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Exploring the Quality of Open Public Spaces in Historic Jeddah

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Abstract

This study evaluates the quality of public spaces in Jeddah, Saudi Arabia, using the Public Space Index and provides recommendations for enhancing their livability. Public spaces are crucial for social, cultural, and economic activities in cities, impacting urban livability and sustainability. As the second-largest city in Saudi Arabia, Jeddah's public spaces are vital for its livability. The Public Space Index is used as the evaluation tool, given its validity and reliability in assessing public space quality. Physical, social, and environmental factors affecting public space quality, as well as accessibility, safety, and diversity-related challenges, are discussed. The study area, sample selection process, and data collection methods are described, with site visits and surveys used to collect relevant data. The findings revealed varying degrees of public space quality in Jeddah, with some spaces meeting international standards while others falling short. Recommendations for enhancing accessibility, safety, and diversity, improving maintenance, and incorporating more green spaces and public amenities are provided to improve the quality of public spaces in Jeddah. The study highlights the importance of public spaces for urban sustainability and offers valuable insights into improving the livability of Jeddah.

Keywords: historic Jeddah; public space index; public space evaluation; livability

Citation

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Explorando la calidad de los espacios públicos abiertos en la Jeddah Histórica

Resumen

Este estudio evalúa la calidad de los espacios públicos en Jeddah, Arabia Saudita, utilizando el Índice de Espacios Públicos y proporciona recomendaciones para mejorar su habitabilidad. Los espacios públicos son cruciales para las actividades sociales, culturales y económicas en las ciudades, y tienen un impacto en la habitabilidad y sostenibilidad urbana. Como la segunda ciudad más grande de Arabia Saudita, los espacios públicos de Jeddah son vitales para su habitabilidad. Se utiliza el Índice de Espacios Públicos como herramienta de evaluación debido a su validez y confiabilidad en la evaluación de la calidad de los espacios públicos. Se discuten los factores físicos, sociales y ambientales que afectan la calidad de los espacios públicos, así como los desafíos relacionados con la accesibilidad, la seguridad y la diversidad. Se describe el área de estudio, el proceso de selección de la muestra y los métodos de recolección de datos, utilizando visitas al sitio y encuestas para recopilar datos relevantes. Los hallazgos revelaron diferentes grados de calidad de los espacios públicos en Jeddah, con algunos espacios que cumplen con estándares internacionales y otros que no. Se proporcionan recomendaciones para mejorar la accesibilidad, la seguridad y la diversidad, mejorar el mantenimiento e incorporar más espacios verdes y servicios públicos para mejorar la calidad de los espacios públicos en Jeddah. El estudio destaca la importancia de los espacios públicos para la sostenibilidad urbana y ofrece ideas valiosas para mejorar la habitabilidad de Jeddah.

Palabras clave: Jeddah histórico; índice de espacios públicos; evaluación del espacio público; habitabilidad

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1. Introduction

Urban public spaces are essential components of cities as they contribute to the social, cultural, and economic activities of the community. These spaces provide opportunities for social interaction, recreation, cultural events, and economic transactions, as well as serving as important nodes for urban infrastructure and transportation systems. Well-designed and well-managed public spaces have been found to enhance urban livability and promote community well-being (Beck, 2009).

However, Jeddah, the second-largest city in Saudi Arabia, has experienced significant urbanization and development in recent decades, leading to changes in the city's spatial structure and built environment, resulting in a shortage of public spaces. The quality of public spaces in Jeddah is a critical concern for urban planners and policymakers as it represents a vital component of the city's livability and urban sustainability (Hegazy et al., 2021).

High-quality public spaces are essential for promoting social interaction, physical activity, and mental well-being among residents. On the other hand, poor-quality public spaces can lead to a range of negative outcomes, including social isolation, decreased physical activity, and increased crime rates (Akin, 2022; Carmona et al., 2008). Therefore, there is a need for a systematic evaluation of public spaces in Jeddah to identify areas for improvement and enhance their quality. The Public Space Index (PSI) is a widely used tool for evaluating the quality of public spaces. It provides a comprehensive framework for assessing public spaces' overall quality by measuring various aspects, including inclusiveness, meaningful activities, safety, comfort, and pleasurability (Mehta, 2014).

Public space quality encompasses physical, social, and environmental factors such as accessibility, comfort, sociability, attractiveness, safety, cleanliness, and sustainability (Abbasi et al., 2016). Livability, a key goal of urban planning and design, includes various factors such as access to public services, social and economic opportunities, and environmental quality (Howley et al., 2009). Public spaces are an important component of livable cities (Mirzakhani et al., 2022; Marcus, & Francis, 1997) as they provide opportunities for social interaction, recreation, and cultural expression.

The Public Space Index (PSI) is a tool widely used to evaluate public space quality in various cities around the world. Developed by Gehl and Svarre (2013) the PSI assesses public space quality based on four main criteria: accessibility, comfort, sociability, and attractiveness. These criteria are further broken down into sub-criteria such as seating, shade, pedestrian traffic, and the surrounding built environment.

The PSI has been applied in various cities worldwide, demonstrating its applicability and usefulness as an evaluation tool. The primary objective of this research is to evaluate the quality of public spaces in Historic Jeddah, using the PSI, and provide recommendations for improving their livability. This will involve conducting a systematic evaluation of public spaces using the PSI and analyzing the data to identify the quality of public spaces in Jeddah. In conclusion, the quality of public spaces in Jeddah is a crucial factor in the city's livability and sustainability.

Historic Jeddah, located on the eastern coast of the Red Sea, has a rich history as a crucial port for the Indian Ocean trade routes dating back to the 7th century AD. Its strategic location facilitated the transportation of goods to Mecca, and it served as a primary entry point for Muslim pilgrims arriving by sea. As a result, the city became a thriving multicultural hub, renowned for its unique architectural style. Historic Jeddah’s affluent merchants constructed tower houses in the late 19th century, blending Red Sea coastal coral building techniques with various architectural influences and crafts from the trade routes (Badawy, & Shehata, 2018).

