JSA Journal of Salutogenic Architecture

Original Scientific Paper **Journal of Salutogenic Architecture**

2025, Volume 4, Issue 1, pages 279–291; https://doi.org/10.38027/jsalutogenic_vol4no1_16

How Can User-Oriented Evaluation Enhance Public Space Design? Insights from the Üsküdar Waterfront

[1] **Seher Başaran**, [2] **Melody Safarkhani**

[1] Department of Architecture, Graduate School, Istanbul Okan University, Turkey
sahfaramarzpour@stu.okan.edu.tr
http://orcid.org/0009-0003-4500-2798

[2] Department of Architecture, Faculty of Art, Design and Architecture, Istanbul Okan University, Turkey
melody.safarkhani@okan.edu.tr
https://orcid.org/0000-0001-6363-9328

Abstract

User-oriented public spaces are central to urban livability, as they address diverse needs, preferences, and everyday experiences while fostering inclusivity, accessibility, functionality, and comfort. These qualities enhance well-being and support sustainable urban development. Aligned with this perspective, the present study conducts a user-oriented post-occupancy evaluation of the regenerated Üsküdar waterfront in Istanbul, a historically layered district undergoing significant transformation. While urban waterfront regeneration is typically assessed through ecological, design, or economic lenses, socially grounded and user-oriented evaluations remain limited. This study addresses that gap by examining user perceptions across four key dimensions: demographic diversity, accessibility, spatial functionality, and environmental quality, using a structured questionnaire. Based on survey data from 100 users and supported by statistical analysis, the findings reveal strengths in aesthetic quality and multimodal accessibility, particularly through effective landscape design and integration with public transport. However, notable deficiencies persist in disability inclusion, sanitary infrastructure, safety, and comfort. These results underscore the importance of aligning physical interventions with users' lived experiences. By placing user experience at the center of evaluation, the study offers actionable insights to guide more inclusive, responsive, and sustainable waterfront development in Istanbul and other similarly evolving urban contexts.

Keywords: Public Space Design, Post-occupancy evaluation, Sustainable Development, User-Oriented approach, Üsküdar Waterfront.

Article History:
Received: 21 February 2025
Revised: 13 July 2025
Accepted: 29 July 2025
Available online: 5 August 2025

1. Introduction

Urban open public spaces are increasingly recognized as vital components of urban life that support social interaction, cultural expression, economic activity, and environmental sustainability (Mehta, 2014; Eltarabily, 2022). Defined as publicly accessible areas where individuals engage in a variety of activities, either alone or in groups (Li et al., 2022), these spaces contribute to urban identity and cohesion by enabling shared experiences among people from diverse backgrounds (Zhu et al., 2025). Beyond their ecological value, such as mitigating urban heat islands, enhancing biodiversity, and promoting climate resilience, they also foster civic engagement through recreation, political expression, and community participation (Qi et al., 2024). Urban public space is not merely a physical location, but a socio-political construct shaped by ownership, management, and use (Low & Smith, 2006; Mehta, 2014). As the spatial setting of the public sphere, it facilitates everyday interactions across different social groups, promoting inclusivity, cultural exchange, and democratic engagement (Carmona, 2010). The design and quality of public spaces significantly influence how they are

experienced, shaping a collective sense of belonging and community (Bodnar, 2015; Carmona et al., 2008).

Urban waterfronts exemplify the evolving role of public space in contemporary cities, merging ecological value with social and cultural significance. Urban waterfronts, conventionally associated with industrial uses, have been reimagined as inclusive destinations supporting leisure, environmental education, and community engagement (Zhu et al., 2025). Their proximity to water enhances both ecological resilience and experiential quality, making them strategic locations for urban regeneration. As Marshall (2004) highlights, waterfronts form a vital interface between the built environment and nature. No longer peripheral, they now serve as key public realms that strengthen urban identity and foster environmental awareness. A recent study has also underscored the shifting approaches to redeveloping these spaces. Tommarchi (2025, p. 6) proposes an updated typology of waterfront redevelopment strategies, identifying five key models: "tertiary-led, culture-led, event-led, late neoliberal, and holistic." Tertiary-led approaches from the 1980s–1990s focused on commercial development driven by deregulated planning and global capital. Culture-led strategies used museums and cultural venues to stimulate regeneration. Event-led redevelopment, centered on large-scale events, often leaves behind underutilized infrastructure. Since the 2000s, late neoliberal projects have emphasized luxury and speculative investment, frequently leading to exclusion and a loss of maritime identity. In contrast, holistic approaches promote sustainability, affordability, and the integration of port-related or productive uses. Expanding on this, Fageir (2021) argues that waterfront regeneration processes often evolve through distinct phases shaped by shifting governance models, development priorities, and external economic pressures. While such efforts can enhance the physical environment and urban image, they also risk undermining cultural heritage and design quality when driven primarily by private investment. Sustaining long-term value requires balanced, publicly guided strategies that integrate urban design, heritage preservation, and inclusive planning. This evolution aligns with a broader shift in urban planning toward inclusive, high-quality spaces that prioritize user experience and sustainability. A user-oriented approach supports this shift by ensuring that public spaces address the diverse needs of urban populations. Recognizing that spatial experiences are shaped by socio-demographic and cultural factors, it emphasizes accessibility, safety, and psychological and physical comfort (Alidoust, 2024). In waterfront contexts, this approach fosters belonging, mitigates exclusion, and advances goals of equity, participation, and environmental responsibility.

Although the literature on urban waterfront regeneration addresses a broad range of themes, including spatial design, economic revitalization, heritage preservation, ecological resilience, socio-cultural dynamics, and tourism development (Gospodini, 2001; Jones, 2017; Ciampa et al., 2021; Al-Saud & Goussous, 2023; Chen et al., 2024), studies that evaluate these spaces through the lens of everyday user experience remain limited. Addressing this gap, Shi et al. (2023) examined public satisfaction with a redeveloped waterfront, emphasizing the influence of service quality, spatial design, and perceived value on user expectations. Their findings highlight the importance of user-oriented planning in fostering public support and ensuring the long-term success of waterfront regeneration efforts. However, much of the existing research continues to prioritize planning objectives and intended outcomes, offering limited insight into how individuals perceive, access, and interact with these spaces in daily life. This gap constrains a comprehensive understanding of whether such environments genuinely support inclusivity, accessibility, and responsiveness. The issue is particularly pronounced in rapidly transforming urban contexts such as Istanbul, where aesthetic enhancement and tourism-driven agendas often take precedence over everyday usability and social equity.

