REFLECTIONS OF USER SATISFACTION IN PUBLIC SPACES: A STRUCTURAL EQUATION MODELING APPROACH AT HASANPAŞA GAZHANE, ISTANBUL

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This study investigates the factors that influence user satisfaction with public spaces by using structural equation modeling (SEM). The case study focuses on Hasanpaşa Gazhane (Gashouse), a versatile public space located in a central area of Istanbul, attracting a diverse range of individuals from various demographic, social, and economic backgrounds. Using a random sampling technique, 203 face-to-face surveys were conducted to assess users' perceptions of accessibility, use and activity, safety, comfort, and image indicators, as well as user satisfaction. Preliminary data analysis employed exploratory factor analysis and reliability analysis methods. Subsequently, the relationship between the identified factors and user satisfaction was analyzed using structural equation modeling in Amos 24 software. The findings indicate that user satisfaction in public places is mostly influenced by the use and activities and image indicators. Accessibility, safety, and comfort factors have a relatively lesser impact on user satisfaction. The results focus on adapting public space design and management techniques to the needs and expectations of the community. This study makes a valuable contribution to the diversification of methodologies used in the study of site-specific attributes within public spaces, with a particular emphasis on optimizing their responsiveness to the needs and expectations of users.

Key words: **public space, user satisfaction, modeling, Hasanpaşa Gazhane.**

INTRODUCTION

Public spaces are essential components of the urban environment, serving crucial functions in fulfilling the daily needs of citizens (Gehl, 1987; Neal, 2010), while also fostering diverse social engagement and facilitating cultural interchange (Jacobs, 1961; Kohn, 2004). Nevertheless, the implementation of neoliberal strategies in urban development has shifted the nature of these interactions, often limiting social engagement to interactions among individuals from similar social backgrounds or homogeneous groups (Hardt and Negri, 2009). Since the 1990s, there has been an increasing tendency to create multifunctional, controlled, and well-maintained public spaces that redefine urban functions, needs, and expectations, changing how

users perceive and experience these spaces (Ercan, 2016; Lopes *et al.*, 2020). Furthermore, demographic and cultural shifts have resulted in new and frequently conflicting demands on public spaces (Carr *et al.*, 1992; De Magalhães, 2010). Over the past few decades, local governments have prioritized the development of public spaces that respond to the increased and varied needs of urban populations (Madanipour, 2019; Mandeli, 2019). An ongoing trend that limits the focus of the current study is the transformation of abandoned industrial sites in urban centers into versatile public spaces with specific purposes like culture, art, and education (Loures, 2015). Given the evolving demand for new public spaces and the complex nature of urban populations, the challenge resides in creating public spaces that can adapt to the diverse needs of urban populations, ranging from democratic engagement to leisure activities, while also addressing the specific needs of different user groups (Franck and Paxson, 1989; De Magalhães and

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Carmona, 2009; Németh and Schmidt, 2011). Hence, it is critical to reconsider the features of public spaces to accommodate the changing needs and preferences of different individuals and user groups, with the objective of satisfying diverse expectations and fostering greater opportunities for coexistence. This study investigates how the features of public spaces respond to the needs and expectations of users.

Mehta (2014) states that good public spaces are responsive, democratic and meaningful. This emphasizes the need for designing and managing public spaces that are responsive to the needs and expectations of society. Assessing user satisfaction provides insight into how well public spaces accommodate the diverse needs of society. Moreover, it offers direct feedback from users to improve the quality of these spaces. Previous studies have extensively investigated the factors that impact user satisfaction. However, there are significant difficulties in finding site-specific characteristics that enhance the capacity to satisfy user expectations (Carr *et al.*, 1992; Carmona, 2014; Zamanifard *et al.*, 2019). The challenges include the subjective nature of satisfaction, the variety of users and social interactions, and the wide range of needs that public spaces must fulfill. Therefore, this study emphasizes the necessity for additional research to comprehensively understand the mechanisms that lead to user satisfaction with public spaces, as also noted by Fezzai *et al.* (2023). This study contributes to the field of public space research by presenting a multidimensional analysis of user satisfaction with public spaces. It aims to capture the complex dynamics of user satisfaction in multifaceted urban spaces, such as Hasanpaşa Gazhane.

The aim of this study is to investigate the relationships between the features of public spaces and the level of user satisfaction with public spaces. It focuses specifically on Hasanpaşa Gazhane in Istanbul and poses the following research question: What are the primary public space features that significantly impact user satisfaction in versatile public spaces such as Hasanpaşa Gazhane, and how do these features interrelate? Hasanpaşa Gazhane is a multifunctional public space that challenges traditional typologies due to its diverse range of roles and functions, from the local to the city-wide scale. Within this context, to the research investigates the correlation between user satisfaction with public space and user perceptions of the different attributes they encounter within different aspects of the space, including accessibility, uses and activities, safety, comfort, and image. Structural equation modeling (SEM) was used, which is a robust statistical technique commonly used to assess complex relationships between variables. SEM provides a multidimensional analysis of the interrelationships between factors and their collective impact on user satisfaction, rather than focusing on the isolated effects of individual variables. The results enhance our understanding of how to design and manage public spaces to meet the diverse expectations of users.

