Promoting Vernacularity in the Cities: Principles for Creating Livable Streets for People in Jordon

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Abstract

It is known that street elements influence the vernacularity and livability of urban spaces, the quality of life and the vitality of society everywhere in the world. Thus, there has been an urgent need to examine the quality and suitability of streets, specifically the commercial streets facing rapid developments and urbanization. Indeed, it is more so in Jordan. In this context, this research investigates the effect of physical characteristics of elements of livable streets where people can enjoy life and act freely. In other words, produce vernacularity.

The research employs mixed methods; qualitative and quantitative methods within a case study. Data collection techniques include a desk study, direct observation and a questionnaire survey.

The findings indicate that applying and paying attention to the characteristics such as color, shape, size, placement of the signs, colors of light, and light in general can achieve livable streets that promote vernacularity. The study suggests a framework to regulate the priorities of principles and the variables of streetscape elements, to help the decision-makers in municipalities and urban planners to bring about livable streets: in other words, promote vernacularity in cities.

Keywords: Sustainability; urban design principles; livable streetscape; streetscape elements; lighting; signs.

Introduction

Research on sustainable urban design has a long tradition. Streets play a significant role in cities and urban public spaces. They are part of the system of human lives and daily activities. Thus, there has been an urgent need to examine the quality and suitability of the sustainability of streets facing rapid developments and urbanization. This is also the case of the streets in Jordan. In fact, there are many reasons for considering Jordan for such studies. These include the rapid and changes that occur in them.

Similarly, it is necessary to ensure that they are still viable, livable and promote people's own ways of doing things: vernacular practices. Undeniably, well-designed streets will improve visual quality and livability of the communities (Kashef, 2016). Consequently, many requirements and design considerations must be taken into account in sustainable urban design of streets. Furthermore, due consideration should be given to urban design concepts and principles in the planning and development to create a high-quality, sustainable and livable built

environments that appeal to people to do engage in vernacular practices: what they do every day by themselves.

However, despite the importance of streets, there is a lack of studies investigating livable streets and their elements, especially in Jordan. There, urban growth and the spatial quality of streets and corridors in the capital city, Amman are affected by various development factors. These factors range from building regulations, population growth, social habits, and lack of awareness (Shaban et al., 2018). Thus, there is a real need to implement the concept of livability in streets through sustainable urban design principles.

This paper argues that the challenge lies in the research on street elements, signs, lighting, and their relationship with livability in commercial streets in Jordan. They face deficiencies and shortcomings due to the lack of comprehensive research for all the characteristics of these elements in detail. In this context, this research investigates the effect of the physical characteristics of street elements on livable streets in the light of sustainable urban design principles. It raises the question: how could sustainable urban design principles be applied for creating livable streets in Jordan?

The study aims to promote the efficacy of street signs and lighting in shaping livable commercial streets in Jordan. Its objectives are:

- To evaluate the current status of street elements such as lighting and signs and explore how they affect the experience of the people.
- To ascertain how the physical characteristics of street signs and lighting can shape livable commercial streets.
- To propose a framework that regulates these relationships and help planners and decision-makers understand what makes streets livable.

Theoretical Framework

Sustainable urban design

Sustainability has emerged as a significant concept in urban design, contributing to creating communities that are socially inclusive, environmentally conscious, and efficient in terms of economics (Moughtin, 2003). Sustainable urban design has been defined as applying sustainability and resilience as the main concepts and principles to the design of cities, planning, management and operation (Roggema, 2016). Moreover, according to the United Nations 1987 definition of sustainable development, this approach aims to "meet the needs and aspirations of the present generation without compromising the ability of future generations to meet their own needs". Therefore, communities might enhance their livability and quality of life of streets by incorporating sustainable principles into urban design (Evans, 2002; Kotus & Rzeszewski, 2013; Mahmoudi a, et al., 2014).

Squares, streets and the structures that accommodate the public activities in cities are the principal spaces in urban design. Urban streets have been analyzed and given many different perspectives by academics. Lynch (1981) has emphasized the importance of urban streets for people to comprehend a city and has added psychology to urban studies. In addition, others emphasize the special benefits streets provide for a city: they are the most vital public spaces where urban vernacular flourishes. In urban places, streets are the continuous linear open spaces. Despite that, the concept of sustainable street design still remains in its infancy (Bevan et al., 2007,). It is clear that sustainability standards may be utilized as a framework to determine the livable design standards due to the connections between sustainability and livability (Bandarabad et al., 2012).

Principles of sustainable urban design

Urban designers are concerned with how people perceive and interact with built and landscaped elements; they aim to create comfortable, lively, attractive, and interesting streets (Rehan, 2019). Moreover, Practitioners and scholars in urban design and landscape architecture have described the qualities that make a built space comfortable, memorable, interesting, or appealing, and may thereby encourage walking (Purciel et al., 2009). Universal design

principles of street elements may bring streets to become more people-friendly, sustainable, and functional.

As people use urban places in their daily lives, they are affected by the experience. This lived experience is affected by various dimensions, such as morphological, perceptual, social, visual, functional, and temporal dimensions (Carmona et al., 2010; Fouda et al., 2021). Furthermore, Planners and designers strive to improve livability in the built environment, thus improving quality of life.

Thus, there must be an appropriate framework that contributes to quality streets (Fouda et Al., 2021). Indeed, a sustainable street is a long-lasting, functioning street that provides positive effects for its people (Tiwary et al., 2016; Sewandono, 2022). Arguably, this can be achieved by implementing sustainable urban design principles on streets. There are four main principles of a sustainable streets: legibility, attractiveness, comfort and safety and liveliness (Burton & Mitchell, 2006; Ayman et al., 2020; Rehan, 2019).

Livable Streets

In recent years, the concept of livability and the development of livable places have received a lot of attention in urban planning and design. The term "livability" describes the general standard of living in a specific area, considering a variety of aspects, including social, economic, and environmental aspects. According to Evans et al., (2002), a livable urban place is one that promotes the overall health and development of all of its residents on a physical, social and psychological level. Others describe livable space as an area where people can live in reasonably comfortable conditions. (Soja, 1989; Davis, 1990; Madanipour et al., 1998; Mahmoudi & Ahmad, 2015).

The ability to live in a region has been favorably correlated with streets that satisfy people's demands for social and recreational activities and doing vernacular practices. In fact, livable areas are distinguished by lively, secure and pleasant streets. Designing and creating urban areas with a focus on people’s quality of life is known as creating "livable streets." The goal of livable streets is to create a setting that makes city living not only more enjoyable but also more practical (Francis, 1991; Gehl, 2001). A city becomes efficient, attractive, and livable when public amenities such as parks, buildings, roadways, and a broad range of street furniture offer sufficient facilities and utilities to suit the demands of the people (Wong & Siu, 2014). Moreover, street furniture not only satisfies peoples physiological needs but also their social, cultural, psychological, and ideological needs (Lee & Chan, 2008; Siu, 2007). For these reasons, street furniture must be considered part of public design in order to improve community livability for residents and promote vernacularity (Siu, 2009).

It has been revealed that the elements of a sustainable street are the main components of urban design. They are summarized as follows: sidewalks, benches, shelter and canopy, lighting, trees and landscape strips, sculpture and fountains, signs, public art, crossings, and trash receptacles (Abdel-Aziz et al., 2020; Rehan, 2019; Mahmoudi et al., 2015; Streetscape Design Guideline, 2005; Streetscape Manual User Guide, 2019; Radwan et al., 2016; Dhaou et al., 2022; Saroinsong et al., 2020). Needless to say, they facilitate urban vernacular practices to emerge effortlessly.