In this light, Istanbul presents a particularly compelling context for examining user-oriented public space development, especially within its recent waterfront regeneration projects. As a transcontinental metropolis bridging Europe and Asia, the city reflects complex layers of historical, cultural, and spatial transformation. The Üsküdar district, located on the Asian shore of the Bosporus, exemplifies this evolution. Once primarily valued for its religious and historical landmarks, the area has recently undergone significant redevelopment aimed at improving environmental quality, accessibility, and recreational use. These efforts align with broader urban trends toward inclusive and sustainable development. This study examines the regenerated Üsküdar waterfront employing a user-oriented post-occupancy evaluation (POE) framework. POE assesses user perceptions, identifies areas for

enhancement, and provides evidence-based recommendations to strengthen the space's inclusivity, functionality, and long-term sustainability (Ridings & Chitrakar, 2021). In doing so, it contributes actionable insights to support the ongoing enhancement of the waterfront as an inclusive, accessible, and responsive public space that meets the diverse needs of its users and reinforces its significance within Istanbul's urban fabric. To guide this investigation, the study addresses the following research questions:

1. How do users perceive and experience the regenerated Üsküdar waterfront in terms of inclusivity, accessibility, environmental quality, and spatial functionality across diverse socio-demographic groups?
2. How can a user-oriented post-occupancy evaluation inform evidence-based strategies to enhance the functionality, responsiveness, and long-term sustainability of urban waterfront public spaces?

As illustrated in Figure 1, the study follows a sequential research design. It begins by establishing a theoretical foundation through a literature review on urban public spaces and waterfronts, with a focus on user-oriented principles and the specific context of the Üsküdar waterfront. This is followed by: (II) the development and implementation of a user-oriented POE using a structured questionnaire; (III) statistical analysis of the collected data via SPSS; and (IV) the formulation of evidence-based recommendations to inform sustainable urban development strategies for the Üsküdar waterfront.

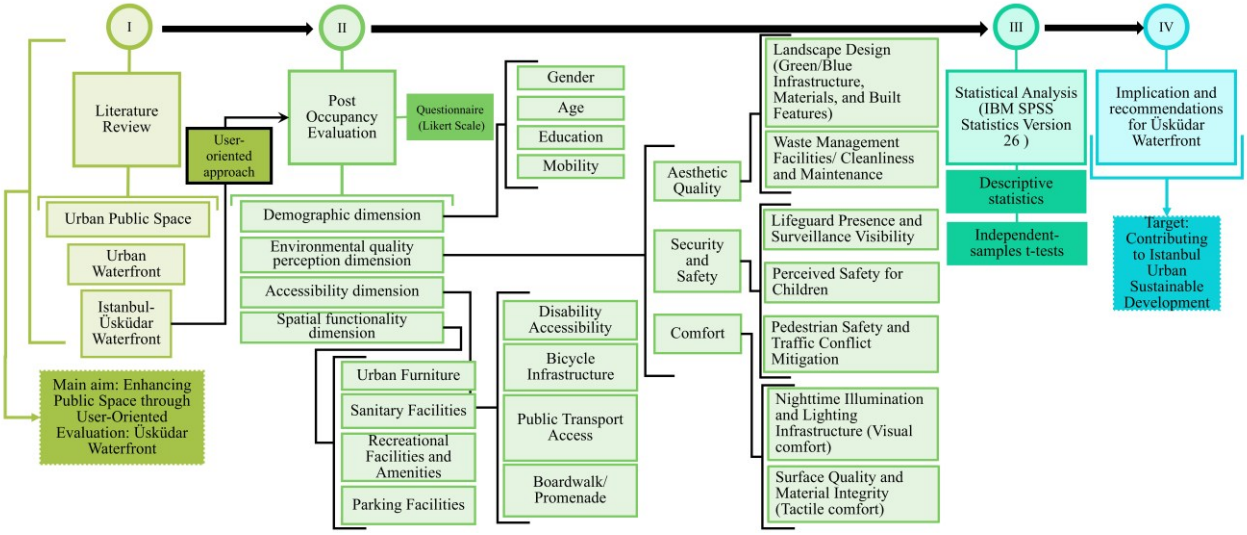

Figure 1. Structure of the Study.

2. Theoretical Framework: User-Oriented Approaches in The Context of Public Spaces

A user-oriented approach to public space design prioritizes the experiences, behaviors, and needs of individuals who interact with urban environments, positioning users as central to the creation of inclusive, functional, and meaningful places (Mehta, 2014). Unlike traditional design models, which emphasize visual form or technical efficiency, user-oriented strategies consider public space as a lived and socially constructed environment shaped by routine activities, emotional attachment, and cultural expression (Carmona, 2010). This perspective underscores the need for public spaces to support a range of everyday interactions and serve diverse populations with different abilities, identities, and socio-economic backgrounds (Alidoust, 2024). Whyte (1980) highlights the importance of understanding human behavior, including how people sit, walk, gather, and pause, in evaluating spatial success. User-oriented approaches intersect with spatial justice by recognizing that design must actively address equity, accessibility, and representation (Low et al., 2005; Soja, 2010). Moreover, participation is a foundational principle in user-oriented frameworks. Involving users as co-creators in shaping public space enhances legitimacy, fosters belonging, and results in more adaptable, context-sensitive outcomes (Sanoff, 2000; Evers et al., 2023). As Sahtout et al. (2024) suggest, user-oriented public spaces are those that respond to the physical, emotional, and social dimensions of use, ensuring that public environments are not only efficient and sustainable but also inclusive, responsive, and human-centered. Within a user-oriented framework, the

experience of public space is shaped by multiple, interrelated dimensions, including demographic characteristics, accessibility, spatial functionality, and environmental quality perception. These dimensions are intricately interconnected, each impacting the way individuals access, perceive, and engage with public environments. Recognizing and integrating these dimensions is essential to ensuring that the design of public spaces accurately reflects the lived experiences and diverse needs of their users (Alsallomy & Polat, 2021). To operationalize this framework, this study organizes user-oriented evaluation into four interrelated dimensions:

- Demographic dimension: This dimension addresses how demographic diversity, such as age, gender, income level, and cultural identity, influences user interaction with public space. These factors introduce distinct needs, preferences, and constraints. To create equitable and inclusive environments, urban designers must account for these differences from the outset, ensuring that public spaces are responsive to a broad range of user profiles and lived realities (Xie & Lu, 2020).
- Accessibility dimension: This dimension is not limited to physical entry but also includes social, cognitive, and economic aspects. Physical accessibility involves mobility-friendly infrastructure. Social accessibility relates to inclusivity and representation. Cognitive accessibility refers to the clarity and intuitiveness of spatial layouts, and economic accessibility concerns affordability and cost-related barriers. These components collectively determine how welcoming and usable a space is, influencing social interaction and participation (Friman et al., 2020). Despite growing global recognition of universal design principles and accessibility standards, there remains a significant gap between policy frameworks and actual implementation, particularly in developing countries and medium-sized towns. The study emphasizes that inclusive public open space design must go beyond physical accessibility, incorporating social, cultural, economic, and policy dimensions to ensure equitable access for all user groups (Gupta et al., 2025).
- Spatial functionality dimension: This dimension refers to how effectively a public space supports diverse and evolving functions. It includes not only performance and usability but also adaptability to users' changing needs. Well-functioning public spaces encourage social interaction, accommodate a variety of activities, and contribute to the overall quality of daily urban life. Key components such as recreational infrastructure, service facilities, and supporting amenities play a crucial role in enhancing functionality and user satisfaction (Paksoy & Colakoglu, 2014; Peng et al., 2023).
- Environmental quality perception dimension: This dimension involves users' assessments of comfort, safety, cleanliness, and landscape aesthetics. These subjective evaluations significantly influence emotional attachment and the willingness to use a space. Poor maintenance or perceptions of insecurity can discourage use, whereas well-maintained and visually pleasing environments foster a sense of trust and belonging (Ríos-Rodríguez et al., 2021; Dane et al., 2024).

By applying this multidimensional lens, the present study seeks to capture the full spectrum of user experiences in public space. This approach aligns with contemporary urban planning principles that emphasize inclusivity, participation, and evidence-based design. It ensures that public spaces respond to the realities of diverse populations and contribute to sustainable, human-centered urban development.

3. Üsküdar Waterfront as a Regenerated Public Space

Building on the user-oriented framework outlined, the Üsküdar waterfront serves as an important setting for examining how such principles are interpreted in contemporary urban regeneration efforts. Located on the Asian side of Istanbul along the Bosphorus Strait, Üsküdar is a historically significant district that connects Europe and Asia through multiple transport modes, including sea, rail, and road (Seçmen & Türkoğlu, 2021). The area presents a layered urban fabric, where historical elements such as Ottoman-era mosques, fountains, and squares coexist with new residential developments, reflecting the broader socio-cultural transformations of Istanbul. Its population, which is approximately half a million, is composed of long-term residents, students, workers, and retirees, making it a socially and demographically complex district (Seçmen & Türkoğlu, 2021). The waterfront, which previously functioned primarily as a transportation corridor dominated by ferry infrastructure, has recently undergone physical redevelopment. These changes aim to transform the area into a more pedestrian-friendly and multi-use public space.

Interventions have included continuous promenades, landscaped areas, recreational amenities, and improvements in accessibility (Üzümcüoğlu & Polay, 2024). While these physical modifications align with current global trends in waterfront urbanism, their actual impact on everyday user experience and inclusivity remains to be systematically evaluated. The current form of the waterfront suggests an intention to serve various functions, including ecological enhancement, social interaction, and cultural engagement. Elements such as green infrastructure, public seating, walking paths, and visual links to historic landmarks imply a design approach informed by accessibility, environmental quality, and spatial functionality. However, whether these interventions align with user expectations, support inclusive access, and effectively meet the needs of the district's diverse population has not yet been empirically assessed. Therefore, this study approaches the Üsküdar waterfront not as a finalized achievement, but as an evolving public space that requires ongoing evaluation. This user-oriented POE examines strengths and potential mismatches between design and use to inform more grounded public space development along the Üsküdar waterfront in Istanbul.

4. Methodology

4.1. Study Design

This study uses a quantitative cross-sectional design within a user-oriented POE to evaluate perceptions of the regenerated Üsküdar waterfront. This approach effectively captures diverse users' feedback, essential for assessing newly revitalized public spaces. The POE methodology is grounded in the principles of user-oriented public space design, emphasizing inclusivity, functionality, and experiential quality. Four primary dimensions were examined in the evaluation. First, demographic characteristics were collected to contextualize user responses, including variables such as age, gender, educational background, and mobility status. Second, the accessibility dimension captured perceptions related to inclusive design and connectivity, such as the presence of ramps, bike lanes, and access to public transportation. Third, spatial functionality was assessed by evaluating the adequacy and condition of infrastructural elements like seating areas, restrooms, recreational equipment, and parking facilities. Lastly, environmental quality perception was explored through three subdimensions: aesthetic quality, which included assessments of landscape design, material usage, and overall visual coherence; safety and security, focusing on factors like perceived safety, surveillance presence, and child safety; and comfort, encompassing elements such as lighting, surface quality, and overall user convenience. To measure these variables, a structured and context-sensitive questionnaire was designed, drawing on validated tools from existing public space evaluation literature and tailored to the specific characteristics of the Üsküdar site. All survey items were close-ended and rated on a 5-point Likert scale (1 = strongly disagree/very poor to 5 = strongly agree/very good), enabling systematic quantification of user perceptions for comparative and statistical analysis.