USER SATISFACTION WITH PUBLIC SPACES

User satisfaction with public spaces is influenced by their overall performance, which includes technical, functional, and aesthetic aspects (Özkan *et al.*, 2015). Physical features, activities, security and surveillance measures, and the microclimate all contribute to this influence (Whyte, 1980). However, the social behaviors and attitudes exhibited during encounters in a particular place are not exclusively determined by the characteristics of that place (Harvey, 1989). Previous studies have shown that the relationship between public space quality and user satisfaction varies significantly depending on the unique dynamics of the space and the city (Ho *et al.*, 2021).

User satisfaction with public spaces can vary according to individual preferences and needs, as it involves the fulfillment of expectations and the resulting positive feelings (Li *et al.*, 2023). According to Stedman (2002), user satisfaction is a comprehensive and multidimensional assessment of a place's perceived quality that consists of several measurable concepts and results from the user experience. Studies on user satisfaction with public spaces are closely related to various concepts such as quality of life (Nasution and Zahrah, 2014), satisfaction with public services (Noda, 2020), loneliness (Hribrenik and Mussap, 2010), well-being (Jabbar *et al.*, 2021), environmental and social satisfaction (Yan and Shahraki, 2023), and the quality of public spaces (Zamanifard *et al.*, 2019; Ho *et al.*, 2021). These concepts can be measured at different levels, from citywide to neighborhood-specific assessments.

To assess user satisfaction with public spaces, many methodologies and procedures can be employed, depending on the distinctive features of the space. Common methods for collecting data include conducting user surveys, organizing focus groups, and conducting user interviews. Furthermore, observing and documenting people's activities and interactions in the area in question, including their utilization and satisfaction with the space, is also a common strategy (Gehl, 2013). Nevertheless, according to Ewing and Clemente (2013), relying solely on observation-based assessments is inadequate for understanding individuals' overall perceptions of the environment. Face-to-face user surveys provide the benefit of gathering firsthand experiences and additional insights from individual observations. Nevertheless, due to the expansive scope of the study area, conducting user surveys can be time-consuming and costly, and a limited sample size can limit the research (Chen *et al.*, 2019). It is crucial to choose the appropriate method for assessing user satisfaction, considering both the assessment's objectives and available resources.

FEATURES OF PUBLIC SPACES

Public spaces, as places of encounter with diversity, facilitate individual fulfillment and play a central role in shaping citizens' social and psychological conditions (Loukaitou-Sideris, 1988; Lynch, 1992). Mandeli (2019) posits that academic discourse on the socio-psychological benefits of public spaces often emphasizes prioritizing the quality of these spaces over other public facilities. However, despite extensive research, scholars still struggle to clearly define the criteria for the quality of public spaces (Trip, 2007).

Carmona *et al.* (2008) conceptualize public space quality through a tripartite framework that integrates tangible qualities such as improved maintenance, intangible

qualities such as encouraging diverse user groups, and desirable qualities that make the space memorable and attractive. Similarly, Gehl (1987) suggests twelve criteria for public spaces, divided into the categories of protection, comfort, and enjoyment, which collectively enhance public life and diversity. The Project for Public Spaces (2000) further identifies four qualities of public space: access and connectivity, use and activity, comfort and image, and sociability. Mehta (2014) argues that addressing the complexities of designing public spaces to accommodate diverse users, purposes, and meanings requires a focus on the user perceptions of inclusiveness, meaningfulness, safety, comfort, and pleasure. These attributes, supported by empirical research, are central to shaping emotional responses, satisfaction, and the community integration of public space users.

Based on the discourse that public spaces must be universally accessible and meet a variety of social needs in order to foster a wide range of interactions (Jacobs, 1961; Kohn, 2004; Németh and Schmidt, 2007; Madanipour, 2010), it becomes clear that the vitality of public spaces is increasingly central. Public spaces are evolving into specialized, complex, and multifaceted environments that facilitate the convergence of diverse demographic populations through arts and culture-oriented activities. Recent trends indicate a shift towards developing cultural centers and museums as multifunctional public spaces that not only contribute to cultural and economic revitalization, but also enhance the urban image (Santagata, 2002). These spaces serve as catalysts for interaction among different demographic and social groups, enriching the urban social fabric with a variety of activities and having a profound impact on the transformation of social life. They provide venues for encountering and engaging with "otherness" (Hajer and Reijndorp, 2001, pp. 128–129), thereby cultivating new forms of publicness.

Following Carr *et al*. (1992), the literature suggests that the success of public spaces depends fundamentally on their responsiveness to diverse user needs while promoting publicness through accessibility, multiple uses, safety, comfort, and a positive image. However, in developing countries, there are significant differences in user profiles and attitudes towards public spaces, which are reinforced by differences in the capacity and resources of the institutions responsible for public space provision and maintenance (Praliya and Garg, 2019; Mandeli, 2019). It is therefore necessary to recognize that the provision, use, and appropriation of public spaces present distinct contextual challenges and opportunities requiring adaptive design and management strategies that reflect the unique cultural, economic, and social landscapes in which they are located.