The PSI is a useful tool for evaluating the quality of public spaces, and this research aims to apply it to Jeddah's public spaces to identify areas for improvement and enhance their overall quality. By doing so, this study aims to contribute to the improvement of public spaces in Jeddah, promoting social interaction, physical activity, and mental well-being among residents, as well as contributing to the city's economic development.

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2. The characteristics and challenges of public spaces in Jeddah

Jeddah's public spaces have diverse characteristics that affect their quality. Some public spaces in Jeddah have attractive designs and features, such as Al-Rahma Mosque Square and King Fahd's Fountain Park. These public spaces have open spaces, water features, and shaded seating areas, which attract people and contribute to their social and cultural activities (Badawi and Farag, 2023). In contrast, other public spaces in Jeddah suffer from physical constraints, such as limited space, lack of vegetation, and inadequate seating areas. These constraints reduce their appeal and limit their use for social and cultural activities (Mandeli, 2019).

Moreover, Jeddah's public spaces face several challenges related to maintenance, accessibility, safety, and diversity. Maintenance is a critical issue for public spaces in Jeddah, as many of them suffer from neglect and poor upkeep, resulting in broken furniture, litter, and graffiti (Mandeli, 2010). Accessibility is another challenge for public spaces in Jeddah, as some of them are not easily accessible for people with disabilities or limited mobility (Murad, 2018). Safety is also a concern for some public spaces in Jeddah (Mostafa, 2017), as incidents of crime and harassment have been reported in some areas, discouraging people from visiting them. Finally, diversity is a challenge for public spaces in Jeddah, as they often lack inclusivity for different age groups, genders, and cultural backgrounds, which affects their social and cultural functions (Addas et al., 2021).

To address these challenges, Jeddah's authorities need to prioritize public space management and planning, taking into consideration the local context and community needs. The application of the Public Space Index can serve as a useful tool to evaluate and improve the quality of public spaces in Jeddah.

3. Methodology

The research methodology for evaluating the quality of public spaces in Historic Jeddah involves a combination of site visits, surveys, and data analysis. The following steps outline the process in more detail:

1. Selection of public spaces: A diverse set of public spaces within Historic Jeddah will be identified for evaluation. These may include parks, plazas, waterfront areas, and cultural attractions. The selection will aim to cover a range of sizes and types of public spaces.
2. Site visits: Researchers will conduct on-site visits to each selected public space. During these visits, they will observe and document various aspects, including the physical characteristics of the space (layout, amenities, design), its use by visitors, cleanliness, and maintenance. Detailed notes, photographs, and measurements may be taken to provide a comprehensive assessment.
3. Surveys: Surveys will be administered to users of the public spaces to gather their perspectives on the quality of these spaces. The survey questionnaire will cover a range of factors that contribute to public space quality, such as safety, accessibility, comfort, aesthetics, and social interactions. The surveys may be conducted on-site or distributed electronically to reach a wider audience.
4. Data collection: The data collected during site visits and surveys will be compiled and organized for analysis. This may involve creating a database or using data management software to store and manage the information effectively.
5. Data analysis: Statistical techniques will be employed to analyze the collected data. This may include descriptive statistics, correlation analysis, and hypothesis testing to identify patterns, relationships, and significant findings. The Public Space Index, a validated tool for evaluating public space quality, will guide the analysis.

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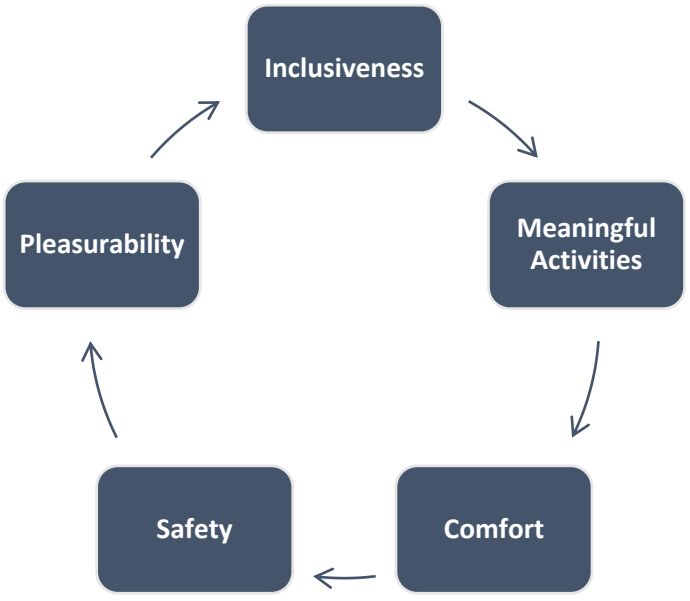
6. Assessment and recommendations: Based on the analysis of the data, the quality of public spaces in Historic Jeddah will be assessed. The findings will help identify strengths and weaknesses in the public spaces and highlight areas for improvement. Recommendations will be developed to enhance the quality, accessibility, and overall experience of the public spaces.

By employing this research methodology, the study aims to provide valuable insights into the quality of public spaces in Historic Jeddah and contribute to enhancing the livability and sustainability of the city.

4. Qualities of Public Space

Urbanism scholars and professionals, including urban designers, architects, and planners, have long been interested in the quality of public spaces. Lynch's articles, "The Openness of Open Space" (Lynch, 1965) and "Open Space: Freedom and Control" (Lynch and Carr, 1979), address concerns such as access, control, equity, stimuli, and social contact. Whyte's examination of urban plazas in 1980 produced guidelines that were adopted by the New York City Planning Department and are now widely recognized (Whyte, 2001). However, two studies have provided the most comprehensive understanding of activities in public spaces to date. First, Carr et al. in 1992 produced a holistic and extensive description by utilizing empirical research and scholarship on public space, proposing that the ideal public space should be responsive, democratic, and meaningful (Carr et al., 1992). Second, Gehl in 1987 proposed a straightforward framework for understanding the use and sociability of public space by categorizing outdoor activities as necessary, optional, and social (Gehl, 2011). Necessary activities, such as going to work or school, are largely independent of the environment's quality; optional activities, such as taking a leisurely walk or lingering, only occur when the environmental conditions are optimal; and social activities are the result of a high level of optional activities that require high environmental quality. This paper presents a theoretical framework for evaluating public spaces using Carr et al.'s definition and Gehl's proposed framework. Good public space should be accessible and open, have meaningful design and support various activities, provide a sense of safety, physical and environmental comfort and convenience, a sense of control, and sensory pleasure (Figure 1). These concepts are discussed in detail below.