4.2. Data Collection and Analysis

Purposive sampling was employed to recruit participants who were actively using the Üsküdar waterfront during the study period. Data were collected over 10 consecutive days in winter 2025, covering mornings, afternoons, and evenings on both weekdays and weekends to ensure temporal variation. Survey locations were rotated systematically every three hours to capture diverse user profiles, and attention was given to balancing the gender of survey administrators to minimize response bias. The finalized dataset was coded and analyzed using IBM SPSS Statistics Version 26, following a structured four-stage process aligned with the study's key evaluation dimensions: demographics, accessibility, spatial functionality, and environmental quality perception. In this study, descriptive statistics were used to summarize the data, including means, standard deviations, frequencies, and percentages. Average scores across evaluation dimensions were calculated to identify general trends in user perceptions. Inferential statistics were applied to examine significant differences and associations. Independent-samples t-tests were conducted to compare mean scores across demographic groups, while Pearson correlation coefficients were used to

assess relationships between the evaluation dimensions. Statistical significance was evaluated at the $p < 0.05$ and $p < 0.01$ levels.

5. Results

5.1. Statistical Analysis Result of Demographic Dimension

A total of 100 valid responses were collected for the study. The gender distribution was relatively balanced, with 52% identifying as female, 45% as male, and 3% preferring not to disclose their gender. The age distribution shows that the largest group of respondents (54%) fell within the 30–49 age range, a cohort often associated with active engagement in urban public life. An additional 32% were aged 20–29, indicating that the waterfront primarily attracts socially and economically active users. Younger individuals (13–19) and older adults (50 and above) were less represented in the sample. In terms of educational attainment, the sample reflected a relatively high level of education. Over 80% of respondents were university students, graduates, or s, suggesting a more informed or critically engaged user base. Only 19% had a high school education or lower. Regarding physical accessibility, 15% of participants reported having a mobility disability, emphasizing the need for inclusive and barrier-free public space design. The results of the statistical analysis of the demographic dimension are presented in Table 1.

Table 1. Results of the statistical analysis of the demographic dimension.

Category	Variable	Frequency	Percentage (%)
Gender	Male	45	45.0
	Female	52	52.0
	Prefer not to say	3	3.0
	Total	100	100.0
Age	13–19	6	6.0
	20–29	32	32.0
	30–49	54	54.0
	50–64	7	7.0
	65 and older	1	1.0
	Total	100	100.0
Education	No formal education	1	1.0
	High school and lower	7	7.0
	High school graduate	11	11.0
	University student	28	28.0
	University graduate	27	27.0
	Postgraduate (Master, PhD)	26	26.0
	Total	100	100.0
Mobility	Yes	15	15.0
	No	85	85.0
	Total	100	100.0

5.2. Statistical Analysis Results of Accessibility Dimension

Accessibility emerged as a central focus in the user evaluation of the Üsküdar waterfront public space, given its foundational role in promoting inclusivity and determining the overall effectiveness of urban regeneration initiatives. In contemporary urban design, accessibility is not only a matter of physical entry but also a key determinant of how equitably public spaces serve diverse populations. In this study, the accessibility dimension was evaluated across four key indicators: disability accessibility, bicycle infrastructure, public transport access, and the boardwalk/promenade. These features represent critical elements of the physical environment, directly influencing how comfortably and comprehensively users can navigate, utilize, and benefit from the regenerated waterfront. Among these, disability accessibility received a mean score of $M = 3.00$ ($SD = 1.18$), with a t-value of 0.00 and $p = 1.000$, suggesting no statistically significant deviation from a neutral perception. This indicates that, on average, users were uncertain about the adequacy of infrastructure for individuals with mobility impairments. While some appreciated elements such as wide sidewalks and ramps, others expressed concerns regarding missing tactile paving and steep gradients, highlighting the ongoing need for more inclusive and responsive design interventions. In contrast, public transport access received the most favorable evaluation ($M = 3.96$, $SD = 0.94$), $t = 7.71$, $p < .001$, reflecting strong user satisfaction with the area's multimodal connectivity. The ease of reaching the waterfront through Istanbul's integrated bus, ferry, and rail systems, particularly the proximity to Marmaray and ferry

stations, appears to have contributed significantly to this positive perception. Likewise, the boardwalk/promenade received a mean score of M = 3.61 (SD = 0.94), t = 4.93, p < .001, pointing to generally favorable impressions of walkability and the continuity of pedestrian infrastructure along the shoreline. These features not only support everyday movement but also foster social interaction and recreational engagement. Bicycle infrastructure was also positively rated (M = 3.53, SD = 1.11), t = 3.66, p = .001, indicating that users valued the provision of cycling paths and bike-friendly amenities. This suggests an increasing appreciation for alternative and sustainable mobility options that expand the inclusivity and usability of the space. Taken together, the results demonstrate strong performance in terms of public and active transport infrastructure, yet they also reveal a clear gap in disability-related accessibility. Addressing this disparity through targeted interventions could substantially improve the inclusiveness of the waterfront. The detailed results of the statistical analysis for the accessibility dimension are presented in Table 2.

Table 2. Results of statistical analysis of the accessibility dimension.