DATA AND METHODOLOGY

This study employed a mixed-methods approach to investigate the elements that impact user satisfaction in public spaces. The main data gathering methods employed were user surveys and direct observations, which yielded information regarding user attitudes and impressions of the public space. Exploratory factor analysis was conducted on data collected through face-to-face surveys to identify

the features that influence user satisfaction at Hasanpaşa Gazhane. Subsequently, SEM was employed using Amos 24 software to examine the relationships between these factors and user satisfaction. The study offers a comprehensive perspective on the factors that affect user satisfaction by incorporating several characteristics, such as accessibility, uses and activities, safety, comfort, and image, into a unified model. The following subsections provide a comprehensive overview of the research methodology used.

Case area: Hasanpaşa Gazhane, Istanbul

Hasanpaşa Gazhane, located in the Kadıköy district of Istanbul, is a significant industrial heritage site. From 1982 to 1993, it operated as a gasworks, supplying energy to the Anatolian side of Istanbul. Following its closure, the site experienced long-term abandonment. The combined efforts of local residents, government agencies, NGOs, academia, and numerous civil stakeholders resulted in the official recognition of the site as a protected area in 1994.

In July 2021, the Istanbul Metropolitan Municipality reopened the site to the public. The site, currently known as Museum Gazhane, has undergone a transformation into a multifunctional urban living space, diverging from its original industrial purpose. While preserving elements of its industrial architecture, Gazhane primarily serves contemporary social and cultural purposes rather than focusing solely on the history of the gasworks. This has led to an ongoing debate regarding whether it should be officially classified as a museum (Uluğ, 2022). This study utilizes its historical name to emphasize its function as a dynamic, multifunctional public space in a densely populated urban setting, providing cultural and recreational opportunities for the community.

Hasanpaşa Gazhane currently functions as a vibrant urban space that integrates a museum, library, co-working spaces, a theater, and concert halls, facilitating a variety of educational, cultural, and recreational activities (Figure 1). This transformation has turned it not only into a neighborhood-scale open space for daily interaction, but also into a new urban living space that attracts visitors city-wide. This dual role fosters a unique user population and diverse interactions that integrate local communities and visitors.

Figure 1. Hasanpaşa Gazhane functions and facilities map (Source: Authors, 2023)

Data collection

A face-to-face user survey served as the primary data collection method. Preliminary pilot studies were initially conducted in April 2022 using online surveys created with Google Forms, followed by additional pilot studies in June 2022 using face-to-face surveys. These initial studies involved a sample of 70 users in the case area to gather feedback on the questionnaire's legibility, clarity, and ease of completion. Findings from the preliminary studies indicated that conducting the surveys in person would be more efficient and convenient. The user survey was then conducted with a sample of 203 respondents between August and September 2022, covering different days of the week and various times of day.

Survey design

The user survey consists of three sections. The first section collects personal data and usage patterns through a mix of open-ended and multiple-choice questions that capture demographic and behavioral characteristics. The second part aims to capture perceptions of the space. Based on a literature review, we identified features of the public space related to accessibility, uses and activities, safety, comfort, and image, and operationalized them through appropriate statements. The questionnaire contains clear and understandable statements about the relevant features of each component. The questionnaire uses a 1–5 Likert scale to assess opinions on these characteristics. The last part assesses user satisfaction and expectations.

Sampling procedures and adequacy

Due to a lack of precise daily visitor numbers, the research universe for the survey study consists of Hasanpaşa Gazhane users over a period of two months. This includes a diverse range of users who spend time in the open spaces of the Gazhane, with different demographic characteristics such as age and gender, as well as varying reasons for, and frequency of their visits. The universe considers various visitation patterns, including peak times on weekends and holidays, as well as quieter times during the week. Furthermore, preliminary data collection helped to establish a profile of the research universe, detailing its social, cultural, and economic characteristics. We excluded users under the age of 18, as well as non-visitors, such as staff and maintenance workers, from the survey. Ultimately, the study achieved a response rate of approximately 100%, with 203 completed surveys received, yielding 200 valid samples.

Survey participation was strictly voluntary, and respondents were assured that personal information would remain confidential and would only be published in aggregate form. The researchers were aware of the potential for a "pleasing effect" and therefore used neutral communication techniques during data collection to ensure the authenticity of responses and reduce any bias.