Figure 1. **The five dimensions of public space**



Source: Updated from Mehta, 2014.

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4.1 Inclusiveness

Inclusiveness is a crucial characteristic for better qualities of public spaces, as it ensures that everyone can access and enjoy the benefits of these spaces (Landman, 2020). Inclusive public spaces are designed to be welcoming and accommodating for all, regardless of age, gender, ethnicity, ability, or any other characteristic (Attia, & Abdel Aty, 2018). Such spaces foster a sense of belonging, promote social cohesion, and contribute to overall community wellbeing.

Research has shown that inclusive public spaces can have significant benefits for individuals and communities. For instance, a study conducted by the Project for Public Spaces found that well-designed public spaces that cater to the needs and interests of diverse users can lead to increased social interaction, civic engagement, and economic activity (PPS, 2023). Similarly, a study by the Urban Land Institute found that inclusive public spaces can help to reduce crime and disorder, as they provide opportunities for positive social interaction and community building (Eitler et al., 2013).

Inclusive public spaces can also promote physical and mental health. Research has shown that spending time in nature or green spaces can have significant benefits for mental wellbeing (Bratman et al., 2012). Additionally, inclusive public spaces that are designed to be accessible to all can promote physical activity and healthy living (Kostrzewska, 2017).

4.2 Meaningful Activities

Meaningful activities are an important characteristic that can promote more qualities of public spaces (Ujang et al., 2018). Meaningful activities are those that provide a sense of purpose, engagement, and enjoyment to people who use public spaces (Nyman, & Szymczynska, 2016). These activities can range from physical activities such as exercise classes and sports to cultural activities such as concerts and festivals.

One of the benefits of meaningful activities in public spaces is that they can promote social interaction and community building. When people engage in activities together, they can form connections and build relationships with others who share similar interests (Scarlett, & McKinney, 2016). This can create a sense of belonging and strengthen the social fabric of a community. A study by Manzo and Perkins (Manzo, & Perkins, 2006) found that public spaces that facilitate social interaction and community engagement are more likely to be successful and sustainable in the long term.

Meaningful activities can also promote physical and mental health by providing opportunities for exercise, recreation, and stress relief. A study published in the Journal of Preventive Medicine found that access to public spaces with physical activity amenities such as parks, trails, and bike paths was associated with higher levels of physical activity and lower rates of obesity (Witten et al, 2008). Additionally, participating in meaningful activities has been shown to reduce stress and improve mental well-being (Penedo, & Dahn, 2005).

To promote meaningful activities in public spaces, it is important to design spaces that are versatile and adaptable to different types of activities. This can include providing open spaces that can be used for a variety of activities, as well as incorporating amenities such as sports fields, playgrounds, and amphitheaters. Public spaces should also be designed with safety and accessibility in mind to ensure that everyone has equal access to meaningful activities (Azemati et al., 2011).

4.3 Safety

Safety is a critical characteristic for better qualities of public spaces, as it plays a fundamental role in creating welcoming and enjoyable spaces for everyone (Giles-Corti et al., 2005). Safe public spaces are designed to protect individuals from physical harm and provide a sense of security, which contributes to a more positive user experience (Bain et al., 2012).

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Studies have shown that well-designed and well-maintained public spaces that are safe and accessible can lead to increased physical activity, improved mental health, and reduced social isolation (Kruize et al., 2019). Similarly, Welsh and Farrington (Welsh, & Farrington, 2009) found that public spaces that are perceived to be safe and well-lit can encourage more people to use them and contribute to a sense of community pride.

In addition to promoting physical and mental health, safe public spaces can also contribute to economic development. Research has shown that well-designed and well-maintained public spaces can attract visitors and stimulate economic activity in surrounding areas (Chen, 2016). Moreover, safe public spaces can help to reduce crime and disorder, as they provide opportunities for positive social interaction and community building (Pasaogullari, & Doratli, 2004).

4.4 Comfort

Comfort is an essential characteristic for better qualities of public spaces, as it contributes to a more positive user experience and promotes longer stays in these spaces (Javadi, 2016). Comfortable public spaces are designed to provide individuals with a sense of relaxation and enjoyment, which can enhance their overall wellbeing and contribute to a more vibrant community.

Research has shown that well-designed public spaces that provide comfortable seating, shade, and protection from the elements can lead to increased social interaction and community building (Javadi, 2016). Similarly, Lau et al. (2014) found that comfortable public spaces that provide opportunities for rest and relaxation can reduce stress levels and improve mental health. Moreover, comfortable public spaces can promote physical activity and healthy living, as individuals are more likely to spend time in these spaces if they feel comfortable and relaxed (WHO, 2018).

4.5 Pleasurability

Pleasurability is a crucial characteristic for better quality public spaces, as it contributes to the overall enjoyment and satisfaction of individuals using these spaces. Pleasurable public spaces are designed to engage individuals and create a sense of joy and happiness (Connel and Meyer, 2010), which can lead to a more positive user experience and contribute to a more vibrant community.

Recent studies have shown that pleasurability can have significant benefits for individuals and communities. For instance, White et al. (White et al, 2018) found that exposure to pleasurable environments, such as parks and gardens, can improve mental health and overall wellbeing. Similarly, Pretty et al. (2005) found that well-designed public spaces that incorporate play and interactive elements can lead to increased social interaction and community building.

There are several ways to promote pleasurability in public spaces. One way is to create and promote streets and public spaces, especially for the most vulnerable. Another way is to tap into the community and encourage them to share their experience in their use of public space. Finally, investing in a robust community process that includes “Lighter, Quicker, Cheaper” design experiments, and in ongoing public space management to ensure that design and programming both continuously evolve in response to community needs can also help to promote pleasurability in public spaces (Carmona, 2019).