Feature	Mean score	Std. Dev	t-value	p-value
Disability Accessibility	3.00	1.18	0.00	1.000
Bicycle Infrastructure	3.53	1.11	3.66	0.001
Public Transport Access	3.96	0.94	7.71	< .001
Boardwalk/Promenade	3.61	0.94	4.93	< .001

5.3. Statistical Analysis Results of Spatial Functionality Dimension

Spatial functionality was evaluated based on four critical features of the Üsküdar waterfront environment: urban furniture, sanitary facilities, recreational facilities and amenities, and parking facilities. These elements directly influence how well the space accommodates users' physical needs, comfort, and expectations for public infrastructure. The urban furniture component, encompassing elements such as benches, trash bins, and shade structures, received a favorable response. The mean score was M = 3.42 (SD = 0.94), with a t = 3.42 and p = .001, indicating a statistically significant positive perception. This suggests that the availability, distribution, and maintenance of street furniture were largely effective in supporting rest, orientation, and overall comfort for visitors along the promenade. Sanitary facilities, including public restrooms, showers, and changing areas, received notably lower evaluations. The mean score was M = 2.65 (SD = 1.15), with a t = -2.36 and p = .021, reflecting a statistically significant level of user dissatisfaction. Several factors may contribute to this negative perception, including limited availability, maintenance issues, lack of signage, or inaccessibility. These findings highlight the critical need to improve hygiene-related infrastructure to ensure user comfort and health. The assessment of recreational facilities and amenities, such as play areas, sports equipment, and open gathering spaces, yielded a mean score of M = 2.77 (SD = 1.14), with a t = -1.59 and p = .118. Although this score falls below the neutral midpoint, the difference is not statistically significant. This suggests that user opinions were somewhat divided. While some respondents may have appreciated the presence of open spaces or activity zones, others likely found them lacking in quality, variety, or accessibility. Enhancing the diversity and quality of recreational offerings could help strengthen engagement and satisfaction. Lastly, parking facilities received the lowest overall rating among the spatial features, with a mean of M = 2.64 (SD = 1.28), t = -2.13, p = .037. This statistically significant result indicates broad dissatisfaction with the available parking infrastructure. Respondents have experienced issues related to capacity, signage, accessibility, or proximity to key areas of the waterfront. As many urban visitors rely on private vehicles, inadequacies in parking provision can hinder overall usability and deter regular use. In conclusion, while certain elements such as urban furniture met user expectations, other components of spatial functionality, especially sanitary and parking facilities, were identified as areas needing substantial improvement. The findings point to a clear opportunity for targeted infrastructure enhancements to better support comfort, usability, and activity diversity within the regenerated waterfront. The full results are summarized in Table 3.

Table 3. Results of the statistical analysis of spatial functionality.

Feature	Mean Score	Std. Dev	t-value	p-value
Urban Furniture	3.42	0.94	3.42	0.001
Sanitary Facilities	2.65	1.15	-2.36	0.021
Recreational Facilities and Amenities	2.77	1.14	-1.59	0.118
Parking Facilities	2.64	1.28	-2.13	0.037

5.4. Statistical Analysis Result of Environmental Quality Perception

Environmental quality perception plays a crucial role in shaping how users engage with and assess public spaces. This section presents the results of seven environmental indicators, organized under three thematic dimensions: aesthetic quality, security and safety, and comfort. The findings presented in Table 4 reveal a mix of positive perceptions and areas requiring targeted improvement in the regenerated Üsküdar waterfront.

5.4.1. Aesthetic Quality

Aesthetic quality is a key factor shaping how users perceive and engage with public spaces, influencing both satisfaction and emotional connection. It encompasses visual appeal expressed through the built environment, natural elements, and material characteristics that enhance spatial identity, coherence, and sensory experience. In urban waterfronts, this quality contributes not only to identity and atmosphere but also to user satisfaction and repeated engagement. The post-occupancy evaluation revealed that users rated the aesthetic quality of the Üsküdar waterfront favorably. Landscape Design (Green/Blue Infrastructure, Materials, and Built Features) received the highest mean score among all assessed variables ($M = 3.72$, $SD = 0.96$, $t = 5.79$, $p < .001$), indicating strong satisfaction with the visual composition and spatial character of the site. This reflects positive impressions of the greenery, water features, and carefully selected materials, which together create a visually cohesive and ecologically enriched environment. Waste Management Facilities/Cleanliness and Maintenance was also rated positively ($M = 3.45$, $SD = 1.02$, $t = 3.43$, $p = 0.001$), suggesting that users generally appreciated the cleanliness and upkeep of the area. While occasional concerns such as bin overflow or uneven distribution may persist, the overall maintenance regime contributes positively to the space's appearance and usability. These findings underscore the importance of both design excellence and ongoing operational care in enhancing aesthetic experience. The synergy between natural and managed features reinforces the waterfront's visual appeal and supports a welcoming, comfortable public realm that strengthens users' emotional and sensory engagement.

5.4.2. Security and Safety

Security and safety are critical determinants of public space usability, directly shaping whether users feel confident, protected, and welcome. These dimensions encompass both physical infrastructures, such as surveillance, traffic control, and emergency preparedness, and perceived safety, particularly for vulnerable groups like children. The post-occupancy evaluation revealed notable deficiencies in this area. Lifeguard Presence and Surveillance Visibility received one of the lowest ratings ($M = 2.48$, $SD = 1.27$, $t = -3.09$, $p = .003$), indicating concerns about limited emergency preparedness and the low visibility of safety personnel. This suggests that users felt unassured about timely assistance, especially in areas adjacent to the water. Similarly, Perceived Safety for Children was rated poorly ($M = 2.43$, $SD = 1.29$, $t = -3.37$, $p = .001$), reflecting the lack of protective features such as fencing near water edges, age-appropriate signage, and secure play zones. These findings suggest that the waterfront is not fully equipped to support the needs of families with young children. Pedestrian Safety and Traffic Conflict Mitigation received a neutral score ($M = 2.96$, $SD = 1.22$, $t = -0.22$, $p = .829$), pointing to a mixed user experience. While some areas may offer sufficient pedestrian protection, others likely suffer from ambiguous crossings or inadequate separation from vehicular zones. These results highlight the need for targeted interventions to improve both perceived and actual safety. Enhancing emergency visibility, integrating child-specific safety infrastructure, and reinforcing pedestrian protections are essential steps toward fostering a secure, inclusive, and widely accessible public space.