As highlighted by Kline (2016), sample size estimation for SEM should consider the number of parameters and the complexity of the model. SEM requires setting a prior sample size based on observed and unobserved variables (Hair *et al.*, 2013). Therefore, this study employed an a priori sample size calculator for SEM (Soper, 2024) to determine an efficient and sufficient sample size. A priori sample size calculation in SEM is often used by researchers to find the minimum sample size needed for a given study by looking at the number of latent and observed variables (Dedeoglu *et al.*, 2018; Kuvaas *et al.*, 2020). This method requires input data such as the number of observed and latent variables in the model, the expected effect size, the anticipated probability, and the level of statistical power (Cohen, 1988). Accordingly, given the number of observed (N=23) and latent (N=6) variables, the anticipated effect size (d=0.30), the desired probability (p=.05), and the statistical power (0.90), a minimum sample size of 200 was required. Thus, our sample of 200 meets the recommended minimum sample size for sampling adequacy.

Sample profile

The demographic analysis of the respondents shows a predominance of people between the ages of 18 and 35, with a gender distribution of 56% female and 44% male. This demographic profile is consistent with on-site observations. The educational level of the respondents is remarkably high: 34.5% have a high school diploma, 37% have a bachelor's degree, and 18.5% have a master's or doctoral degree, reflecting the educational and cultural nature of the activities at Hasanpaşa Gazhane, which include museums, a library, and co-working spaces. Table 1 provides information on the socio-demographic characteristics of the participants.

Table 1. Socio-demographic structure of respondents
(Source: Case study conducted by the Authors)

Variables	Categories	Frequency (%)
Gender	Female	56.00%
	Male	44.00%
Age	18-24	24.50%
	25-34	32.50%
	35-44	15.00%
	45-54	11.50%
	55-64	11.00%
	Over 65	5.50%
Education	Primary/secondary school	10.00%
	High-school degree	34.50%
	Bachelor's degree	37.00%
	Master's or doctoral degree	18.50%
Employment	Working	54.00%
	Non-working (housewife/unemployed)	20.00%
	Retired	14.50%
	Student	11.50%
Income (Monthly)	No income	26.50%
	1-5,500 TL	14.50%
	5,501 TL- 11,000 TL	26.50%
	11,001 TL- 22,000 TL	28.00%
	22,001 TL- 40,000 TL	3.50%
	More than 40,001 TL	1.00%

The majority of respondents (54%) indicate an economically active segment in terms of employment. The respondents' income distribution adds another layer to the user base's socio-economic landscape. While 26.5% of respondents report no income, which could include students and those not working, there is a relatively even spread across the other income brackets, indicating a broad representation of economic status. This variability in employment and income levels indicates a range of daily activities and user engagements within the public space.

Collectively, the survey results and on-site observations suggest that users prefer to use open spaces for multiple purposes. The results of the user survey identified seven main uses of the space: socializing (32%), using the library (18.8%), participating in events (16.7%), visiting museums and exhibitions (13.7%), resting (8.1%), using the cafeteria (9.6%), and business visits (2.5%). Additionally, residential data show that 52.5% of respondents reside in Kadıköy, with 31% living in the immediate vicinity, particularly in Hasanpaşa. This suggests a strong local attachment and frequent use, which contribute to the Gazhane's vibrancy and public life. Interactions between visitors and those who use the area for their everyday needs enrich the public life of the space and create a vibrant atmosphere of publicness for the city.

Data processing

Exploratory Factor Analysis (EFA) was employed to identify underlying structures among variables measuring the perceived characteristics of public spaces and their influence on user satisfaction. The principle behind EFA is to reduce the observed variables to fewer factors that can explain the relationships in the data (Ullman, 2006). In this study, principal component analysis with varimax rotation was used to improve the interpretability of the factors by maximizing loading variances, which served as an initial validation step for the survey items.

The internal consistency and reliability of the factors were assessed using Cronbach's alpha, a statistic commonly used to measure the degree to which a set of variables are related as a group. The reliability coefficients obtained confirmed that each of the factor structures for accessibility, uses and activities, safety, image and comfort had satisfactory internal consistency, with coefficients all above 70% (Table 2). The coefficients for the user satisfaction structure were between 60% and 70%, which, although lower, are still considered acceptable (Hair *et al.*, 1998; Taber, 2018).

Bartlett's sphericity test and Kaiser-Meyer-Olkin (KMO) were employed to assess the suitability of factor analysis for the dataset. Bartlett's test yielded a highly significant result (p<0.001), indicating that there is a strong correlation structure between the variables. Additionally, the KMO

Table 2. The results of the factor analysis and the reliability test

Factors	Measured variable	Factor Loading	Cronbach's Alpha
Accessibility	Ease of access	0.66	0.77
	Entrance accessibility	0.79	
	Rules and restrictions	0.66	
	Openness	0.81	
Uses and activities	Indoor functionality	0.59	0.79
	Open spaces functionality	0.68	
	Public amenities (restroom, food etc.)	0.73	
	Economic accessibility	0.71	
	Overall functionality	0.69	
Safety	Sense of safety	0.82	0.74
	Sense of safety during night use	0.72	
	Surveillance and control	0.71	
Comfort	Seating available	0.69	0.78
	Climatic comfort	0.82	
	Presence of greenery	0.75	
	Sense of comfort	0.66	
Image	Maintenance and cleanliness	0.72	0.75
	Aesthetics and attractiveness	0.73	
	Local and historical character	0.61	
	Sense of belonging	0.55	
User satisfaction	Satisfaction with the quality of physical space	0.79	0.66
	Overall satisfaction with space	0.75	
	Expectations of public space	0.77	

index for both the public space quality and user satisfaction variables exceeded the recommended threshold of 0.60 (0.887 and 0.656, respectively), indicating that the factor analysis is well suited to the data, and the sample size of 200 is sufficient for the analysis.

