree and 5 represents strongly disagree to capture the opinion made. These attributes were adapted from prior studies done on factors influencing the walkability of shopping streets (Vural Arslan et al., 2018). Using an open-ended question on the third section, the participants were given a chance to give suggestions and recommendations on how to enhance the walkability of Bahrain's commercial streets.

The investigation of the topic was carried out following closely the requirements of ethical research. Participants' identity and confidentiality were protected since the aim of the questionnaire was explained, and no individual information was exposed.

2.3 Third part: On-site observation was carried out on the selected shopping street. The site was observed on two visits per week based on the Heat Maps generated by Google Maps, a service that maps the data of Google services through the use of mobile devices commonly used in Bahrain, to identify the highest-density timing of the day during the week. The observation visits were conducted during the weekend on Friday between 5:30 pm-6:30 pm (Figure 5a).

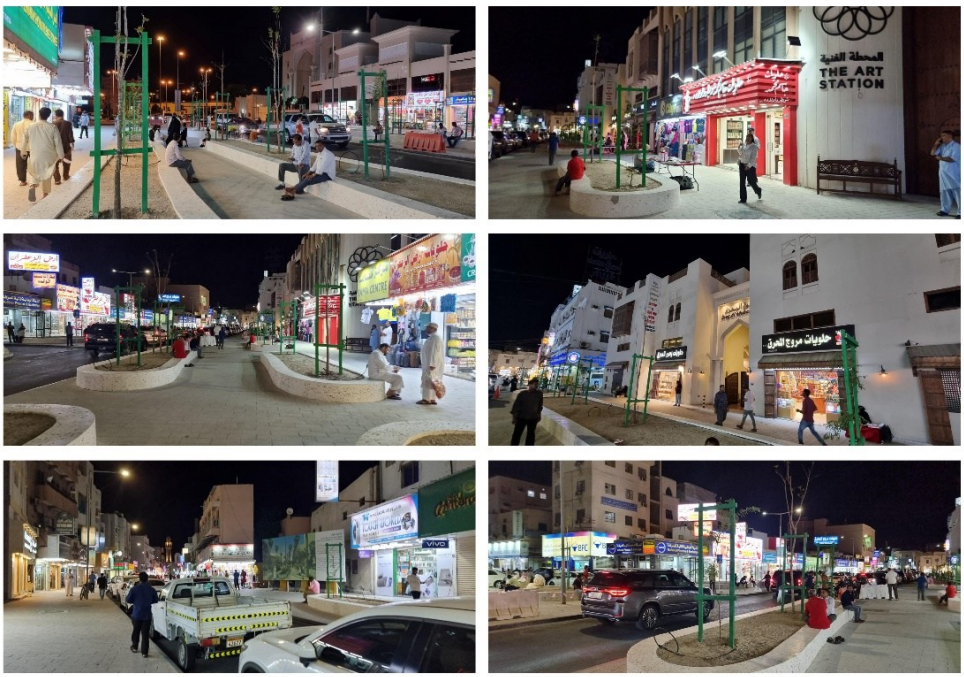

Figure 5a. Pictures of Shaikh Hamad Avenue on Friday (5:30 pm-6:30 pm), Muharraq City.

Another visit was conducted at the same time on Sunday (Figure 5b) to observe the difference in pedestrian movement patterns within these two days. In addition, the built environment characteristics

were noted in terms of sidewalks, vehicle traffic route, street furniture, and types of shops along the 620m avenue. To correlate the various findings, the gathered data was incorporated into the GIS mapping. GIS improves the analysis's precision and effectiveness, allowing for the derivation of significant insights from the spatial data.