Street signs

Street signs are furniture for urban areas that provide information about their various uses and send crucial messages about security and safety of those locations. They are crucial elements of commercial streets and may be some of the most effective ways of delivering information. One of the main concerns of urban designers and planners however has always been the regulation of the placement of signage and advertising, particularly commercial signs, in public areas (Mahmoudi, 2012).

Moreover, well-designed signs appropriately located can enhance the visual environment by, e.g., creating pleasant spaces, screening sites awaiting redevelopment, or wasteland (Jiuan, 1984). Thus, the location, type, scale, design, materials, color, style, illumination, and number of signs should be according to pre-set standards to ensure livable

streets. For example, Kim and Park (2020) have focused on the direction of signboard management for streetscapes. Thus, the size, surface, color, quantity and lighting of signboards may not be suitable for street environments, and therefore, the guidelines need to be improved. Simultaneously, the materials and lighting of signboards need improvement. Mahmoud (2012) has measured the main negative influences of uncontrolled commercial signs in historical city centers, like different sizes, proportions, font styles, colors and the locations of installation on the facades, etc. In Jordan, Abu-Ghazzeh (1996) has investigated street signs and building regulations and their impact on vernacular practices of people.

Such street signs often examined in research are summarized and organized in the table 1. It includes variables and their characteristics according to previous studies. These variables were distributed according to their relationship to the four principles of livability as evaluated and reached by the researchers before (Jiuan, 1984; Abu-Ghazzeh, 1996; Morris, 2001; Hashim, 2001; Coetzee, 2003; Zineddin et al., 2005; Burton & Mitchell, 2006; Mulyaningsih, et al., 2012; SANTOSA et al., 2013; Mahmoudi & Ahmad, 2015; Wilsona et al., 2015; PESZKO, 2016; Wilson & Casper, 2016; Kim & Park, 2020; Laskara et al., 2020; Won & Lee, 2020; Y He, et al., 2020).

Table 1: livable street signs characteristics.
Source: Author.

principle	characteristic
Safety & comfort	size: •Size should be proportional to road width/class, high risk in wide size. (Could distract drivers). placement: •away from pedestrian way and movement zone uncovered the entire building facade shape: •A simple geometric shape that does not cause a distraction while driving/riding. illumunation: •avoiding illuminated signs, of the neon type and high lighting brightness at the intersection area (very dangerous for drivers) density: •Increasing the number of advertisement signs led to an increasing accident rate.
attractiveness	size: •Larger size attracts more attention. •(A higher level of visual saliency). color: •Stronger saturation and brighter or darker than other objects in the visual field more likely will be noticed. shape: • Sharp shapes are stronger to attract attention placement: • Most effective is when the advertisement is properly located within the driving environment.
Legibility	location: •optimal viewing, such as the side of the road, distance from the road. illumination: •Sufficient and stable lighting. •There are advertisements that do not use lighting, making them ineffective at night. density: •When the average number of advertisements located in every building (ads/building) is high, information transferred will be low. size: •uniformity in size with other signs (signs being of equal size various sizes). color: •Dark characters on a light background, instead of light characters on a dark background. light signboard
liveliness	color and shape: •The forms, color, and light of advertisements are bold and large, creating a "roadside architecture" appearance that encourages **liveliness.**

Street lighting

Lighting is one of the elements of public furniture that significantly influences the overall quality of urban spaces and either facilitate or hinder what people do on their own: in other words, vernacular practices. It can be seen as an element of urban security (Mahmoudi, 2012). Furthermore, lighting systems are considered an important facility in cities, improving the feelings of pedestrian security and road traffic safety (Jordan et al., 2016).

Improving outdoor lighting may also be advantageous in attracting people to an area improving the nighttime economy (Fotios et al., 2015). In this regard, Sipahiioglu (2022) has examined the attractiveness of street lighting. Finally, livable streets are required for people to gather and engage in vernacular activities without any trouble.

Therefore, vitality and liveliness in urban design should be defined, and many criteria for it should be discovered. Indeed, the most effective factors leading a street to have the quality of vitality should be determined to create an atmosphere that is dynamic (Ahmadi et al., 2014).

Based on these, street lighting is summarized and organized in the table 2. It includes the variables and their characteristics according to previous studies and the questionnaires were prepared accordingly. These variables were distributed according to their relationship to the four principles of livability as evaluated and reached by researchers before (Choia et al., 2006; Ahmadi et al., 2014; Peña-García et al., 2015; Fotios, et al., 2015; Markvica , et al.,2019; Svechkina , et al., 2020; U. Lindh, et al., 2021; Sipahioglu, 2022).

Table 2: livable street lighting characteristics.
Source: Author.

principle	characteristic
Safety & comfort	illumination: •Enough street lights, clear roads, and vision brightness: •The streets need well-balanced lighting. uniformity: •Good uniformity in lighting distribution avoids differences between dark and bright areas. color of light: •White light helps to improve the sense of safety and makes facial recognition easier. location: •The location of lights on the street is suitable to make it comfortable and safe
attractiveness	Light in general: •Attractive in lighting and enough brightness Color of light: •Attractive in lighting colors
Legibility	Uniformity: •More uniformity in lighting makes the road more legible Brightness: •Balance in brightness so that everything in the street is legible. Color: •Visibility of vehicles Recognizability of colours (e.g. clothes of other people)
liveliness	Light in general: •Liveliness streets are needed to absorb people in all situations to gather and have activities without any difficulty.

Literature Review

A lot of research has been conducted into the application of sustainable urban design principles and livable streets. Among them, a number of themes have emerged. For example, Rahnama et al. (2012) discuss the rough and fast process of urban modernization and its effects, which make it necessary to think and reconsider about forming an urban sustainable environment. Furthermore, they emphasize the introduction of a new urbanism approach in the course of creating an appropriate urban environment on a humanistic scale, which is responsible for responding to evolutions and urban and developmental modern improvements in the framework of urban sustainable developmental goals. Similary, El-Shimy & Raghab (2017) point out that, in our towns and cities, streets make up most of the public spaces. They accommodate buildings, vehicles, people, utilities, signage, lighting and street furniture.

Therefore, communities can live in livable, vernacular-friendly places with the implementation of sustainable urban streets. Considering and assessing sustainable principles will enable urban streets to function in a manner that is more beneficial to people, communities, the economy and the environment. El-Shimy & Raghab (2017) offer some recommendations to develop the main components of sustainable streets in order to design a sustainable street for a liveable community. They include aspects such as using renewable energy and more sustainable street furniture, upgrading the level of services, facilities, and infrastructure, and other recommendations derived from the theoretical study.

According to Mahmoudi et al. (2021), regardless of the shape of urban spaces, social and physical issues deteriorate the livability of an urban environment. In most of the recent research, it is noted that social issues in urban areas come from their physical issues. Therefore, it is argued that physical problems influence the quality and livability of streets, with especially in an old part of a city.

Subsequently, the physical attributes of the streets have been considered as variables and their examination is taken via direct observations to explore the physical problems of the streets. Overall, Mahmoudi et al. find that physical problems like irregular signs and inadequate public services and maintenance diminish the livability of streets. Rehan (2019), proposes that, by applying sustainable principles, it can help achieve sustainable urban design processes and, thus, also produce sustainable cities.