5. Case Study

Historic Jeddah is situated in the heart of the city and is a significant location in Jeddah. The area is demarcated by primary gates that marked the borders of Historical Jeddah. At the time, the word "Hara," which means neighborhood, was used. Each of the four neighborhoods that constitute the study area has a meaning behind its name (Figure 2).

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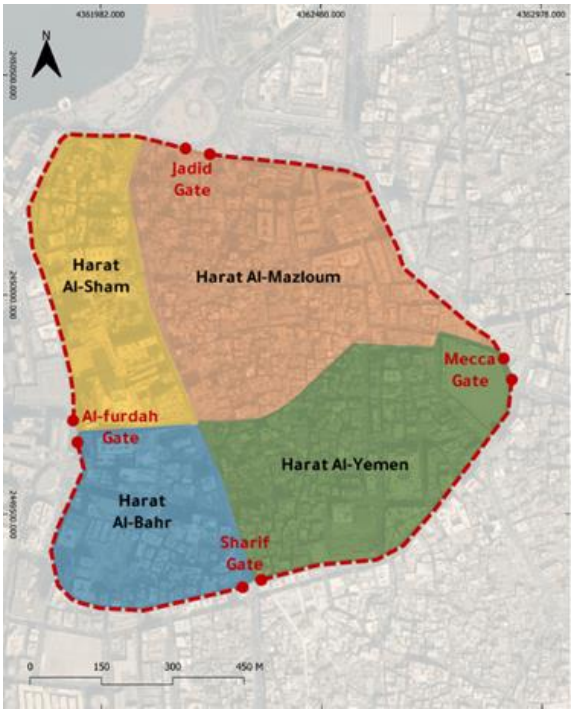
- Harat Al-Mazloum is the oldest neighborhood in the city and is located northeast of historical Jeddah. It was named after Mr. Abdul Karim Al-Barzanji, who was wrongfully killed by the Ottomans.
- Harat Al-Yemen is situated in the southern part of historical Jeddah and received its name due to its direction towards Yemen.
- Harat Al-Sham is located in the north of historical Jeddah and was named after its direction towards the Levant.
- Harat Al-Bahr is situated southwest of historical Jeddah and was named because of its proximity to the sea.

Figure 2. **Historical Jeddah's Map**

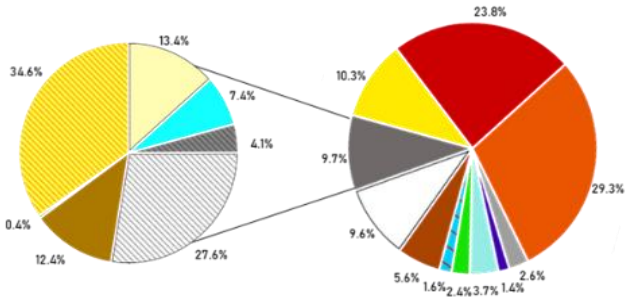


Source: Elaborated by authors.

5.1 *Land use*

Based on the field survey results of the study area, residential commercial use accounts for 29% of the area, while commercial use accounts for 23% (Figure 3). The highest percentage of land use is for commercial and residential purposes (Figure 4). These uses are primarily concentrated in the central and southern parts of the region, as historically the central region was primarily a housing area and market. Vacant land comprises 9.6% of the total area, estimated at 4.8 hectares, while open spaces constitute 2.4%.

Figure 3. **Land Use Ratios**



Source: Elaborated by authors.

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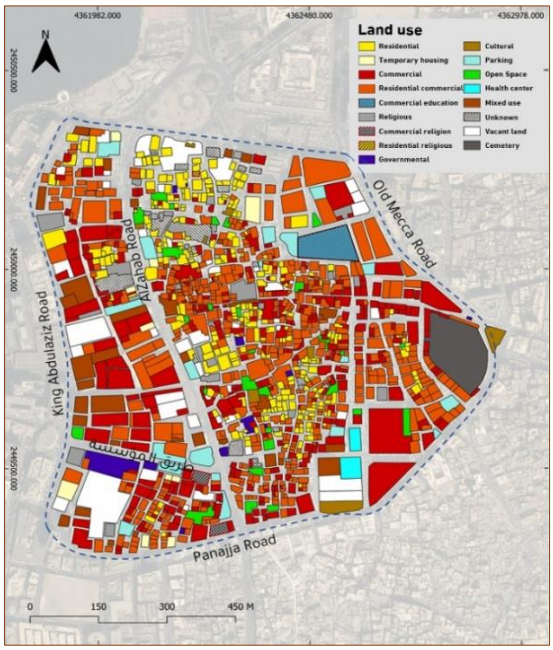
Figure 4. **Land Use Map**

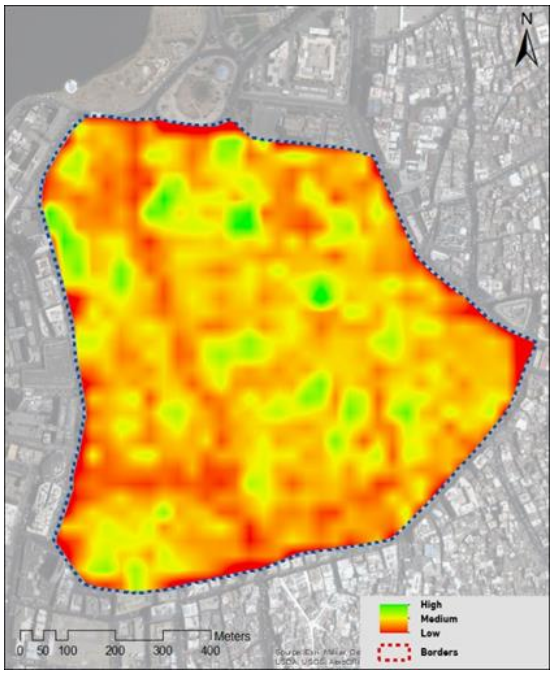


Source: Elaborated by authors.