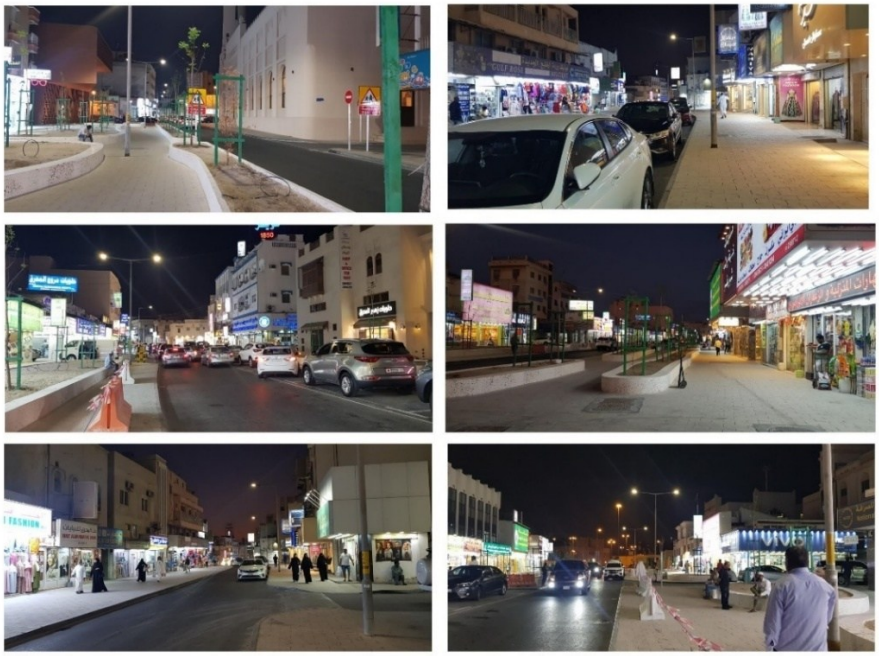

Figure 5b. Pictures of Shaikh Hamad Avenue on Sunday (5:30 pm-6:30 pm), Muharraq City.

3. Results

Based on the findings from the data questionnaire, statistical analysis was performed using the frequency distribution in the SPSS application. A total of 135 respondents completed the survey, as shown in Table 1 below. According to the participants' allocation among Bahrain's five governorates, 20.9% of them resided in the Muharraq Governorate. The majority of the responders were Bahrain nationals, as 86.6% of the participants responded; 37% of the participants were male, while 63% were female. Participants' employment status showed that 49.6% of the respondents are employed citizens. Age distribution indicated majority 26.7% of the participants were between 45 and 54 years. The respondents' age, nationality, and other characteristics showed that the range of interest in the research question has expanded.

Table 1: Demographic Characteristics of the Participants.

Variables	Category	Percentage
Gender	Female	63
	Male	37
Nationality	Bahraini	83.7
	Non-Bahraini	16.3
Age Group	18 - 24	14.8
	25 - 34	20.0
	35 - 44	17.8
	45 - 54	26.7
	55 and above	20.7
Occupation	Employed	49.6
	Retired	21.5
	Self-employed	6.7
	Student	13.3
	Unemployed	8.1
Place of Living	Capital Governorate	29.1
	Muharraq Governorate	20.9
	Northern Governorate	34.3
	Southern Governorate	15.7

The results of the survey show that the respondents frequently use shopping streets in their everyday lives; most of them go there at least once a week, mostly to fulfill their daily product consumption demands (Figure 6a). According to the statistics, 98.5% of people rely on their own cars to get to the shopping districts, while just 6.7% choose to walk (Figure 6b). The majority of participants (80%) found it easier to navigate the shopping streets using Google Maps, whilst 31.9% prefer to use local landmarks. Some participants navigate the commercial streets using verbal instructions and signage (Figure 6c).

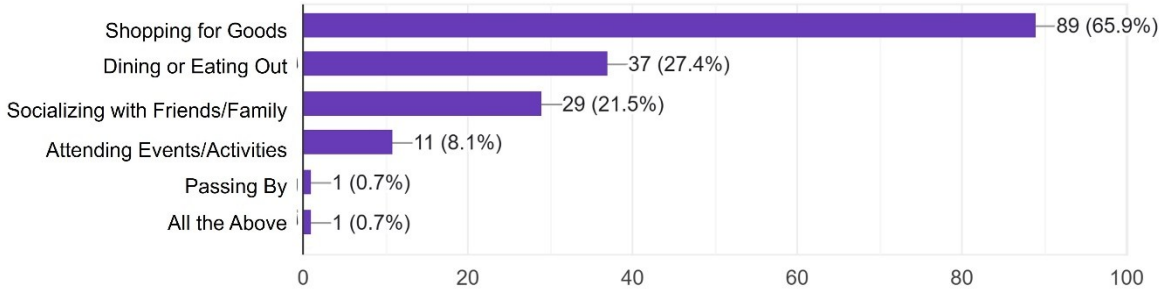

Figure 6a. Reasons for Participants' Visits to the Commercial Streets.