Many requirements and design considerations must be taken into account in sustainable urban design of streets. The principles of sustainable streets include legibility, attractiveness, safety& comfort and liveliness. Rehan analyzes the street elements and concludes that the street signs and lighting are significant. According to Alshammari (2023), changing people's requirements for public areas and increasing urbanization lead to some problems. Thus, he proposes to reconsider street design by reshaping the urban experience toward greater livability by responding to and connecting with onlookers in order to improve understanding of onlookers' activities in the streets and urban livability. Moreover, Alshammari emphasizes that the design of street elements must produce livable areas where people may gather and communicate.

In this connection, Harsritanto (2018) points out that the street is an urban public space built to facilitate the basic needs of people as social beings. Moreover, he suggests to use street design guidelines based on universal design principles to accommodate a wide range of human diversity. Where the design sections are universal; however, the quality and identity of each street may vary (depending on the surrounding environment).

Scholars in Jordan, such as Al Odat & Al Kurdi (2021) have highlighted the characteristics of street elements that particularly affect people’s experiences to improve social and sustained activities in commercial streets. They find that poor and inadequate streetscapes of commercial streets affect people’s experiences. Accordingly, there are only temporary and essential stationary activities available. Therefore, well designed shopping streets, with lighting devices all over the street would become much livelier. Moreover, they highlight the importance of public participation in creating lively cities and recommending the best practices that local governments ought to implement.

According to Sharaf et al. (2023), public spaces, which include squares and streets, give the city identity and urban character, whether historical or modern. Their quality and success are the result of taking into account the physical and social factors in the design and planning stages to create successful public spaces. Moreover, the quality and success of public spaces is the result of taking into account physical and social factors in the design and planning stages to create successful public spaces. Similarly, Tawil et al. (2014), adopt an integrated approach that interlinks all aspects of roads and reflects the needs of all the people for a sustainable pedestrian traffic setting. They suggest strategies for creating a new definition of a street's functional spaces. In this instance, streets should encompass various understandings and functionalities of a space, such as communication potential, living in the space, and quality of living. Needless to say, vernacularity of people’s existence in the public spaces.

Research Methodology

This research uses a mixed research method; qualitative and quantitative within a case study approach. The case studies included the most important commercial streets in Amman, Jordan.

Data collection techniques included a desk study, direct observations and questionnaire surveys. An extensive desk study was undertaken to derive variables and methods of measuring the street signs and lighting from the existing literature. Then, these variables were tested in

the two study cases using a mixed-methods approach involving direct observations and questionnaire surveys.

At first, the variables of the street signs and lighting derived from the previous studies were synthesized according to the principle of livability: legibility, safety and comfort, attractiveness, and liveliness; each variable indicates its characteristics and measurement techniques derived from the existing literature.

After the desk study, direct observations were employed as the qualitative method. The field notes summarized the observations providing rich and detailed descriptions of the situation observed. The observations evaluated the current situation of the streetscape elements.

The streets were visited in March 2023 during the day to document images of signs and at night to document and evaluate street lighting. The information, images, and observations obtained were organized in four tables for signs. Each table represents a principle of livability, and each variable was expressed by images and notes based on the desk study, as well as for street lighting. In order to facilitate the comparison of the results later with other methods, this information and images monitored and recorded by the researcher were converted into ratios.

Subsequently, the qualitative method is used as a second step to validate the examined and evaluated variables using the observations. For this, questionnaire surveys were employed. They consisted of two parts, a part for lighting and a part for signs, and each part consisted of five sections. The first section includes questions about the respondent's information, and the remaining sections discuss the principles of livability variables (legibility, safety and comfort, attractiveness, and liveliness). They consist of Likert-scale questions ranging from 1 to 5: 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 5 = agree; and 6 = strongly agree. Furthermore, the questions were derived from the characteristics of each variable derived from the document study.

The survey samples were selected using probability sampling, using the stratified simple random sampling method (Acharya et al., 2013). The target population of this study comprised of the users of multifunctional - shopping areas. They were mainly the passersby, and there was a great variety of them. Four groups of participants were sampled: people in restaurants and cafes, shopping, walking and passing through, based on their reason for being in the street. Data was collected in April 2023, and were all distributed electronically on social networking sites and sent randomly to everyone, targeting different age groups giving an overview of the nature of the research and the purpose of the questionnaire. A total of 167 responses were obtained. The questionnaire was also distributed in Arabic to ensure understanding of the questionnaire and to obtain the largest number of responses from all the categories. Due to the limited time for this study, this number has been sufficient. The data in the questionnaire were analyzed according to the sections distributed in the questionnaire related to the four principles of livability.

Case Studies

This study was conducted in Amman, Jordan. The Hashemite Kingdom of Jordan is a country in Western Asia (Teller, 2002). Amman, the modern and ancient capital of Jordan is one of the oldest continuously inhabited cities in the world. It is located at 31.96 latitude and 35.95 longitude and at 757 meters above the sea level (Whereig, 2023). However, in Amman City, Jordan, streets are still growing and shaped into highways and streets that serve vehicles, neglecting the concept of revitalizing the main streets for social interaction between people and their vernacular existence (Tawil et al., 2014). Therefore, Amman's most important commercial streets were chosen as case studies. The were important according to the function and location. Therefore, the choice was made from the multi-use commercial streets that serve pedestrians and vehicles. As illustrated in the Figure 1, Al Madina Al Monawara and Al-Wakalat Street are selected in this study according to their variations in characteristics and scale.

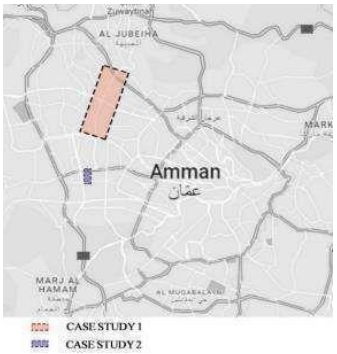


Fig. 1: case studies location
Sources: Google open street map.

Case Study 01: Al Madina Al Monawara Street

The first case study is Al Madina Al Monawara Street. It is located in Amman and connects many districts in West Amman. The street length is 3.255 m. The highest ratio of land use in the street is commercial land use (75%), and the least is 20% residential B and 5% residential A. These residential buildings are gradually being converted into office buildings. Most buildings in all parts are modern and in good structural condition since only 1% of buildings were built before 1978 (Tawil et al., 2014). Due to the changing building legislation, the scale has changed from low-rise houses (one to three floors) to mid-rise commercial or commercial office building types (six floors). The common building material in the street is a local lime stone and curtain wall.

Case Study 02: Al- Wakalat Street

Salem Al-Qdah Street in Sweifieh, also known as "Al-Wakalat" Street or Trademarks Street, is located in the commercial district of Sweifeih, West Amman. The location of the street is important because it links two major streets. The architectural character of Al-Wakalat Street signifies an era of the Jordanian millennium architecture (Al-Najjar, 2004). Façade cladding, including techniques such as Alocobond and other aluminum and metal cladding brands, is widely used. Also, Glass is widely used, with various colours for frames, windows, and doors. The street is also distinguished by its physical and spatial qualities. Building heights are about (17 m), the maximum allowed height in the building regulations of the area. The Table 3 presents the summary of the street characteristics:

Table 3: Characteristic of Al Madina Al Monawara Street.
Source: Author.

Street/ characteristic	Al-Madina Al Monawara Street	Al-Wakalat Street.
Street length	3.255 m	400 m
Street width	30 m	20 m
Width/Height	1:0.6	1:0.75
Buildings material	Local white stone, curtain wall.	Local white stone, Metal cladding, glass.
Land use	Commercial – mixed use	Commercial – mixed use
Buildings function	Daily use shops, stores, restaurant, offices and others shops and services.	Clothing stores, offices, restaurants.
Average speed	60 km/hr.	30 km/hr.
priority of users	vehicles	Pedestrian

Findings and Analysis

This section includes the results of the observational and questionnaire analysis. At the end of the section, observation and questionnaire results were compared and then combined for each street to reach the final results for each element and its relationship with the livability principles.