5.4.3. Comfort

Comfort involves the environmental and sensory conditions that support a pleasant, accessible, and psychologically reassuring user experience. One of the central aspects of comfort is visual comfort, which encompasses adequate lighting, spatial legibility, and a sense of environmental clarity and safety. Nighttime illumination and lighting infrastructure received a moderately positive rating ($M = 3.29$, $SD = 1.08$, $t = 2.04$, $p = .046$), reflecting general user satisfaction. However, concerns were raised about underlit peripheral paths, dark transitional zones, and uneven light distribution, particularly among female and elderly users. These limitations impact both perceived safety and wayfinding at night, indicating a need for improved lighting strategies. Surface quality and material integrity, including tactile comfort, received a neutral evaluation ($M = 3.03$, $SD = 1.20$, $t = 0.22$, $p = .829$). While visually appealing due to new paving materials, users identified shortcomings such as slipperiness in wet conditions, insufficient textural contrast for individuals with visual impairments, and monotonous color schemes. These aspects diminish both sensory engagement and physical comfort, particularly for vulnerable populations. Together, the results suggest that while baseline comfort standards are met, refinements in visual and tactile design could significantly enhance user experience and inclusivity.

Table 4. Results of statistical analysis of the environmental quality perception dimension.

Category	Feature	Mean Score	Std. Dev	t-value	p-value
Aesthetic Quality	Landscape Design (Green/Blue Infrastructure, Materials, and Built Features)	3.72	0.96	5.79	< .001
	Waste Management Facilities/ Cleanliness and Maintenance	3.45	1.02	3.43	0.001
Security and Safety	Lifeguard Presence and Surveillance Visibility	2.48	1.27	-3.09	0.003
	Perceived Safety for Children	2.43	1.29	-3.37	0.001
	Pedestrian Safety and Traffic Conflict Mitigation	2.96	1.22	-0.22	0.829
Comfort	Nighttime Illumination and Lighting Infrastructure (Visual comfort)	3.29	1.08	2.04	0.046
	Surface Quality and Material Integrity (Tactile comfort)	3.03	1.20	0.22	0.829

6. Discussion

The evaluation of the Üsküdar waterfront through a user-oriented POE framework revealed a nuanced understanding of how diverse users perceive and interact with regenerated public spaces. The analysis confirms that accessibility, spatial functionality, and environmental quality perception are critical dimensions shaping user satisfaction. Accessibility emerged as a central strength of the waterfront. The high mean scores for public transport access and boardwalk design reflect the success of multimodal connectivity and pedestrian-friendly planning. However, the neutral perception of disability accessibility suggests a significant shortcoming in inclusive design. Despite efforts to enhance walkability, users with mobility impairments reported barriers such as missing tactile paths and steep gradients, echoing broader concerns in the literature about the exclusion of vulnerable groups in urban regeneration (Kapsalis et al., 2022; Ramírez-Saiz et al., 2025).

In terms of spatial functionality, the evaluation revealed a clear contrast between features that support effective use and those that hinder daily comfort and inclusivity. Urban furniture, such as seating and signage, was positively rated, indicating its role in supporting rest, orientation, and spatial legibility. This reflects a thoughtful design approach that enhances usability and accommodates diverse user needs. In contrast, recreational amenities, sanitary facilities, and parking infrastructure received low ratings, exposing functional shortcomings that compromise comfort and convenience. These deficiencies reduce the everyday usability of the space and limit its capacity to support diverse social activities. As Ferwati et al. (2021) emphasize, physical features such as seating, shading, recreational provisions, and essential service infrastructure like restrooms and maintenance are critical for ensuring comfort and fostering social interaction. When these elements are lacking or poorly maintained, the overall functionality and inclusivity of public spaces are significantly diminished.

Environmental quality perception revealed both strengths and weaknesses. The landscape design received the highest score, affirming the aesthetic and ecological success of green/blue infrastructure. However, concerns over security and safety, particularly for children and during nighttime, underscore critical design gaps. Low scores in perceived safety reflect insufficient surveillance, fencing, and lighting in transitional areas. This reinforces arguments by Pérez-Tejera et al. (2022) and Chen et al. (2024) that maintenance and visibility are central to fostering emotional comfort and trust in public spaces. Together, these findings indicate that while the Üsküdar waterfront demonstrates progress toward user-oriented design goals, particularly in connectivity and aesthetics, it still falls short in terms of inclusive infrastructure and sensory accessibility. The gaps between physical form and social function emphasize the importance of continuous user feedback, adaptive planning, and participatory processes in urban regeneration (Deakin, 2009; Falanga & Nunes, 2021).

7. Conclusion

This study applied a user-oriented post-occupancy evaluation to assess the regenerated Üsküdar waterfront, providing empirical insights into how different user groups perceive and interact with the space. The findings highlight that while the waterfront performs well in terms of aesthetic appeal and multimodal access, it presents notable deficits in disability inclusion, sanitation, safety, and comfort. The results underscore the value of a multidimensional user-oriented framework that integrates demographic diversity, inclusive accessibility, functional infrastructure, and environmental perception in the evaluation of public spaces. Such an approach ensures that design interventions go beyond visual appeal to address the lived realities of users. Based on the identified strengths and shortcomings, the study offers the following recommendations for urban planners, designers, and policymakers:

- Enhancing accessibility for individuals with disabilities requires the application of universal design principles, including the incorporation of tactile guiding paths for the visually impaired and the elimination of physical barriers through leveled surfaces and barrier-free gradients. These interventions aim to promote inclusive mobility and ensure equitable use of the space for all users.
- Improving sanitary facilities involves the provision of clean, well-maintained, and accessible restrooms that accommodate a diverse range of users. This includes gender-inclusive design, child- and family-friendly features, and facilities that meet the needs of individuals with disabilities.
- Developing parking infrastructure focuses on expanding the availability and functionality of parking areas while maintaining the spatial integrity of the public realm. Priority should be given to integrated, clearly marked spaces for bicycles, vehicles, and users with limited mobility, without compromising pedestrian accessibility or environmental aesthetics.
- Addressing safety concerns entails enhancing passive and active surveillance through the installation of visible security measures and strategically placed lighting. Adequate nighttime illumination not only improves visibility but also contributes to users' perceived safety, particularly for vulnerable groups such as women, children, and the elderly.
- Refining tactile and visual comfort features includes upgrading surface materials to improve walkability, minimize slip hazards, and enhance sensory experience. Additionally, lighting design should ensure visual comfort by reducing glare and supporting both aesthetic and functional aspects of the waterfront environment.