5.2 *Vegetation analysis (NDVI - 2022)*

The indicator is calculated by measuring the contrast of chlorophyll reaction properties in plants with electromagnetic radiation. Based on the index values, it can be observed that a substantial portion of the region lacks vegetation. However, there are also several open spaces in the protective zone of the study area that contain vegetation. The index data also indicates the presence of numerous open spaces that are devoid of significant plant life (Figure 5). Additionally, the absence of vegetation in the southeast of the area is attributed to the presence of a cemetery.

Figure 5. **Result of the vegetation index (NDVI – 2022)**



Source: Elaborated by authors.

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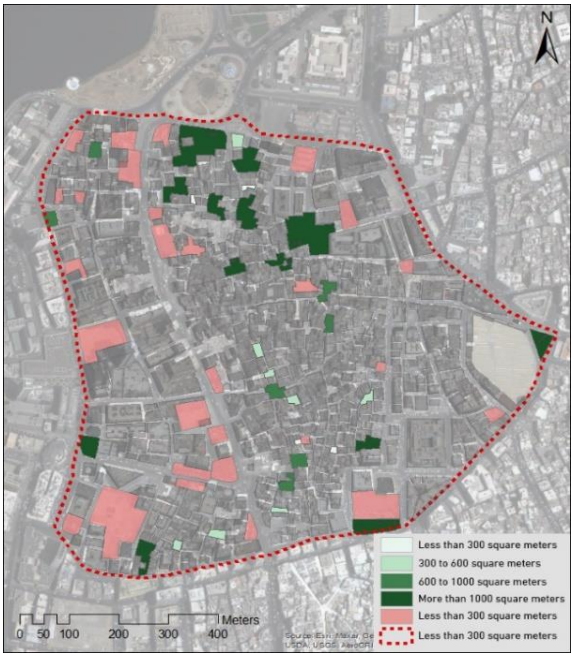
5.3 *Open spaces in the study area*

Using the Geographic Information Systems (GIS) program, the open spaces in the historical area were categorized according to their size, into two categories: existing open spaces and areas that have the potential for creating open spaces, as presented in Figure 6.

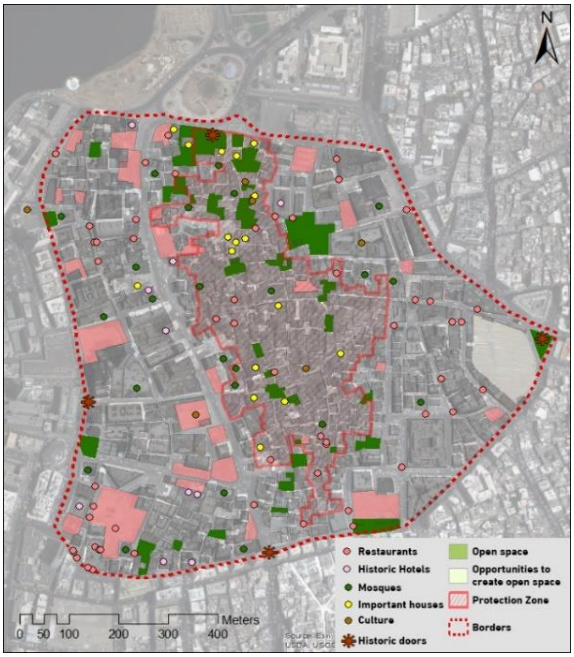
Figure 6. **Goals in the region and its relationship to open spaces**



Source: Elaborated by authors.

The overall size of the existing open spaces in the historical area is 4 hectares, and there is a possibility to develop open spaces in an additional 6 hectares of currently unused space (Figure 7).

Figure 7. **Existing open spaces and opportunities to create open spaces**



Source: Elaborated by authors.

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6. Classification of open spaces

The author conducted a thorough study of several public spaces in Historic Jeddah, utilizing structured and semi-structured observations at different times of day, week, and year. Interviews and surveys were conducted with individuals who used these spaces. Through these empirical studies, the author gained insight into the detailed usage patterns of urban public spaces and identified specific characteristics that contribute to their performance.

The observations and user feedback from these studies also shed light on the significance of various characteristics of the spaces. To evaluate the quality of traditional public spaces, such as streets, plazas, squares, and small urban parks, the author developed a Public Space Index (PSI) based on the five dimensions of public space previously discussed. The Public Space Index (PSI) comprises 30 sub-criteria that are used to evaluate the five dimensions of public space (Table 1).

Table 1. **Public space index: Dimensions, sub-criteria, and measuring criteria**

Dimension of public space	Sub-criteria	Measuring method
Inclusiveness	Presence of people of diverse ages/genders/classes/races	Determined by observations
	Presence of people with diverse physical abilities	Determined by observations
	Control of entrance to public space	Determined by observations
	Range of activities and behaviours	Determined by observations
	Perceived ability to conduct and participate in activities and events in space	User's subjective rating
	Perceived openness and accessibility	User's subjective rating
Meaningful activities	Presence of community-gathering third places	Determined by observations
	Range of activities and behaviours	Determined by observations
	Space flexibility to suit user needs	Determined by observations
	Variety of businesses and other uses at the edges of the space	Determined by observations
	Perceived suitability of space layout and design to activities and behaviour	User's subjective rating
	Perceived usefulness of businesses and other uses	User's subjective rating
Comfort	Places to sit without paying for goods and services	Determined by observations
	Seating provided by businesses	Determined by observations
	Climatic comfort of the space—shade and shelter	Determined by observations
	Design elements discouraging use of space	Determined by observations
	Perceived physical condition and maintenance appropriate for the space	User's subjective rating
	Perceived nuisance noise from traffic or otherwise	User's subjective rating
Safety	Visual and physical connection and openness to adjacent street/s or spaces	Determined by observations
	Physical condition and maintenance appropriate for the space	Determined by observations
	Lighting quality in space after dark	Determined by observations
	Perceived safety from presence of surveillance cameras, security guards, guides, ushers, etc. providing safety	User's subjective rating
	Perceived safety from traffic	User's subjective rating
Pleasurability	Presence of memorable architectural or landscape features (imageability)	Determined by observations
	Sense of enclosure	Determined by observations
	Permeability of building facades on the street front	Determined by observations
	Personalization of the buildings on the street front	Determined by observations
	Variety of elements on sidewalk/street providing sensory complexity	Determined by observations
	Perceived attractiveness of space	User's subjective rating
	Perceived interestingness of space	User's subjective rating

Source: Updated from Mehta, 2014.