The EFA revealed five distinct factors corresponding to perceived public space qualities: accessibility, uses and activities, safety, image, and comfort. Each of these factors includes several measured variables (Table 2), which were determined through factor loadings. Factor loadings above a threshold of 0.4 are considered significant (Hurley *et al.*, 1997) to ensure that only relevant and stable structures are retained for further analysis. The 5-factor model developed in EFA accounts for 62% of the total variance, providing a substantial explanation of the underlying structure of the data. User satisfaction was constructed as a construct with three components – quality of physical space, alignment with expectations of public space, and overall satisfaction – each a distinct variable within the single-factor model, explaining 59.7% of the total variance. In conclusion, EFA not only supports the constructs derived from the survey data, but also provides a basis for subsequent, more detailed analysis using SEM.

Structural Equation Model (SEM)

Based on the validated constructs from the data processing phase, SEM is used to explore the relationships between these constructs and their impact on user satisfaction. SEM allows for the estimation of multiple and interrelated dependence relationships simultaneously, providing a comprehensive view of the causal dynamics within the data (Bagozzi and Yi, 2012). This advanced statistical approach is particularly well-suited to manage complex model structures, offers considerable adaptability to different data conditions, and is based on robust theoretical foundations (Ullman, 2006; Musil *et al.*, 1998). These attributes make the SEM, designed according to the research purpose, an effective tool for analyzing the interrelationships between study variables.

The measurement model, which precedes the construction of the SEM to ensure internal consistency, is shown graphically in Figure 2. The results of the measurement model, presented in Table 3, are within the desired range, with a p-value of less than 0.001. The standardized regression weights for all variables are above the minimum criterion of 0.40 (MacCallum *et al.*, 1996).
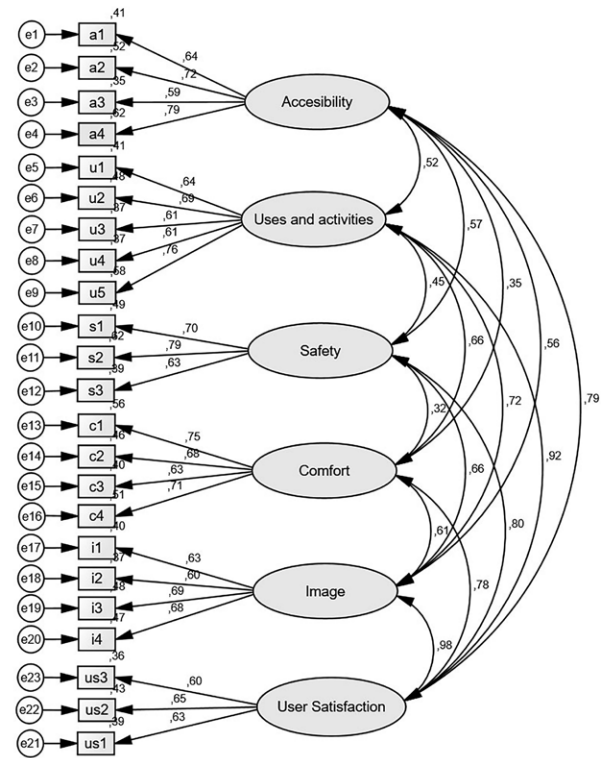

Figure 2. Diagram of the variables and their relationships in the measurement model
(Source: Authors, 2023)

Table 3. Structural relationships and assessment of model fit in the measurement model

Observed variables	Unobserved variables	Standard Regression Weight	Standard Error	p-Value
a1: Ease of Access (on foot/by vehicle)	← Accessibility	0.64	0.17	<0.001
a2: Entrance accessibility	← Accessibility	0.72	0.18	<0.001
a2: Rules and restrictions	← Accessibility	0.59		
a3: Openness	← Accessibility	0.79	0.15	<0.001
u1: Indoor functionality	← Uses and activities	0.64	0.12	<0.001
u2: Open spaces functionality	← Uses and activities	0.69	0.10	<0.001
u3: Public amenities	← Uses and activities	0.61	0.11	<0.001
u4: Economic accessibility	← Uses and activities	0.61	0.13	<0.001
u5: Overall functionality	← Uses and activities	0.76		
s1: Sense of safety	← Safety	0.70	0.12	<0.001
s2: Sense of safety during night use	← Safety	0.79	0.17	<0.001
s3: Surveillance and control	← Safety	0.63		