Overall, the study confirms that creating sustainable, inclusive, and responsive urban public spaces is an ongoing and adaptive process. Achieving this goal requires continuous user engagement, evidence-based planning, and design strategies that reflect the cultural, social, environmental, and economic context of each site. Embedding user-oriented and participatory practices into planning frameworks strengthens the capacity of urban spaces to promote social equity, ecological resilience, and long-term usability for diverse groups, including both residents and tourists.

Given Istanbul's role as both a cultural center and major tourist destination, its evolving waterfronts must address the needs of visitors alongside those of local communities. As regeneration efforts continue, future research should explore how user perceptions shift in response to design interventions, particularly regarding accessibility, safety, and comfort. Comparative studies across districts can help determine which user-oriented strategies are most effective within Istanbul's complex spatial and

socio-cultural landscape. The integration of digital tools, such as mobile surveys and real-time feedback platforms, can further support participatory planning. Prioritizing the experiences of underrepresented groups, including individuals with disabilities, children, and the elderly, will be essential for advancing inclusive and adaptable public spaces throughout the city.

Acknowledgements
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. This study is derived from the first author's ongoing thesis work in the Master of Architecture program at the Graduate School of Istanbul Okan University.

Funding
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of Interest
The authors report no conflicts of interest.

Data availability statement
The original contributions presented in the study are included in the article; further inquiries can be directed to the corresponding author.

Institutional Review Board Statement
Written informed consent was obtained from all participants prior to data collection.

CRediT author statement
Conceptualization: S.B.; Data curation: S.B.; Formal analysis: S.B.; Funding acquisition: Not applicable; Investigation: S.B.; Methodology: S.B., M.S.; Project administration: S.B.; Resources: S.B., M.S.; Software: S.B.; Supervision: S.B., M.S.; Validation: S.B.; Visualization: S.B.; Writing – original draft: S.B.; Writing – review & editing: S.B., M.S. All authors have reviewed and approved the final version of the manuscript.

References

Alidoust, S. (2023). Sustained liveable cities: the interface of liveability and resiliency. *Cities & Health, 8*(6), 1108–1119. https://doi.org/10.1080/23748834.2023.2260132

Alsallomy, S., & Polat, S. (2021). The Evaluation of Public Open Space Quality from the Perspective of Syrian Refugees Living in Bursa, Turkey. *Journal of Environmental and Natural Studies*, *3*(1), 56–71.

Al-Saud, L. E., & Goussous, J. S. (2023). Waterfront Urban Regeneration and Its Impact on Socio-cultural Activities (The Case of Jeddah Waterfront). In S. Kostopoulou, G. Herrera-Franco, J. Wood, & K. Al-Kodmany (Eds.), *Cities' Vocabularies and the Sustainable Development of the Silkroads* (pp. 21–32). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-31027-0_3

Bodnar, J. (2015). Reclaiming public space. *Urban Studies*, *52*(12), 2090–2104. https://doi.org/10.1177/0042098015583626

Carmona, M. (2010). Contemporary Public Space: Critique and Classification, Part One: Critique. *Journal of Urban Design*, *15*(1), 123–148. https://doi.org/10.1080/13574800903435651

Carmona, M., Magalhães, C. de, & Hammond, L. (2008). *Public Space: The Management Dimension*. Routledge.

Chen, L., Leng, H., Dai, J., Liu, Y., & Yuan, Z. (2024). Urban Waterfront Regeneration on Ecological and Historical Dimensions: Insight from a Unique Case in Beijing, China. *Land*, *13*(5), 5. https://doi.org/10.3390/land13050674

Ciampa, F., De Medici, S., Viola, S., & Pinto, M. R. (2021). Regeneration Criteria for Adaptive Reuse of the Waterfront Ecosystem: Learning from the US Case Study to Improve European Approach. *Sustainability*, *13*(8), 8. https://doi.org/10.3390/su13084156

Dane, G., Evers, S., van den Berg, P., Klippel, A., Verduijn, T., Wallgrün, J. O., & Arentze, T. (2024). Experiencing the future: Evaluating a new framework for the participatory co-design of healthy public spaces using immersive virtual reality. *Computers, Environment and Urban Systems*, *114*, 102194. https://doi.org/10.1016/j.compenvurbsys.2024.102194

Deakin, M. (2009). A Community-Based Approach to Sustainable Urban Regeneration. *Journal of Urban Technology*, *16*(1), 91–112. https://doi.org/10.1080/10630730903090354

Eltarabily, S. (2022). Toward a conceptual framework for evaluating the quality of urban open spaces. *Journal of Sustainable Architecture and Civil Engineering*, *31*(2), 58–84. https://doi.org/10.5755/j01.sace.31.2.31311

Evers, S., Dane, G. Z., van den Berg, P. E. W., Klippel, A. K. A. J., Verduijn, T., & Arentze, T. A. (2023). Designing healthy public spaces: A participatory approach through immersive virtual reality. *AGILE: GIScience Series*, *4*, 24. https://doi.org/10.5194/agile-giss-4-24-2023

Fageir, M., Porter, N., & Borsi, K. (2021). Contested grounds; the regeneration of Liverpool waterfront. *Planning Perspectives*, *36*(3), 535–557. https://doi.org/10.1080/02665433.2020.1804989

Falanga, R., & Nunes, M. C. (2021). Tackling urban disparities through participatory culture-led urban regeneration. Insights from Lisbon. *Land Use Policy*, *108*, 105478. https://doi.org/10.1016/j.landusepol.2021.105478

Ferwati, M. S., Keyvanfar, A., Shafaghat, A., & Ferwati, O. (2021). A Quality Assessment Directory for Evaluating Multi-functional Public Spaces. *Architecture and Urban Planning*, *17*(1), 136–151. https://doi.org/10.2478/aup-2021-0013