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These criteria capture and measure both observed behaviour (use) and perceptions of public space. Out of the 30 sub-criteria, 20 (depending on the type of space) are observable and are rated by the researchers through direct observation of the space and the interactions between its occupants. The remaining 10 sub-criteria are perceptual and are rated by the people who use the public space. The scoring criteria for each variable are based on a rating scale ranging from 0 to 3, where 0 indicates very bad, 1 indicates bad, 2 indicates good, and 3 indicates very good.

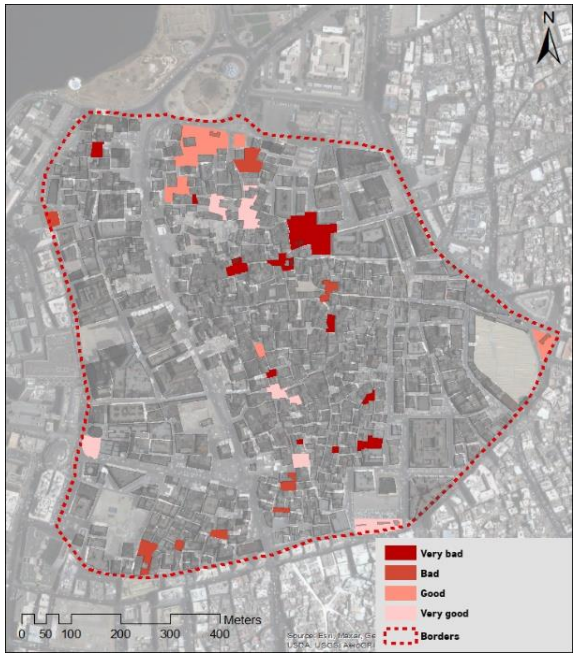
To ensure comprehensive data collection, a minimum of two researchers conduct independent visits to the public space at least six times, spread out over weekdays and weekends, and throughout the day to capture a diverse range of activities and behaviours. On-site, the researchers complete a survey that includes two parts. The first part is filled out by the researchers themselves, based on their observations of the characteristics of the space, its use, management, and interactions between the space and its users (Researcher input). The second part of the survey involves gathering input from users of the space directly at the public space (User input).

As the researchers observe the space at multiple times during the day and week, the results of the researcher input are averaged, and means are calculated to ensure accuracy and reliability in the data analysis process. This rigorous approach helps to capture a comprehensive understanding of the public space and its characteristics, usage patterns, and user perceptions.

6.1 *Classification of open spaces by inclusiveness index*

The inclusiveness index, which takes into account the accessibility of open spaces to different segments of the population, reveals that only 15.6% of the open spaces were classified as "good," while 34% were classified as "very bad." However, the protective zone exhibited a higher concentration of open spaces classified as "very good," indicating better accessibility for all (Figure 8).

Figure 8. **Classification of open spaces by inclusiveness index**



Source: Elaborated by authors.

6.2 *Classification of open spaces by meaningful activities index*

The meaningful activities index, which measures the potential for activities that contribute to social interaction and community building, shows that the largest percentage of open spaces, at 40.6%, were classified as "bad," while only 9.4% were classified as "good." Interestingly, the protective zone,

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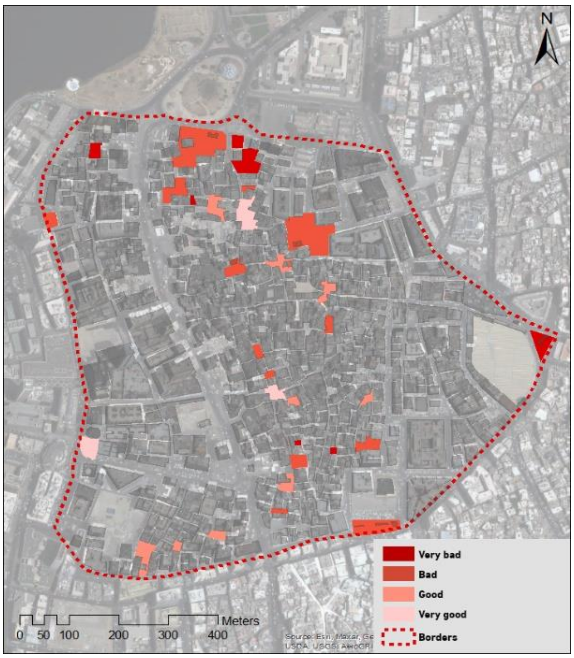
which is supposed to prioritize the community's well-being, displayed a concentration of open spaces with bad ratings, while the good ones were scattered across the central and southwestern parts of the region (Figure 9).

Figure 9. **Classification of squares by meaningful activities index**



Source: Elaborated by authors.

6.3 *Classification of open spaces by comfort index*

The comfort index, which considers factors such as shade, temperature, and noise levels, reveals that the highest percentage of open spaces, at 43.8%, were classified as "very bad," while only 9.4% were classified as "very good." This is particularly alarming, given the crucial role of open spaces in mitigating the effects of extreme heat in urban areas. Once again, the protective zone showed a concentration of open spaces with bad and very bad ratings, while the very good open spaces were mainly located in the southwestern area of the region (Figure 10).

6.4 *Classification of open spaces by safety index*

The safety index, which takes into account factors such as lighting, crime rates, and visibility, reveals that the highest percentage of open spaces with bad ratings, at 37.5%, were located in the central area of the region, while the lowest percentage of open spaces with very good ratings, at 12.5%, were located in the same area. Interestingly, the good open spaces were clustered towards the north of the protective zone, highlighting the importance of safety in promoting community use of open spaces (Figure 11).

6.5 *Classification of open spaces by Pleasurability index*

The pleasurability index, which measures the aesthetic appeal of open spaces and their potential for relaxation and enjoyment, reveals that the highest percentage of open spaces, at 37.5%, were classified as "bad," while only 12.5% were classified as "very good." Once again, the good open spaces were concentrated towards the north of the protective zone, while the center of the area had a concentration of bad open spaces (Figure 12).