Signs analysis

This section includes the analysis of street signs observation for the two cases, then the analysis of questionnaire results for the two cases.

Street signs observation analysis

This section includes the analysis of observation for Al-Madinah Al-Munawwarah Street, case study 01.

Legibility variable

Table 4: Analysis of the legibility principle for the case study 1 observation.
Source: Author

<table>
<tr><td colspan="2">Location</td><td colspan="2">Illumination</td></tr>
<tr><td> 
Fig. 2: advertisement signs.</td><td> 
Fig. 3: grounded advertisement sign.</td><td> 
Fig. 4: shows not all signs use lighting.</td><td> 
Fig. 5: shows not all signs use lighting.</td></tr>
<tr><td colspan="2">Density</td><td colspan="2">Size</td></tr>
<tr><td> 
Fig. 6: signs density on the shop front.</td><td> 
Fig. 7: signs density on the shop front.</td><td> 
Fig. 8: shop front signs similar in size.</td><td> 
Fig. 9: shop front signs similar in size.</td></tr>
<tr><td colspan="2">Color</td><td colspan="2"></td></tr>
<tr><td> 
Fig. 10: sign include dark characters on a light background.</td><td> 
Fig. 11: sign include dark characters on a light background.</td><td colspan="2"> 
Fig. 12: sign include dark characters on a light background.</td></tr>
</table>

Table 4 includes Figures from the observation that illustrate the variables (location, illumination, density, size, and colour) of the legibility principle for the signs for case study 1. The location of the signs in Figures 2 and 3. As seen in figure 3 advertisement signs on the road junction island. Figure 3 shows an advertisement sign on the Pavement between the street and the shop parking. In figures 4 and 5 the illumination of signs where not all use lighting, making them illegible at night. The density in Figures 6 and 7, which show the density of signs on the shop front. The high density of signs makes them illegible to drivers due to overcrowding. The size in Figures 8, 9. Shop front signs are uniform in size to each other. Additionally, as seen the color in Figures 10, 11, and 12, where dark characters on a light background increase legibility.

Attractiveness variables

Table 5: Analysis of the attractiveness principle for case study 1 observation.
Source: Author.

size		**shape**	
 **Fig.13:** shopfront signs similar in size to each other.	 **Fig.14:** shopfront signs in differences with size.	 **Fig.15:** signs with a strange shape in the street.	 **Fig.16:** sign with a strong and strange shape.
Color		**Placement**	
 **Fig.17:** sign with strong and darker color.	 **Fig.18:** sign with a strong and strange shape.	 **Fig.19:** grounded sign located in the driving environment.	 **Fig.20:** grounded sign located within the driving environment.

Table 5 presents the figures from the observation that illustrate the variables (size, shape, placement, and color) of the attractiveness principle for the signs for case study 1. As seen, the size in Figures 13 and 14 illustrate the sizes of the signs on the storefronts which are close to each other. The shapes in the Figures 15 and 16 have strong and strange signs are shaped in the street to attract attention. Colors in the Figures 17 and 18, have signs with Strong saturation colors and brighter or darker than other street objects. The placement variable in Figures 19 and 20, show that the signs are located within the driving environment and close to the road.

Safety & comfort variables

Table 6: Analysis of the safety and comfort principle for case study 1 observation.
Source: Author.

Size		
 **Fig. 21:** large sign located on the side of a building.	 **Fig. 22:** large sign located on the side of a building.	 **Fig. 23:** large sign located on the side of a building.
Placement		
 **Fig. 24:** grounded sign away from the movement zone.	 **Fig. 25:** sign located in the middle of the road.	 **Fig. 26:** grounded sign away from the pedestrian zone.
Shape		
 **Fig. 27:** sign with simple geometric shape.	 **Fig. 28:** sign with stranger geometric shape.	
Illumination		

Fig. 29: well illuminated signs.

Fig. 30: well illuminated signs.

Density

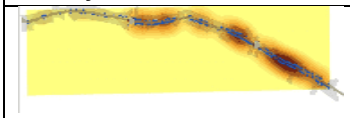


Fig. 31: GIS map shows the density of signs in the street.

Fig. 32: shows an average density of signs.

Fig. 33: shows an average density of signs.

Table 6 presents the Figures from the observation that illustrate the variables (size, shape, placement, illumination, and density) of the safety and comfort principle for case study 1 signs. The size variable in Figures 21, 22, and 23, show that the signs are proportional to road width. The placement variable in Figures 24, 25, and 26, as seen in the figures the location of the signs is within the driving environment and may cause a distraction for the drivers. The shape variable in Figures 27 and 28, have simple geometric shapes that do not cause a distraction to the drivers. The illumination of signs shown in the Figure 29, 30 have illuminated signs that cause distractions. The density variable is illustrated in Figures 31, 32, and 33, because of the large number and variety of shops in the street. In fact, there are many signs in the street, and thus there is competition in lighting them at night. As seen in the Figure 32, a GIS map that illustrates the density of the signs, where signs are in average density, are not crowded, and an average number of signs are in the same area.

Liveliness variables

Table 7: the analysis of the liveliness principle for case study 1 observation.
Source: Author

Shape and colour

Fig. 34: a variety of signs styles in roadside architecture

Fig. 35: signs with a variety of sizes.

Fig. 36: signs with a variety of colours.

Fig. 37: signs with a grounded sign.

Fig. 38: signs with a variety of styles and colours.

Fig. 39: electronic sign.

Table 7 presents the Figures from the observation that illustrate the variables: shape and color of the liveliness principle for the case study 1. The figure 34 shows the variety of roadside architecture. The figure 35 shows the variety of sizes with a big sign on the side of the building and the average sign on the shop front. There is a variety of colors and materials in Figure 36. There is a variety of sign placements in the Figure 37. There is a variety of styles and colors in the Figure 38. In the Figure 39, there are electronic advertisement signs. These variety of street sign features allow them to create the kind of dynamism that creates a distinctive street-style feel.

Undeniably, these contribute immensely to the vernacularity and livability of the streets. People carry on their daily activities as they wish comforted by the livability that arises from the presence of these aspects. Urban vernacular, the notion of how people do things by themselves is facilitated by the presence of the street elements appropriately.

This section includes the analysis of observations of al-Wakalat Street, the case study 2.

Legibility variable

Table 8: Analysis of the legibility principle for case study 2 observation.
Source: Author.

Location		Illumination
 **Fig. 40:** signs' locations.	 **Fig. 41:** signs' locations.	 **Fig. 42:** signs illumination.
Density	**Size**	
 **Fig. 43:** signs density.	 **Fig. 44**: signs sizes.	 **Fig. 45:** signs color

Table 8 presents the Figures from the observation that illustrate the variables (location, illumination, density, size, and color) of the legibility principle for the signs for case study 2. The location in Figures 40 and 41. As seen in the figure the signs' location on a shopfront. The signs are not legible to pedestrians from a distance. In figure 42 the level of sign illumination. Sign lighting is enough to be legible from a distance. The density in Figure 43, which shows the average number of signs on the shop front. The size in Figure 44. There is a variation in the sizes of the signs in relation to some of them. The color in Figure 45, where dark characters on a light background.