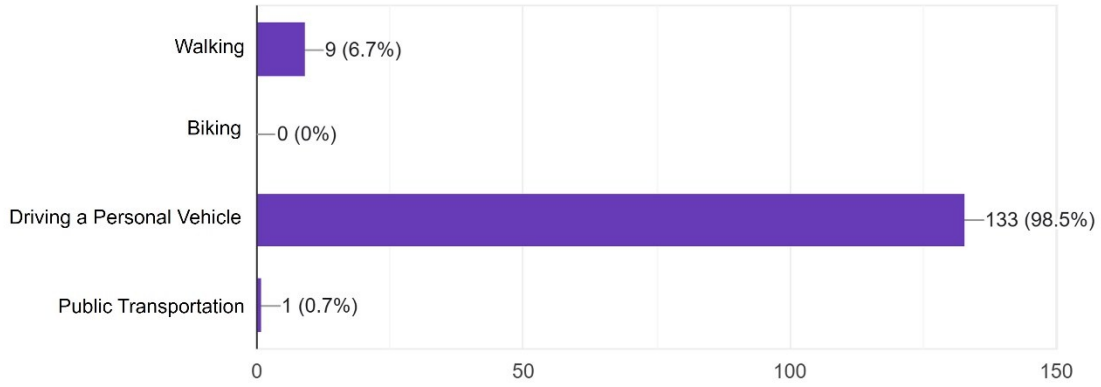

Figure 6b. Participants' Modes of Travel to the Commercial Streets.

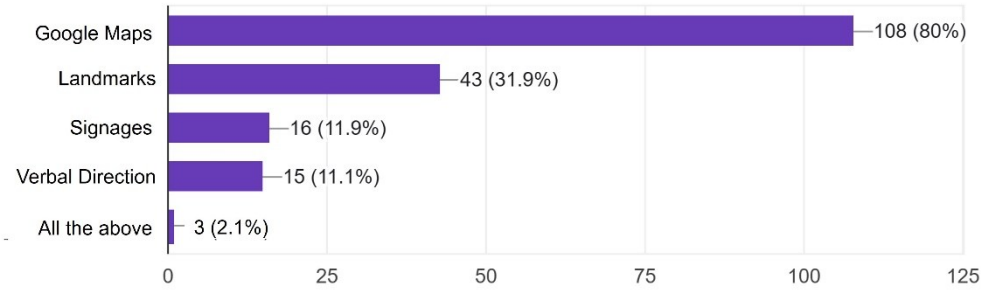

Figure 6c. Means of Wayfinding Used by the Participants in Commercial Streets.

In order to gauge their sense of walkability, the participants answered 14 statements that focused on five key characteristics that influence their choice to walk on commercial routes. The statements were assessed using a 5-point Likert scale. Table 2 displays the responses to each statement from Muharraq residents.

Table 2: Opinions of the Respondents Living in Muharraq Governorate on Statements on Walkability.

#	Statements	Category	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	"I feel safe when walking in shopping streets"	Safety & Security	37.04%	33.33%	22.22%	3.70%	3.70%
2	"Shopping streets are well-maintained and clean."	Built Environment Characteristics	7.14%	39.29%	39.29%	10.71%	3.57%
3	"There are variety of shops and services available on current commercial streets."	Built Environment Characteristics	32.14%	53.57%	7.14%	7.14%	0%
4	"Social events, cultural activities and family entertainment can add vitality to shopping areas and attract pedestrians."	Connectivity	57.14%	32.14%	10.71%	0%	0%
5	"There are enough crosswalks and pedestrian signals in the shopping areas."	Accessibility	3.70%	37.04%	25.93%	29.63%	3.70%
6	"The shopping streets have sufficient seating areas and rest spots for pedestrians."	Comfort	32.14%	28.57%	17.86%	7.14%	14.29%
7	"I believe that improving walkability would enhance my shopping experience."	Connectivity	42.86%	50.00%	7.14%	0%	0%
8	"I believe that shopping streets should prioritize pedestrian access over vehicle traffic."	Safety & Security	44.44%	40.74%	11.11%	3.70%	0%
9	"I prefer walking in areas with close proximity to car parking and public transport stops."	Accessibility	22.22%	37.04%	33.33%	0%	7.41%
10	"I believe that shopping streets should be accessible for wheelchairs and strollers."	Accessibility	64.29%	21.43%	10.71%	3.57%	0%
11	"I believe that shopping streets should be shaded with trees and greenery."	Comfort	75.00%	17.86%	7.14%	0%	0%
12	"Streets with attractive shop front design encourage me to walk on those streets."	Built Environment Characteristics	57.14%	32.14%	10.71%	0%	0%
13	"It's difficult to walk long distances during hot seasons."	Comfort	57.14%	35.71%	7.14%	0%	0%
14	“I believe that promoting walkability has a positive impact on the environment.”	Built Environment Characteristics	71.43%	17.86%	10.71%	0%	0%