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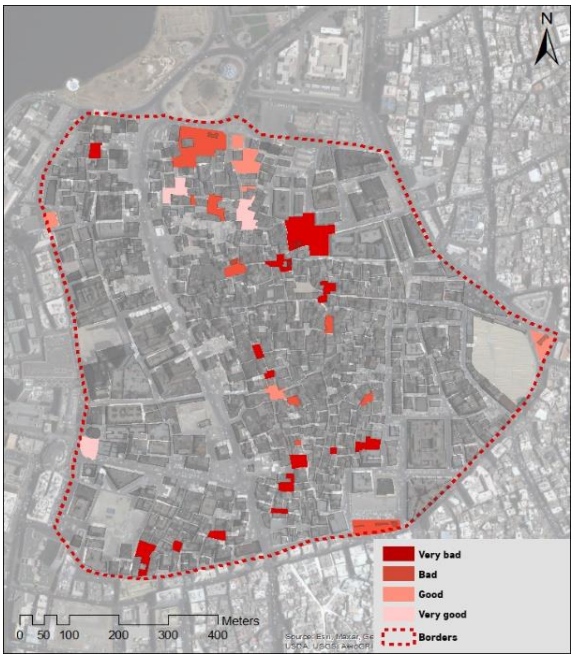
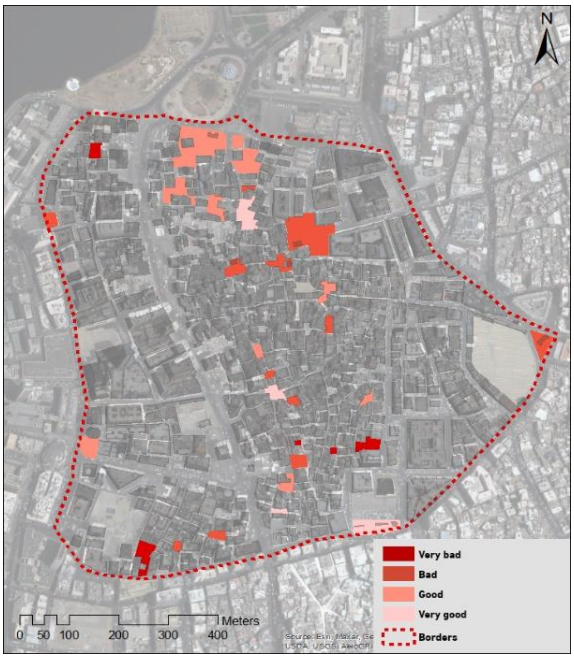
Figure 10. **Classification of squares by comfort index**



Source: Elaborated by authors.

Figure 11. **Classification of squares by safety index**



Source: Elaborated by authors.

6.6 *Classification of open spaces by the overall result of the index*

According to the index data, the highest percentage of open spaces with poor quality was 46.9%, while the lowest percentage of open spaces with very good quality was 9.4%. It is notable that the bad quality open spaces are concentrated in the northern region and extend towards the southwest (Figure 13).

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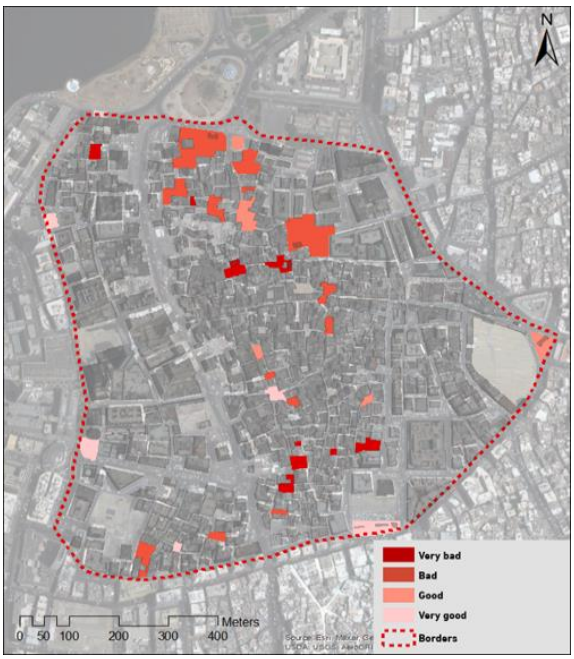
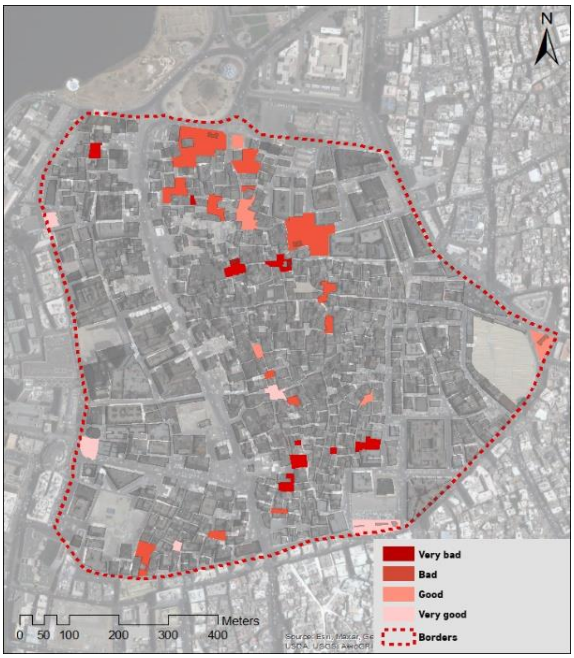
Figure 12. **Classification of squares by pleasurability index**



Source: Elaborated by authors.

Figure 13. **Classification of squares by the overall result of the index**



Source: Elaborated by authors.

The spider chart (Figure 14) compares and visualizes the performance or characteristics of the five dimensions of public space. It reveals the following results for the dimensions of inclusiveness, pleasurability, safety, comfort, and meaningful activities in the evaluated public spaces.