Attractiveness variables

Table 9: Analysis of the attractiveness principle for case study 2 observation.
Source: Author

Size	Colour
 **Fig. 46:** large signs in the street.	 **Fig. 48:** brighter and darker signs.
Shape	**Placement**
 **Fig. 47:** shape of signs in the street.	 **Fig. 49:** location of signs in the street.

Table 9 includes Figures from the observation that illustrate the variables (size, shape, placement, and color) of the attractiveness principle for the signs for case study 2. As seen in Figure 46 the sizes of the signs on the storefronts are close to each other. Shapes in figure 47, where no strong and strange signs are in the street. The color in Figure 48, where there are no eye-catching colors or bright colors. The placement variable in Figure 49, where the signs located within the driving environment and close to the road.

Safety & comfort variables

Table 10: the analysis of the safety and comfort principle for case study 2 observation. Source: Author.

Size	Placement	Shape
 **Fig. 50:** the size of the sign is proportional to street width.	 **Fig. 51:** placement of the signs on the building's façade.	 **Fig. 52:** simple geometric signs on the whole street.
Illumination	**Density**	
 **Fig. 53:** shows the level of signs illumination at night.	 **Fig. 54:** GIS map shows the low density of signs in the street.	

Table 10 includes Figures from the observation that illustrate the variables (size, shape, placement, illumination, and density) of the safety and comfort principle for the signs for case study 2. Figure 50 illustrates the size variable, where signs are proportional to road width. The placement variable in Figure 51, where signs are away from the pedestrian way and movement zone. The shape variable in Figure 52, where simple geometric shapes do not cause a distraction for drivers. The illumination of signs in Figure 53, where the signs are balanced and illuminated. The density variable in Figure 54. GIS map shows the low density of signs in the street, where the blue dots represent the places of the signs in the street.

Liveliness variables

Table 11: the analysis of the liveliness principle for case study 2 observation. Source: Author.

Shape and colour		
 **Fig. 55:** a variety of signs styles in roadside architecture.	 **Fig. 56:** signs with different colours.	 **Fig. 57:** signs with different placement.
 **Fig. 58:** sign with different material.	 **Fig. 59:** signs with different colours and placement.	 **Fig. 60:** signs with darker colours in the street.

Table 11 includes Figures from the observation that illustrate the variables (shape and colour) of the liveliness principle for the signs of case study 2. As seen in figure 55, the variety in roadside architecture. In figure 56 the variety in sizes with a big sign on the side of the building and average signs on the shop front. The variety of colors and materials in Figure 57. In Figure 58 the variety in sign placement, in Figure 59 the variety of shapes and sizes, and Figure 60 shows signs with darker colors in the street.

Comparing street signs between the two case studies

Table 12: a comparison of the observation for cases 1 and 2.
Source: Author.

case / Principle	case study 1		Case study 2	
	Variables	**Situation**	**variables**	**situation**
legibility	• Location • Illumination ○ Density ○ size • Colour	•	○ Location ● Illumination ● Density ○ size ○ Colour	○
attractiveness	● size ● shape ○ placement ● colour	●	● size ○ shape ○ placement ○ colour	○
safety and comfort	● size ● shape ○ placement ○ illumination ○ density	○	○ size ● shape ○ placement ● illumination ● density	●
liveliness	● shape and colour	●	○ shape and colour	○
• succeed ○ fail				

Table 12 presents a comparison of the observation of Al-Madinah Al-Munawwarah Street (case study 01) and Al-Wakalat Street (case study 02) based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The legibility succeeds in case 1 and fails in case 2. The attractiveness principle succeeds in case 1 and fails in case 2. The safety and comfort principle failed in case 1 and succeeded in case 2. The liveliness principle is achieved in case 1, while case 2 fails in the liveliness principle.

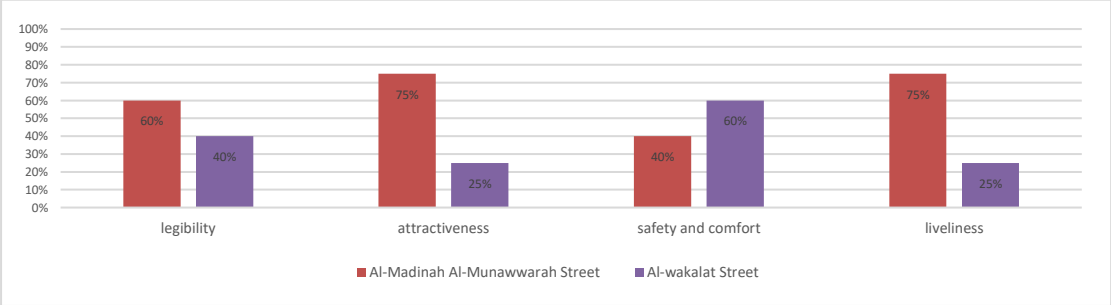


Fig. 61: Comparison of the observation for cases 1 and 2.
Source: Author.

As seen in the Figure 61, the comparison of the observation of Al-Madinah Al-Munawwarah Street (case 1) and Al-Wakalat Street (case 2) based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The principles of legibility (60%), attractiveness (75%), and liveliness (75%) succeed in case 1, while only safety and comfort (60%) are achieved in case 2.

Signs Questionnaire analysis

This section includes the analysis of questionnaire results for street signs in the two cases:

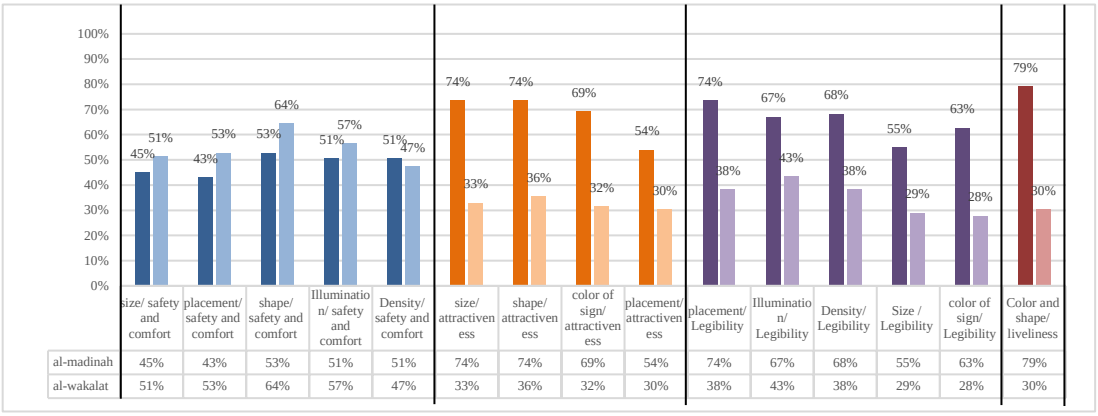


Fig. 62: The result of the street signs for cases 1 and 2.
Source: Author.

As seen in the figure 62, the result of the street signs in Al-Madinah Al-Munawwarah and Al-Wakalat Street. In Al-Madinah Al-Munawwarah Street shows that there is a variation in the results of variables in the street. The highest approval in this street was the liveliness variable, color and shape (79%), and the lowest approval was the safety and comfort variable, placement (43%). In general, 13 out of 15 variables succeeded in this street.

In contrast, Al-Wakalat Street shows that there is a variation in the results in variables in the street. The highest approval in this street was the safety and comfort variable, shape (64%), and the lowest approval was the safety and comfort variable, placement (43%). In general, 4 out of 15 variables succeeded in this street.