The information obtained from the on-site observation is incorporated into the Geographic Information System (GIS) mapping for each visit day on Friday and Sunday in order to show the pedestrian circulation pattern in relation to the distribution of shop types along Shaikh Hamad Avenue (Figure 7a & 7b). The data shows how the number of pedestrians varies between weekdays and weekends. Weekend foot traffic is 180, while weekday foot traffic is 51. Clusters are seen more frequently at food establishments, though, when broader sidewalks with street furniture are available. In the center section of the roadways where parallel parking lots are available, there was less foot traffic near the retail establishments.

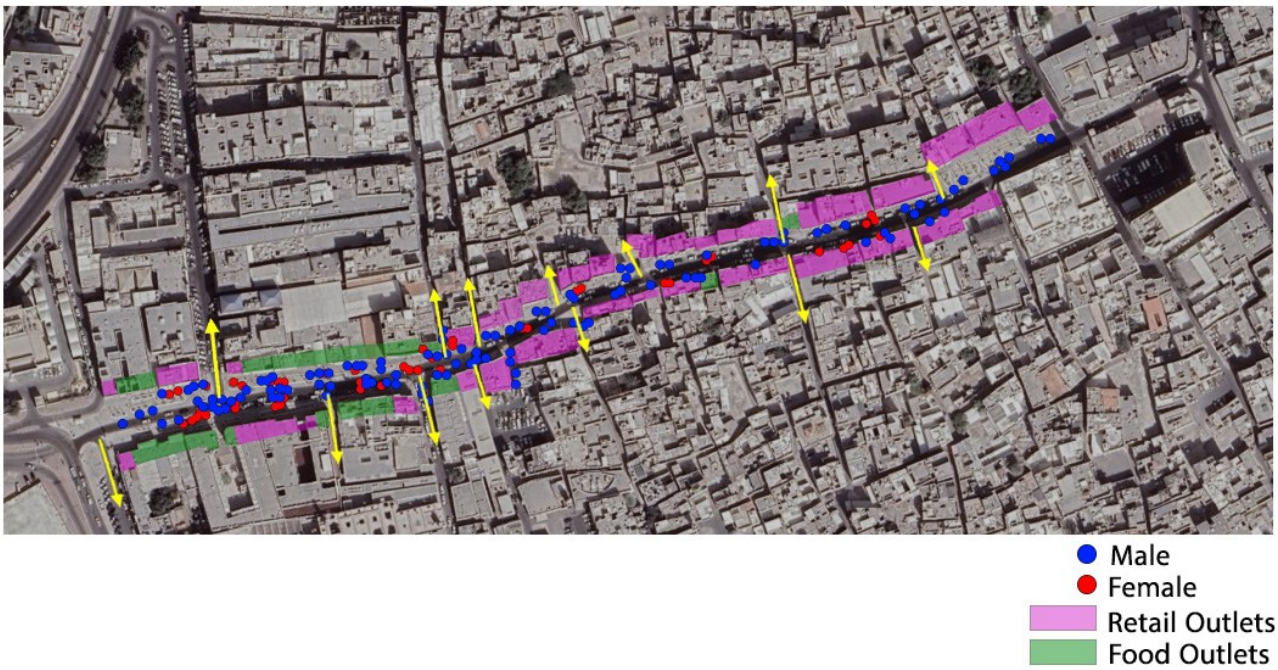

Figure 7a. On-site observation of pedestrian movement pattern on a weekend (Friday at 5:30pm-6:30pm) on Shaikh Hamad Avenue, Muharraq City, using GIS for cluster analysis vs type of shops.

Figure 7b. On-site observation of pedestrian movement pattern on a weekday (Sunday at 5:30 pm-6:30 pm) on Shaikh Hamad Avenue, Muharraq City, using GIS for cluster analysis vs type of shops.