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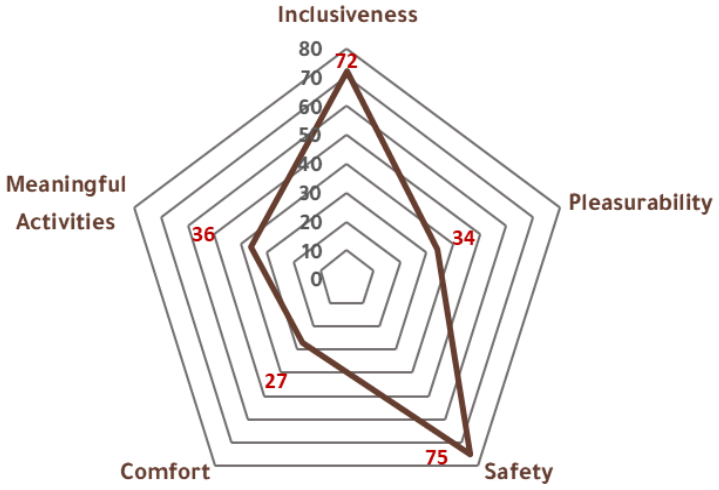
Figure 14. **A visual display of the results of the Public Space Index under investigation**



Source: Source: Elaborated by authors.

- Inclusiveness: The public spaces demonstrate a relatively high level of inclusiveness, as indicated by the score of 72. This suggests that the spaces are accessible and welcoming to a diverse range of individuals, accommodating their needs and promoting social interaction and integration.
- Pleasurability: The score of 34 suggests that there is room for improvement in terms of pleasurability within the public spaces. This dimension indicates that the space may lack certain elements or features that contribute to a more enjoyable and satisfying experience for its users. Enhancing aesthetics, amenities, and engaging activities could help improve the overall pleasurability.
- Safety: The public space excels in terms of safety, as indicated by the score of 75. This suggests that the spaces have implemented effective measures and design features to ensure the well-being and security of its users. They provide a secure environment, minimizing risks and hazards, and promoting a sense of safety and comfort.
- Comfort: The score of 27 suggests that the public spaces may have limitations in terms of providing comfort to its users. Areas such as seating arrangements, shade, cleanliness, and temperature control might require attention to enhance the overall comfort level. Improving these aspects can contribute to a more pleasant and enjoyable experience for visitors.
- Meaningful activities: The score of 36 indicates that there is potential for improvement in terms of offering meaningful activities within the public spaces. This dimension refers to the availability of events, programs, and opportunities for individuals to engage in activities that enrich their experiences and create a sense of connection and purpose. Incorporating more diverse and engaging activities could enhance the meaningfulness of the space.

These results provide insights into the strengths and weaknesses of the public space across different dimensions. The analysis can guide future efforts to improve the overall quality and experience of the public space by focusing on enhancing areas such as pleasurability, comfort, and the provision of meaningful activities while maintaining the positive aspects of inclusiveness and safety.

7. Conclusion

The results obtained from the classification of open public spaces using different indices provide significant insights into the quality of open spaces in the historical district of Jeddah. The analysis highlights several key findings that have implications for the development and management of these spaces.

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Firstly, the inclusiveness index reveals a concerning trend, with a large percentage of open spaces classified as "very bad" in terms of inclusiveness. This indicates a lack of accessibility and amenities that cater to the diverse needs of the community. Conversely, the protective zone stands out as an area with a high concentration of "very good" open spaces, suggesting successful inclusivity measures in that specific region.

Secondly, the meaningful activities index shows that a significant proportion of open spaces are classified as "bad," particularly in the protective zone. This indicates a lack of engaging and purposeful activities within these spaces. On the other hand, the presence of "good" spaces dispersed throughout the central and southwestern regions highlights the potential for more diverse and meaningful activities in those areas.

Furthermore, the comfort index reveals a pressing issue with the comfort levels of open spaces. The highest percentage of spaces falls under the "very bad" category, indicating shortcomings in providing adequate amenities, shade, seating, and other comfort-related factors. The protective zone displays a concentration of "bad" and "very bad" spaces, suggesting the need for targeted improvements. Conversely, the presence of "very good" spaces mainly in the southwestern part of the region demonstrates the positive impact of well-designed and well-maintained spaces.

In terms of safety, the analysis of the safety index reveals that the central area of the region has the highest percentage of open spaces rated as "bad" in terms of safety. This raises concerns about potential hazards or inadequate security measures in those spaces. However, the northern part of the protective zone showcases a concentration of "good" spaces, indicating successful safety measures in that specific area.

Lastly, the Pleasurability index demonstrates a significant concentration of "bad" open spaces, while "very good" spaces are predominantly found in the northern part of the protective zone. This indicates the need to address factors that contribute to the lack of enjoyment and satisfaction within the open spaces, such as aesthetics, amenities, and recreational opportunities.

These findings collectively highlight the importance of comprehensive strategies in the development and management of public spaces in the historical Jeddah district. There is a clear need to prioritize the well-being, inclusiveness, and safety of the community. Additionally, the unique challenges posed by the extreme heat and rapidly changing urban landscape in the region should be taken into account.

To address the identified issues, strategies should focus on improving inclusivity through better accessibility, amenities, and provisions for diverse user groups. The development of more engaging and purposeful activities can enhance the meaningfulness of the open spaces. Attention should also be given to improving comfort levels by providing shade, seating, and other amenities. Enhancing safety measures and implementing proper maintenance protocols are vital for creating a secure environment within the public spaces. Additionally, efforts should be made to enhance the overall pleasurability of the spaces by considering aesthetics, recreational opportunities, and user preferences.

By implementing these comprehensive strategies, the quality and appeal of open public spaces in the historical Jeddah district can be significantly enhanced, resulting in a more vibrant and enjoyable environment for the community.

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Authorship

Dr. Ayman Imam played a crucial role in the conceptualization and design of the research, while Dr. Mansour Helmi took the lead in analyzing the collected data. Mr. Amr Alkadi actively participated in the data collection process, ensuring its accuracy and completeness. Additionally, Dr. Ibrahim Hegazy played a vital role in the writing and revision of the research work, contributing significantly to its development.

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