Comparison in the questionnaires for cases 1 and 2

Table 13: a comparison of the questionnaire for cases 1 and 2.
Source: Author.

case / Principle	Case study 1		casestudy 2	
	variables	situation	variables	situation
legibility	• Location • Illumination • Density • size • Colour	•	○ Location ○ Illumination ○ Density ○ size ○ Colour	○
attractiveness	• size • shape • placement • colour	•	○ size ○ shape ○ placement ○ colour	○
safety and comfort	○ size ○ shape • placement • illumination • density	•	• size • shape • placement • illumination ○ density	•
liveliness	• shape and colour	•	○ shape and colour	○
• succeed ○ fail				

Table 13 presents a comparison of the questionnaire about Al-Madinah Al-Munawwarah Street (case 1) and Al-Wakalat Street (case 2) based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The legibility succeeded in case 1 and failed in case 2. The attractiveness succeeded in case 1 and failed in case 2. The safety and comfort principle succeeded in case 1 and succeeded in case 2. While the liveliness principle was achieved in case 1, so succeed and fail in case 2.

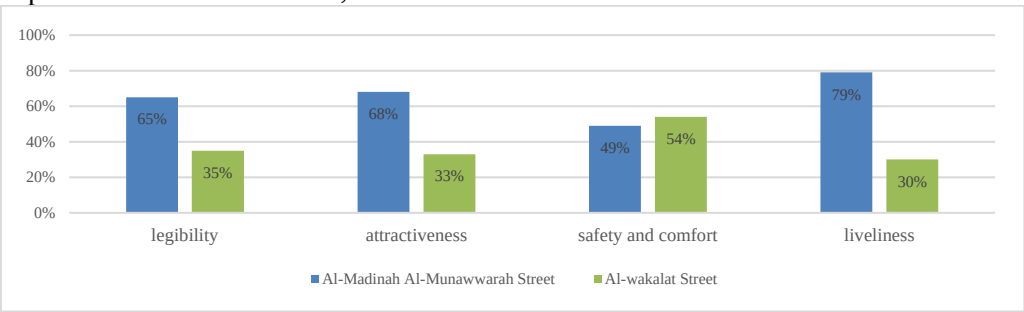


Fig. 63: Comparison of the questionnaire for cases 1 and 2.
Source: Author.

As seen in the Figure 63, the comparison of the observation of Al-Madinah Al-Munawwarah Street (case 1) and Al-Wakalat Street (case 2) based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The principles of legibility (65%), attractiveness (68%), and liveliness (79%) succeed in case 1, while only safety and comfort (54%) is achieved in case 2.

Street lighting analysis

This part includes the analysis of street lighting observation in Al-Madinah Al-Munawwarah Street and Al-Wakalat Street.

Al-Madinah Al-Munawwarah Street lighting observation analysis.

This section includes the analysis of street lighting observation in the case study 1.

Legibility variables

Table 14: the analysis of the legibility principle of case study 1 observation
Source: Author

Uniformity	Brightness	Colour
 **Fig. 64:** the ununiformed lights in the street.	 **Fig.65:** the level of lighting brightness	 **Fig.66:** the yellow colours of street lighting.

Table 14 presents the Figures from the observation that illustrate the variables of the legibility principle for the lighting of case study 1. As seen in the Figure 64, the street lighting is not uniform in all areas. In some places, the lighting is weak. In the Figure 65, the level of street lighting brightness, which is enough to make the objects in the street legible. In Figure 66 the yellow color of street lighting.

Attractiveness variables

Table 15: Analysis of the attractiveness principle in case study 1 observation
Source: Author

Light in general	Colour of light
 **Fig. 67:** the light attraction in the street.	 **Fig. 68:** the colour of the street light attraction.

Table 15 presents the Figures from the observation that illustrate the variables of the attractiveness principles for the lighting in case study 1. In figure 67 the light in general in the street. In figure 68 the yellow color of a street light.

Safety & comfort variables

Table 16: Analysis of the safety and comfort principle in case study 1 observation.
Source: Author

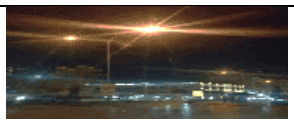
illuminance/ light in general	Brightness (intensity)	Uniformity
 **Fig. 69:** light in general in the street.	 **Fig. 70:** the level of brightness.	 **Fig. 71:** the differences in uniformity in street lighting.
Colour of light	**Location**	
 **Fig. 72:** the colour of lighting.	 **Fig. 73:** the location of street lighting.	

Table 16 presents the Figures from the observation that illustrate the variables of the safety and comfort principle for the lighting of the case study 1. As seen in figure 69, the light in general in the street. In figure 70 the brightness and intensity of lighting. The brightness, in general, is enough, and there are pedestrians, specifically in commercially active spaces. In the Figure 71 the differences in uniformity in street lighting, and there is a difference in lighting distribution. In the Figure 72, the yellow color of the street lighting, which is not enough to enhance the safety and comfort of pedestrians. Figure 73 shows the location of street lighting located in the middle of the street lights on the two sides of the street.

Liveliness variables

Table 17: Analysis of the liveliness principle of case study 1 observation.
Source: Author

Light in general
 **Fig. 74:** the light in general in the street.

Table 17 presents the Figures from the observation that illustrate the liveliness principles for the lighting of the case study 1. As seen in the Figure 74, the street light in general,

which is not enough to do any activity like walking or social activities like gathering in the street.

Case study 2 lighting observation analysis.

This section includes the analysis of street lighting observation in the case study 2.

Legibility variables

Table 18: Analysis of the legibility principle of Al-wakalt Street observation.
Source: Author

Uniformity	Brightness	Colour
 **Fig. 75:** the uniformity in street lighting.	 **Fig. 76:** the level of brightness in street lighting.	 **Fig. 77:** the colour of street lighting.

Table 18 presents the Figures from the observation that illustrate the variables (uniformity, brightness, and color) of the legibility principles for the lighting of the case study 2. As seen in the Figure 75, the uniform lighting in the street, which is well uniformed, where users in all areas of the street are spread out. In the Figure 76, the level of street lighting brightness suitable for street function. The white color of street lighting in the Figure 77.

Attractiveness variables

Table 19: Analysis of the attractiveness principle for case study 2 observation
Source: Author

Light in general	Colour of light
 **Fig. 78:** the street lighting in general.	 **Fig. 79:** the colour of street lighting.

Table 19 presents the Figures from the observation that illustrate the variables (light in general and color of light) of the attractiveness principle for the lighting in case study 2. As seen in the Figure 78, the light in general in the street, which attracts users to the street. The white colour of the street light in the Figure 79.

Safety & comfort variables

Table 20: Analysis of the safety & comfort principle for case study 2 observation.
Source: Author

Illuminance/ light in general	Brightness (intensity)	Uniformity
 **Fig. 80:** the street lighting in general.	 **Fig. 81:** the brightness of street lighting.	 **Fig. 82:** the uniformity of street lighting.
Colour of light	**Location**	

 **Fig. 83:** the colour of street lighting.	 **Fig. 84:** the location of street lighting.

Table 20 presents the Figures from the observation that illustrate the variables (light in general, brightness, uniformity, color of light, and location) of the safety and comfort principles for the lighting for case study 2. As seen in the Figure 80, the light in general in the street, which is enough to be safe and comfortable. The brightness and intensity of lighting in the Figure 81. In the Figure 82, the differences in uniformity in street lighting, so there is no difference in lighting distribution and avoiding differences between dark and bright areas. In the Figure 83, the white color of the street lighting, which enhances the feeling of comfort and safety. Figure 84 shows that the location of street lighting is on one side of the street at the pavement.