| c1: Seating available	← Comfort	0.75	0.11	<0.001
c2: Climatic comfort	← Comfort	0.68	0.11	<0.001
c3: Presence of greenery	← Comfort	0.63	0.12	<0.001
c4: Sense of comfort	← Comfort	0.71		
i1: Maintenance and cleanliness	← Image	0.63	0.13	<0.001
i2: Aesthetics and attractiveness	← Image	0.60	0.14	<0.001
i3: Local and historical character	← Image	0.69		
i4: Sense of belonging	← Image	0.68		
us1: Satisfaction with the quality of physical space	← User satisfaction	0.63		
us2: Overall satisfaction with space	← User satisfaction	0.65	0.12	<0.001
us3: Expectations of public space	← User satisfaction	0.60	0.10	<0.001
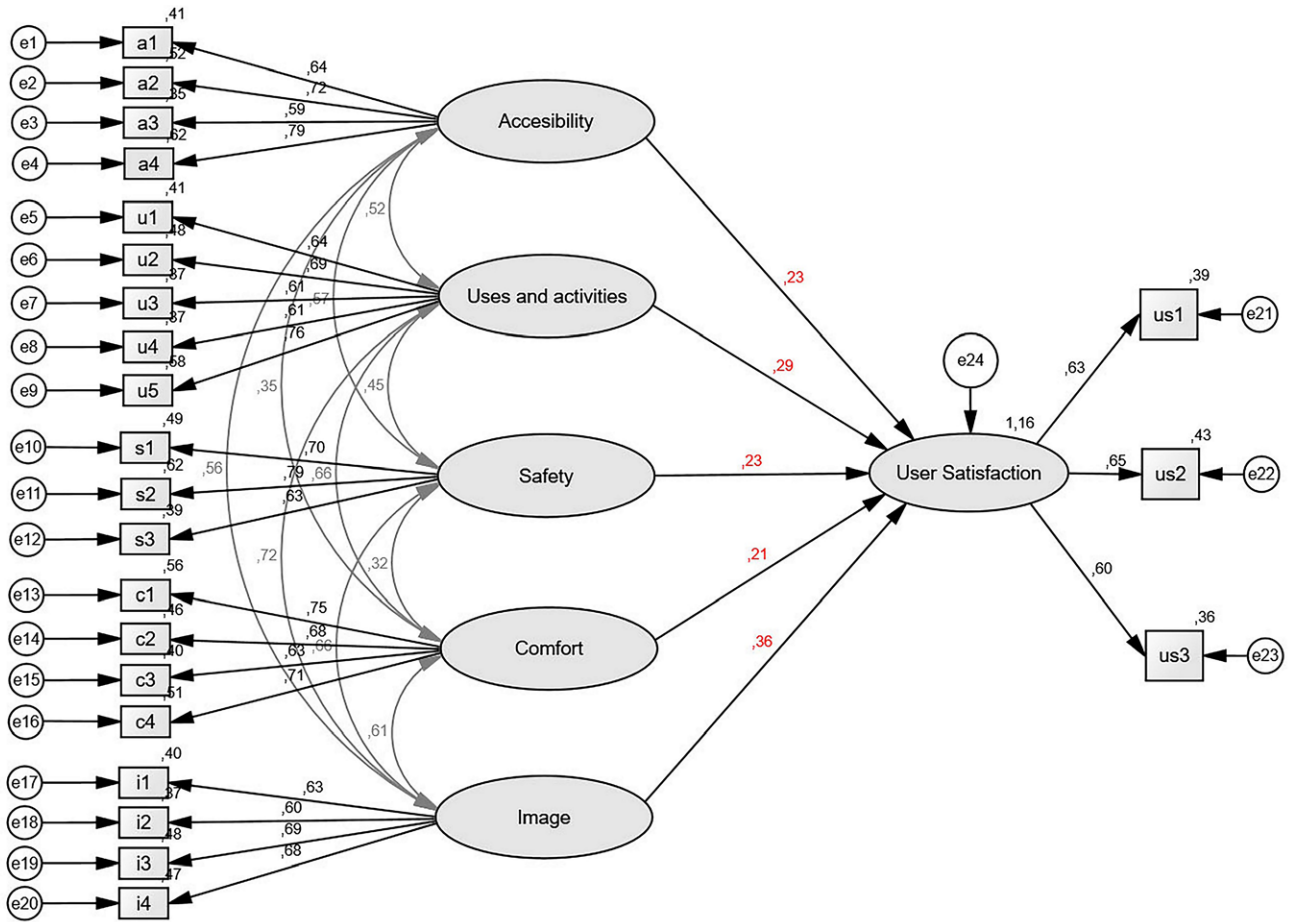
Figure 3. The SEM path diagram of user satisfaction and public space quality indicators at Hasanpaşa Gazhane
(Source: Authors, 2023)

Table 4. The fit index values of the developed SEM
(Source: Modified by the Authors and based on Yan and Shahraki (2023, p. 11))