Friman, M., Lättman, K., & Olsson, L. E. (2020). Public transport quality, safety, and perceived accessibility. *Sustainability*, *12*(9), 3563. https://doi.org/10.3390/su12093563

Gospodini, A. (2001). Urban Design, Urban Space Morphology, Urban Tourism: An Emerging New Paradigm Concerning Their Relationship. *European Planning Studies*, *9*(7), 925–934. https://doi.org/10.1080/09654310120079841

Gupta, A., Yadav, M., & Nayak, B. K. (2025). A Systematic Literature Review on Inclusive Public Open Spaces: Accessibility standards and universal design Principles. *Urban Science*, *9*(6), 181. https://doi.org/10.3390/urbansci9060181

Jones, A. L. (2017). Regenerating Urban Waterfronts—Creating Better Futures—From Commercial and Leisure Market Places to Cultural Quarters and Innovation Districts. *Planning Practice & Research*, *32*(3), 333–344. https://doi.org/10.1080/02697459.2016.1222146

Kapsalis, E., Jaeger, N., & Hale, J. (2022). Disabled-by-design: effects of inaccessible urban public spaces on users of mobility assistive devices – a systematic review. *Disability and Rehabilitation: Assistive Technology*, *19*(3), 604–622. https://doi.org/10.1080/17483107.2022.2111723

Li, J., Dang, A., & Song, Y. (2022). Defining the ideal public space: A perspective from the publicness. *Journal of Urban Management*, *11*(4), 479–487. https://doi.org/10.1016/j.jum.2022.08.005

Low, S., & Smith, N. (2006). *The Politics of Public Space*. Routledge. https://www.routledge.com/The-Politics-of-Public-Space/Low-Smith/p/book/9780415951395

Low, S., Taplin, D., & Scheld, S. (2005). *Rethinking Urban Parks: Public Space and Cultural Diversity*. University of Texas Press.

Marshall, R. (2004). *Waterfronts in Post-Industrial Cities*. Taylor & Francis.

Mehta, V. (2014). Evaluating Public Space. *Journal of Urban Design*, *19*(1), 53–88. https://doi.org/10.1080/13574809.2013.854698

Paksoy, P., & Colakoglu, N. (2014). Beach management & analysis of visitors' remarks. *International Journal of Research in Business and Social Science, 3*(3), 63–76. https://doi.org/10.20525/ijrbs.v3i3.110

Peng, Y., Qiu, H., & Wang, X. (2023). The influence of spatial functions on the public space system of traditional settlements. *Sustainability*, *15*(11), 8632. https://doi.org/10.3390/su15118632

Pérez-Tejera, F., Anguera, M. T., Guàrdia-Olmos, J., Dalmau-Bueno, A., & Valera, S. (2022). Examining perceived safety and park use in public open spaces: The case of Barcelona. *Journal of Environmental Psychology*, *81*, 101823. https://doi.org/10.1016/j.jenvp.2022.101823

Qi, J., Mazumdar, S., & Vasconcelos, A. C. (2024). Understanding the Relationship between Urban Public Space and Social Cohesion: A Systematic Review. *International Journal of Community Well-Being*, *7*(2), 155–212. https://doi.org/10.1007/s42413-024-00204-5

Ramírez-Saiz, A., Larriva, M. T. B., Martín, D. J., & Alonso, A. (2025). Enhancing Urban Mobility for All: The Role of Universal Design in Supporting Social Inclusion for Older Adults and People with Disabilities. *Urban Science*, *9*(2), 46. https://doi.org/10.3390/urbansci9020046

Ridings, J., & Chitrakar, R. M. (2021). Urban design frameworks, user activities and public tendencies in Brisbane's urban squares. *Urban Design International*, *26*(3), 272–288. https://doi.org/10.1057/s41289-020-00113-x

Ríos-Rodríguez, M. L., Rosales, C., Lorenzo, M., Muinos, G., & Hernández, B. (2021). Influence of Perceived Environmental Quality on the Perceived Restorativeness of Public Spaces. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.644763

Sahtout, I., Zorgati, I. B. Y., & Lafhaj, Z. (2024). Integrating dynamic culture and participatory design in urban spaces for sustainable futures. *Journal of Contemporary Urban Affairs*, *8*(1), 212–231. https://doi.org/10.25034/ijcua.2024.v8n1-12

Sanoff, H. (2000). *Community Participation Methods in Design and Planning*. Wiley.

Seçmen, S., & Türkoğlu, H. (2021). Spatial characteristics of urban waterfronts. *Ekistics and the New Habitat*, *80*(1), 68–81. https://doi.org/10.53910/26531313-e2020801484

Shi, J., Dai, X., Sun, Z., Liu, M., & Tang, D. (2023). Exploring the Determinants and Consequences of Public Satisfaction with Urban Waterfronts: A Case Study of the Xuhui Waterfront in Shanghai, China. *Journal of Urban Planning and Development*, *149*(2), 04023005. https://doi.org/10.1061/JUPDDM.UPENG-4139

Soja, E. W. (2010). *Seeking Spatial Justice*. University of Minnesota Press.

Tommarchi, E. (2025). Waterfront Redevelopment Five Decades Later: An Updated Typology and Research Agenda. *Ocean and Society, 2*, 9265. https://doi.org/10.17645/oas.9265

Üzümcüoğlu, D. & Polay, M. (2024). Unveiling contemporary and thrilling waterfront design principles through theoretical and case-based investigations. *Journal of Architectural Sciences and Applications, 9* (1), 44- 68. https://doi.org/10.30785/mbud.1366291

Whyte, W. H. (1980). *The Social Life of Small Urban Spaces*. Project for Public Spaces.

Xie, Q., & Lu, M. (2020). Measures of Spatial and Demographic Disparities in Access to Urban Green Space in Harbin, China. *Complexity*, *2020*(1), 8832343. https://doi.org/10.1155/2020/8832343

Zhu, Y., Zhang, Y., & Biljecki, F. (2025). Understanding the user perspective on urban public spaces: A systematic review and opportunities for machine learning. *Cities*, *156*, 105535. https://doi.org/10.1016/j.cities.2024.105535