Liveliness variables

Table 21: Analysis of the liveliness principle for case study 2 observation.
Source: Author

light in general
 **Fig. 85:** the light in general in street

Table 21 presents the Figures from the observation that illustrate the liveliness principle for the lighting for case study 2. As seen in the Figure 85, the street light in general, which is enough to do any activity like walking or social activities like gathering in the street. The figure shows that many pedestrians use the street at night for walking. Despite the low commercial traffic in the street at night, as most of the shops are closed, many people are walking and using the street.

Street lighting observation Comparison of two cases:

Table 22: A comparison of the observation for cases 1 and 2.
Source: Author

Principle/ case	case study 1		case study 2	
legibility	○ Uniformity ● Brightness ○ Colour of lighting	●	● Uniformity o Brightness ● Colour of lighting	●
attractiveness	● Light in general ● Colour of light	●	○ Light in general ● Colour of light	-
safety and comfort	● Light in general ● Brightness ○ Uniformity ○ Colour of light ○ Location	●	● Light in general ● Brightness ○ Uniformity ● Color of light o Location	●
liveliness	● light in general	●	● light in general	●
● succeed o fail				

Table 22 presents a comparison of the observation of Al-Madinah Al-Munawwarah Street (case 1) and Al-wakalat Street (case 2), based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The legibility was achieved in case 1 in the brightness variable, but in case 2, it was achieved in uniformity and color of light variables; therefore, the legibility failed in case 1 and succeeded in case 2. The attractiveness principle in case 1 was achieved in lighting in general and color of lighting, it was achieved in case 2 only in color of light; therefore, attractiveness succeeded in case 1 and case 2. The safety and comfort principle in case 1 was achieved in light in general and brightness, in case 2, it was achieved in light in general, color of light, and brightness; therefore, the safety and comfort principle failed in case 1 and succeeded in case 2. In liveliness principle, the case 1 and case 2 succeed.

Lighting Questionnaire Analysis

This section includes the analysis of questionnaire results for street lighting in the two cases.

Street lighting questionnaire analysis:

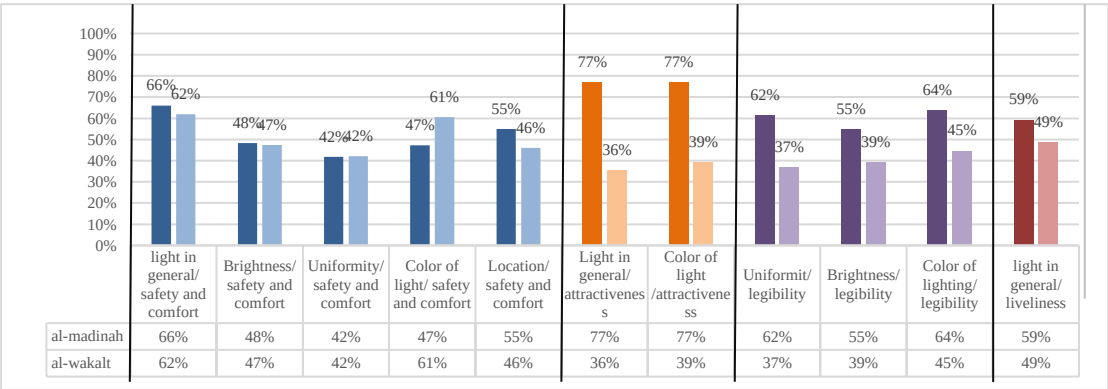


Fig.86: The result of the street lighting for cases 1 and 2.
Source: Author

As seen in the Figure 86, the result of the street lighting in case 1 and case 2. In the case 1 Street, the highest approval was the attractiveness variable, light in general and colour of light (77%), and the lowest approval was the safety and comfort variable, uniformity (42%). In general, 8 out of 11 variables succeeded in this street. While in the case 2, the highest approval was the safety and comfort variable, light in general (62%), and the lowest approval was the attractiveness variable, light in general (36%). In general, 2 out of 11 variables succeeded in this street.

Comparison in the questionnaire of the two cases

Table 23: A comparison of the questionnaires for cases 1 and 2.
Source: Author.

Principle/ case	case study 1		case study 2	
legibility	• Uniformity • Brightness • Colour of lighting	•	o Uniformity o Brightness o Colour of lighting	o
attractiveness	• Light in general • Colour of light.	•	o Light in general o Colour of light.	o

safety and comfort	○ Light in general ● Brightness ● Uniformity ● Colour of light ○ Location	●	● Light in general ○ Brightness ○ Uniformity ● Colour of light ● Location	●
liveliness	● light in general	●	○ light in general	○
• succeed ○ fail				

Table 23 presents a comparison of the questionnaire responses in Al-Madinah Al-Munawwarah Street (case 1) and Al-Wakalat Street (case 2), based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The legibility succeeded in case 1 and failed in case 2. The attractiveness principle succeeded in case 1 and case 2. The safety and comfort principle failed in both case 1 and case 2. At the same time, liveliness succeeds in case 1 and case 2.

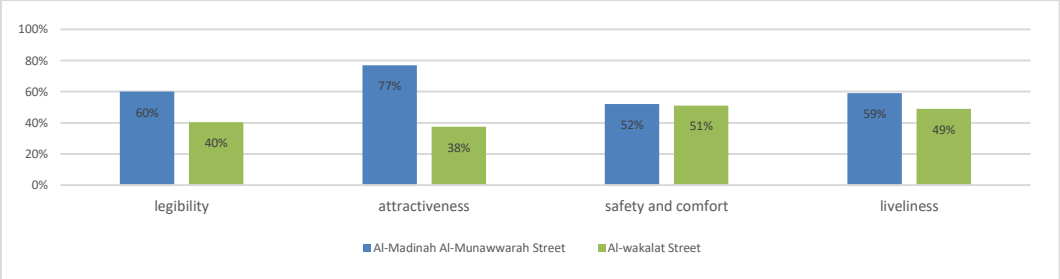


Fig. 87: comparison of the street lighting questionnaires for cases 1 and 2.
Source: Author.

As seen in the Figure 87, the comparison of the questionnaire Al-Madinah Al-Munawwarah Street (case 1) and Al-Wakalat Street (case 2) based on the livability principles (legibility, attractiveness, safety and comfort, and liveliness). The principles of legibility are (60%), attractiveness (77%), safety and comfort (52%), and liveliness (59%) in case 1, while legibility (40%), attractiveness (38%), safety and comfort (51%), and liveliness (49%) in case 2.

Results

Street signs

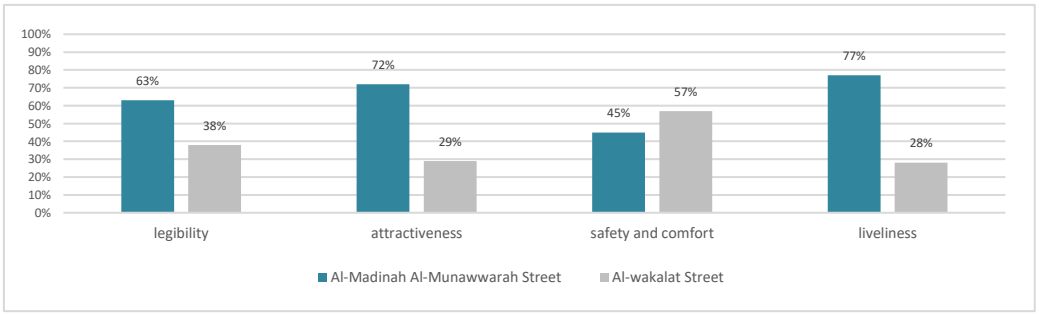


Fig. 88: the Comparison results of the principles' analysis for cases 1 and 2.