Overall model	Fitting index	Standard	Model fitting
Absolute fit	CMIN/DF	1-3	1.142
	GFI	>0.9	0.906
	RMR	<0.05	0.027
	RMSEA	<0.1	0.027
Relative fitting index	IFI	>0.9	0.981
	CFI	>0.9	0.981
Simplified fitting index	PNFI	0-1	0.737
	PGFI	0-1	0.706
	CAIC	-	629.433

In this study, the SEM framework incorporates factor constructs such as accessibility, uses and activities, safety, comfort, and image, as independent variables. The observed variables, identified by EFA, are used to assess the potential influence of these variables on the dependent variable, user satisfaction (Figure 3). User satisfaction is a dependent variable that is derived from multiple observed variables, including satisfaction with the quality of the physical environment, overall satisfaction with the space, and the extent to which the public space fulfills user expectations. The SEM includes direct paths that connect each factor construct to user satisfaction, allowing the measurement of their direct impact on user satisfaction. Moreover, the model is specifically designed to investigate potential indirect connections, such as the path through which safety might indirectly impact user satisfaction by means of enhancements in comfort, or how enhanced accessibility might positively influence user satisfaction by enabling efficient use and activities in the space. This in-depth examination provides a more profound comprehension of the factors that have a major influence on shaping user satisfaction. It also illustrates the complex relationship between these variables within the context of public spaces.

The SEM fit index values are assessed using absolute fit, relative fitting index, and simplified fitting index to determine the degree of agreement between the proposed model and the empirical data (Yan and Shahraki, 2023, p. 11). Results such as CMIN/DF, GFI, RMR, and RMSEA confirm the model fits within acceptable standards. The relative fit index (IFI and CFI) and the simplified fitting index (PGFI and CAIC) demonstrate that the model is robust and that its constructs make sense (Table 4). Furthermore, the SEM was found to be significant, with a p-value of 0.075. The Standardized Root Mean Square Residual (SRMSR) is 0.05, which is below the acceptable range for the SRMR index of 0-0.08 (Hu and Bentler, 1999). Thus, empirical evidence has demonstrated the significance of the structure of direct and indirect relationships.

FINDINGS AND DISCUSSION

The impact of various factors on user satisfaction with the public space at Hasanpaşa Gazhane has been examined through the application of SEM. The data presented in Table 5 show that the standardized factor loads for public space quality components on user satisfaction are 0.23, 0.29, 0.23, 0.21, and 0.36, for accessibility, uses and activities, safety, comfort, and image respectively. Accordingly, the perceptions of these components positively influence user satisfaction. The SEM provides evidence of a positive relationship between the perceived features of the public space and user satisfaction at Hasanpaşa Gazhane (Figure 3).

The SEM results indicate that among the five public space qualities, the image component has the greatest effect on user satisfaction ($\beta=0.36$, p=0.01). This component includes the perceived attractiveness and distinctiveness of the space, which are fundamental in shaping how the public perceives the environment. Scholars have underscored the pivotal role of aesthetic quality, visual appeal, environmental cleanliness, and maintenance in this regard (Zhang *et al.*, 2017; Liu and Xiao, 2021). Nasar (1990) supports this view by suggesting that both historical significance and maintenance and order critically influence the image of a space.

In the specific case of Hasanpaşa Gazhane, it is observed that local and historical characteristics (i3) and sense of belonging (i4) have a greater impact on image than maintenance and cleanliness (i1) and aesthetics and attractiveness (i2) (Table 3). Scholars argue that public spaces that foster community connections promote a sense of belonging, and significantly increase satisfaction (Francis *et al.*, 2012; Sakhaeifar and Ghoddusifar, 2016). The integration of historical elements is essential to empower individuals to connect with and find meaning in their surroundings. In support of this, Lotfata and Ataöv (2020) argue that historical continuity and socio-cultural values significantly increase the sense of belonging and satisfaction in urban environments, thereby deepening the connection between communities and public spaces. This evidence underscores the importance of designing public spaces that not only meet aesthetic and functional standards, but also reflect the historical and cultural context of communities.

As emphasized by Mehta (2014), public spaces to which people can assign meaning promote social interactions and the fulfilling of various needs such as socializing and relaxing. This study reveals a significant positive covariance of 72% between the uses and activities at Hasanpaşa Gazhane and its perceived image (Figure 3). Studies confirm the need to integrate image and functionality in public spaces to enhance urban life and user satisfaction (Dea and Kusuma, 2021).

The perception of Hasanpaşa Gazhane as a public space characterized by its diversity of uses and activities significantly influences user satisfaction ($\beta=0.29$, p=0.01). This demonstrates the pronounced attraction of environments that provide appropriate space for various interests and interactions without any obstacles or restrictions. The open spaces of the Gazhane are used for both programmed activities such as concerts and exhibitions, and spontaneous activities such as relaxing, socializing, walking the dog, and children cycling and playing.