4. Discussion

Residents' opinions on whether Bahrain's bustling urban areas, such as its commercial avenues, are walkable and how this impacts business activity were gathered through questionnaires and interviews. The findings of previous research reveal that commercial opportunities are among the attributes that enhance public participation. For this reason, Jiang et al. (2022) have stressed the importance of understanding how certain characteristics of the built and natural environment cause users to move within the space and, therefore, increase activity in the area. All these attributes are considered by the

Bahrainis who want a powerful change in their society. Table 3 below shows the use of participant replies and the suggestions given by the questionnaire that was developed.

Table 3: Recommendations on Enhancing Walkability Given by the Respondents.

No.	Recommendations
1	Increase greenery and natural shading
2	Provision of Car Parks in close proximity to the shops
3	Provision of services such as well-maintained public toilet facilities
4	Use technology for outdoor cooling.
5	Well-planned land use and distribution of the shop types
6	Wider pedestrian sidewalks
7	Pedestrian-oriented social attractions and more cultural activities
8	Prioritize safety and security for children, elderly people, and people with disabilities.

The five traits that were derived from the literature were examined and correlated with the data that was gathered in this study. Based on the first attribute of built environment aspects, customers are determined to be highly motivated to stroll on the streets instead of driving their cars (Li et al., 2024). As a result of the data analysis, the factors that were found affecting the walkability of the shopping street are summarized as follows (Figure 8):

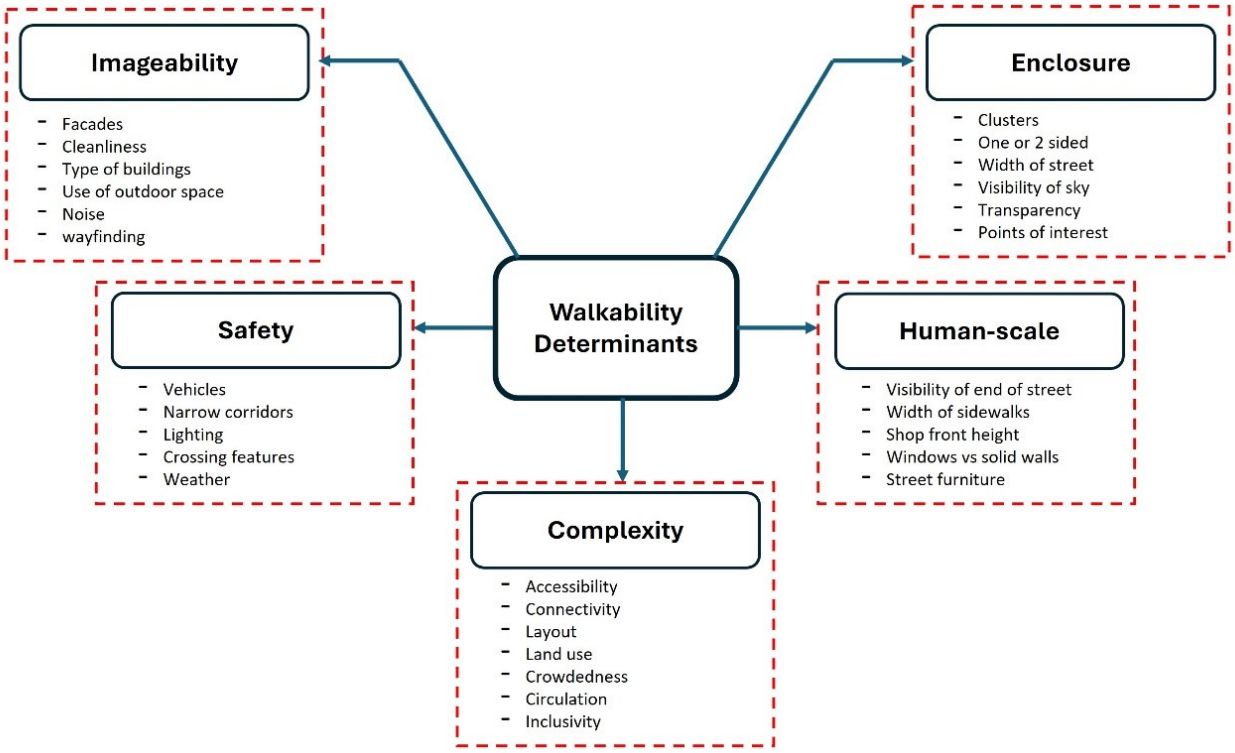

Figure 8. Walkability Determinants of Shopping Streets.