As seen in the Figure 88, a clear difference in the order of priority between the two streets, as the priority on the case 1 is the principle of liveliness, followed by attractiveness, legibility, safety, and comfort. In the case 2, the priority is for safety and comfort, followed by legibility, attractiveness, and liveliness.

When comparing the results of the two streets with each other, it appears that there is a contradiction in the results of the values. The difference in priority order is due to the differences in the characteristics of each street, such as the length and width of the Street, land use surrounding the street, buildings' function, and others. Thus, increasing street width and length and diversity in land use and function, as in case 1, led to the success of liveliness, attractiveness, and legibility in the street and the failure of safety and comfort. In addition, it has an impact on the order of priority for the principles in the street. However, less diversity and harmony in land use and buildings' function and the length and width of the street, as in case 2, led to the success of safety and comfort and the failure of liveliness, attractiveness, and legibility.

Street lighting

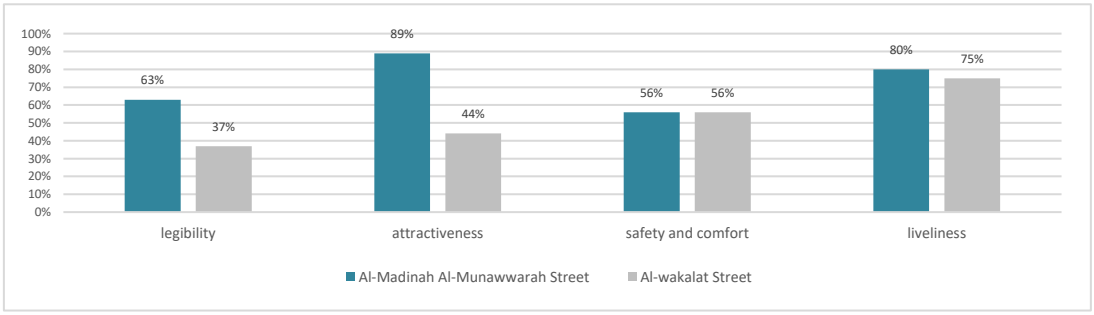


Fig. 89: Comparison of the results of the principles analysis for cases 1 and 2.
Source: Author

As seen in the Figure 89, a clear difference in the order of priority between the two streets, with the priority on case 1 for the attractiveness principle, followed by liveliness, legibility, and then safety and comfort. In case 2, the priority is for liveliness, followed by safety, comfort, attractiveness, and legibility.

When comparing the results of the two streets with each other, there appears to be a difference in the results of the values, which means that the priority order of the principle in the two streets differs. The difference in priority order is due to the differences in the characteristics of each street, such as the length and width of the street, land use surrounding the street, buildings' function, and others. Thus, increasing street width, length, and diversity in land use and function, as in case 1, led to the success of liveliness, attractiveness, legibility, safety, and comfort in the street. However, less diversity and harmony in land use and buildings' function, and the shorter length and width of the street as in case 2, led to the success of safety and comfort, and liveliness failure of attractiveness and legibility. In addition to its impact on the order of priority for the principles in the street.

Finally, the results of street signs and lighting summarized in a framework show the priority of principles and variables. As seen in the Figure 90, the framework for street signs, and in the Figure 91, the framework of street lighting.

1. liveliness	2. attractiveness	3. legibility	4. safety and comfort
• colour and shape	• 1. size of sign • 2. shape of sign • 3. colour of sign • 4. placement of sign	• 1. placement of sign • 2. density of sign • 3. illumination of sign • 4. colour of sign • 5. size of sign	• 1. shape of sign • 2. illumination of sign • 3. placement of sign • 4. size of sign • 5. density of sign

Fig.90: street signs framework.

Fig.91: street signs framework.

Discussion

To start answering the research question, the physical characteristics were monitored through site observation to evaluate them. Observation methodology contributed to documenting and evaluating the study cases based on the study of previous literature. In the end, it contributed to arranging the priority of principles in general (L. Meetiyagoda et al., 2016; Khanal, 2018; Markvica et al., 2019; Ali and Baper, 2023), to overcome some of the observational challenges, such as the bias of the observer, reliability, and validity of generalization, questionnaire methodology was used for the validity of the evaluation (A. Svechkina et al., 2020; K. Markvica, et Al., 2019; S. Bendak, K. Al-Saleh, 2010; A. Ali and S. Baper, 2023). When the indicators were examined using questionnaire methodology, the results were more accurate and gave an accurate order of priority for the variables. However, there has been a change in the order of some priorities, where some variables succeeded in the observation and failed in the questionnaire.

Some researchers have examined some of the aspects dealt with in this research. (Won, et al., 2020) studied the effect of colors and density on legibility. Regarding the effect of the number of signboard colors on color harmony, they did not include all factors and other variables of the signs. In addition, Mulyaningsih et al. (2012) have investigated commercial street signs in different areas and found that size, location and density contribute to legibility. Hussain et al. (2011) have examined the relationship between attractiveness and sign characteristics. Due to its size, colour, location, celebrity, and images, proper attention is given to billboard advertising. This finding contradicts this study, as density does not affect legibility if other variables such as size, colour, and placement are achieved.

As for street lighting, Balasubramanian et al. (2022) discussed street lighting and concluded that night lights, such as neon lights, were more powerful and attractive, which confirms this study's result. In addition, the study of García et al. (2015) has addressed that the average illuminance was also measured in each street to detect potential correlations between survey data, illumination levels, and light color. The results of this study indicate that well-illuminated streets, where lighting is uniform with higher illuminance levels, tend to make people feel safer and better, which confirms this study. In addition, the literature review (García et al., 2015) shows that even though white light seemed to make people feel safer, this result contradicts the result of the thesis, where people in the commercial streets preferred the color of white lighting to enhance the feeling of safety and comfort.

Conclusion

Lighting and signs form important and effective elements of a street, but with the rapid increase in urbanization, the streets suffer from neglect. Nevertheless, there is a huge potential for creating livable streets and achieving livability goals where vernacular practices of the people can flourish. This paper investigated the efficacy of street signs and lighting in shaping a livable commercial streets in Jordan and enable people to carry on their day to day activities within the contemporary urban vernacular. Thus, the research raised the question of the role of sustainable urban design principles in delivering livable streetscape elements and how to achieve these principles on commercial streets in Jordan.

The level of user satisfaction with certain variables highlighted the strengths and weaknesses of these streets. By testing legibility, safety and comfort, attractiveness and liveliness principles used in this study, the current status of streetscape elements was evaluated through direct observations. This study also ascertained how the physical characteristics of

street signs and lighting can shape livable commercial streetscape elements. According to Sharaf et al., (2023), the assessment of public places could be demonstrated in quantified results to establish a more accurate evaluation of their success. They also contribute to open space development decisions.

Therefore, based on people's opinions and preferences, it was concluded that applying and paying attention to these characteristics—color, shape, size, placement of the sign, color of light, and light in general—can achieve livable streets. Accordingly, the study found that there are external factors that may influence the principles of livability in commercial streets, such as the diversity of land uses, which directly influences liveliness and attractiveness. Moreover, the study suggests a framework to regulate the priorities of principles and the variables of street elements, as shown in the Figures 90–91. These undeniably will help decision-makers in municipalities as well as the urban planners develop the current streets and suggests basic principles for street design in the future. They will make the streets people friendly, promote spontaneous and natural day to day activities and promote urban vernacular practices.

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