4.1 Imageability: One of the factors determining these street images is how far the street can encourage people to walk around it; a clean street could encourage people to walk around it. Besides the aesthetics of the storefronts, customers in the shopping street also prefer well-distributed stores, diversity of outlets, and the openness of the façade. In addition, other components are the way that pavements and outdoor areas facilitate social integration besides walking. It is acknowledged that the possibility of accessing amenities is critical to the improvement of walkability.

4.2 Enclosure: The perceived convenience of a walk depends on such factors as the relation of the length of the street to the height of the buildings along it or the visibility of the endpoint of the street. Besides, the street is given more dynamics and the sense of choice and mobility by the store's location on both sides of the street. However, the road width may affect the choice of people to cross the road to the other side.

4.3 Human-scale: As found out along Shaikh Hamad Avenue, it is important to note that people love to take their time, especially where the sidewalks are wider and get to spend more time window shopping (Balasubramanian et al., 2022). Also, it is noted that parts with equal distribution of solid and transparent frontages solicit more people traffic than the long continuous solid fronts that make the walk monotonous. The most crowded spots were where the street furniture is found, which facilitates a person sitting down to take a break on a quite extensive shopping street. There are many methods for expressing the level of comfort, such as the length of a commercial strip. Lack of stopovers for longer distances may just discourage shopping by walking.

4.4 Complexity: Basu et al. (2024) argued that the largest barrier to pedestrians' willingness to walk is the warmer temperatures. Hence, either self-shading or planting should be averagely incorporated into the consideration of the urban street layout to facilitate ease of walking when the weather is hot. Analysis of the results also indicated how accessibility influences walkability. The respondents said that as much as possible, the parking lots and buses should be close to the stores so that they would not have to walk long distances, and also to make getting to where they have to get to very easy. Furthermore, attention should be paid to the possibility of walking for different types of users, such as disabled people, children, and the elderly. These findings indicate that if such routes are well linked physically and established aesthetically to structures, social and cultural activities, other crossing points, and other amenities that are important for the life of people, then people can gradually adopt the practice of walking.

4.5 Safety: The respondents explained their perception by strongly agreeing that safety should be provided. Since there was no crossing feature between the two sides of the road and cars were parked along the sidewalk, traffic regulations should be studied for these areas. In general, Bahrain's shopping streets have been shown to be secure and safe, so customers generally feel comfortable moving about and conducting business there.

The findings of the data gathered from the respondents, which significantly correlate with the observations made on site, show that many of these walkability attributes were not applied in the planning of this shopping street. This emphasizes the importance of addressing them by the planning authority to enhance the walkability in these public areas.

5. Conclusion

The study examined how socio-cultural and built environment characteristics shape walkability and urban vitality in Bahrain’s commercial streets, with a focus on Shaikh Hamad Avenue in Muharraq. Findings demonstrated that pedestrian perceptions are significantly influenced by five interrelated determinants: imageability, enclosure, human scale, complexity, and safety. Shade provision, shop diversity, and spatial connectivity emerged as central enablers of walkability, while inadequate pedestrian crossings and harsh climatic conditions presented notable barriers. These results highlight the importance of designing commercial streets that not only accommodate functional movement but also foster social interaction, cultural identity, and environmental comfort.

By integrating local socio-cultural dynamics with human-centred design, the research provides valuable insights for planners and policymakers in Bahrain and the wider Gulf context. The evidence suggests that urban vitality can be enhanced when commercial streets are developed with attention to culturally sensitive design elements, pedestrian-oriented infrastructure, and micro-scale amenities. Such strategies not only strengthen street-level activity but also contribute to broader sustainability goals by promoting inclusivity, liveability, and reduced car dependency. The study reinforces that walkability is not merely a transport concern but a multidimensional concept intertwined with social behaviour, cultural expression, and urban resilience.

Nevertheless, this research acknowledges certain limitations, particularly the modest sample size and the single case study focus, which may limit broader generalisation. Future studies should extend the investigation across diverse urban contexts in Bahrain and other Gulf states to validate and refine the findings. Expanding the scope to include longitudinal data and economic variables could also provide deeper insights into how walkability interacts with commercial performance and long-term urban development. Overall, this study underscores the urgent need for evidence-based urban policies that prioritise pedestrians and cultural dynamics in shaping commercial streets, thereby creating more sustainable, dynamic, and human-centred urban environments.

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