The variety of functions and social activities in public spaces

Table 5. The SEM results for user satisfaction and public space quality indicators at Hasanpaşa Gazhane

Independent variable	Dependent variable	β	Standard Errors	Critical Ratios	p- values
User satisfaction	← Accessibility	**0.23**	0.08	2.73	**0.01**
User satisfaction	← Uses and activities	**0.29**	0.11	2.58	**0.01**
User satisfaction	← Safety	**0.23**	0.09	2.34	**0.02**
User satisfaction	← Comfort	**0.21**	0.06	2.34	**0.02**
User satisfaction	← Image	**0.36**	0.12	2.61	**0.01**

not only promotes the diversity and vitality of public life, but also strengthens community ties and creates an informal surveillance and monitoring network, thereby increasing feelings of safety (Jacobs, 1961; Newman, 1972; Gehl, 1987). The SEM results show a significant positive correlation between user satisfaction and the safety component (β=0.23, p=0.02), suggesting that the level of perceived safety increases satisfaction. Nevertheless, the degree of surveillance and control (S3) has a minimal effect on users' perceived safety (Table 3). These findings suggest that the social dynamics and ambience within a space are important in promoting a safe atmosphere. This is supported by the observed 66% significant positive covariance between image and the safety dimension, highlighting the integral relationship between the perceived image of a space and the sense of safety it provides. The findings of this study reinforce that while security measures are critical to ensuring the safety of public spaces, their implementation must be carefully considered to maintain the social structure and inclusive use of these spaces and to support a balanced approach.

The SEM results show a statistically significant relationship between user satisfaction and the comfort component (β=0.21, p=0.02). Comfort includes adequate seating arrangements that promote climatic comfort, active recreational spaces, and the harmonious integration of natural environments (Carr *et al.*, 1992). The academic discourse emphasizes the need for diverse and flexible seating in public spaces to improve comfort (Varna and Tiesdell, 2010; Lopes *et al.*, 2020), complemented by green spaces to improve climatic comfort through shading and other natural elements (Németh and Schmidt, 2007). However, within the SEM framework, the modest standardized regression weights assigned to climatic comfort (c2) and the presence of greenery (c3) indicate that these environmental considerations may not significantly influence satisfaction in the case area (Table 3). The results suggest that while comfort measures are significantly related to satisfaction, users may prioritize the experiential features of Hasanpaşa Gazhane, such as its cultural and social facilities, over the more physical attributes of climatic comfort and greenery. This reflects users' adaptation to the spatial constraints of the urban environment, where the value of a public space is measured not only by its physical attributes, but also by the richness of the experiences it provides. This assumption is supported by a 66% significant positive covariance between the uses and activities in Hasanpaşa Gazhane and the comfort dimension (Figure 3).

The SEM results show a statistically significant but moderate relationship between user satisfaction and accessibility (β=0.23, p=0.01), with less influence than factors such as image and uses and activities. Accessibility is a multifaceted dimension that encompasses how easily individuals can approach and use a space. Carr *et al.* (1992) and Kayden (2005) distinguish between physical access, which concerns the ability to physically enter a space, and symbolic access, which reflects the perceived inclusivity and welcoming nature of the space. Despite the implementation of security measures and physical barriers to the entrances of the Gazhane, the results show considerable consensus among respondents that barriers to entry do not exist. This is evidenced by the fact that perceived openness (a4) has a significant standardized regression weight of 79% within accessibility (Figure 3). The high level of user satisfaction with the openness of the Gazhane's entrances underscores the wider societal expectation that public spaces should offer both physical access and a welcoming environment, reflecting the essence of symbolic access. This aligns with academic debates on the importance of creating inclusive spaces that reflects the values and identities of the community (Jalili, 2020).

CONCLUSIONS

The study employs SEM to conduct a comprehensive analysis of how different aspects of public spaces directly impact user satisfaction and how the relationships between these components reflect on user satisfaction. The results of the SEM focusing on Hasanpaşa Gazhnane, indicate that the image dimension, and uses and activities dimension have a substantial influence on user satisfaction. Although accessibility, safety, and comfort contribute to user satisfaction, their independent effects are relatively less significant compared to other components. The study reveals that while each dimension has an individual effect on satisfaction, their combined effect leads to overall user satisfaction.

Public spaces, especially those in historic urban areas, play an important role in emphasizing local and historical identity and revitalizing urban areas with a new image. The study highlights that a welcoming atmosphere, supported by a local and historical character that promotes a sense of belonging, significantly increases user satisfaction. Implementing design strategies that promote adaptability and multifunctional use, combined with management strategies that support both planned and spontaneous activities, enhances the ability of public spaces to meet the diverse needs of users from different demographic and socio-economic backgrounds. These features promote social interaction among different user groups, fostering community cohesion and a sense of belonging to the space, thereby strengthening perceptions of safety, comfort, and accessibility. Thus, this study highlights the need to develop the diversity of activities and the image of the space in a balanced and consistent manner, as key drivers of user satisfaction in such public spaces. This approach ensures the preservation of the historical and cultural essence of the space while evolving to meet contemporary urban needs.

The study acknowledges certain limitations, such as the exclusion of socio-demographic variables from the SEM. Future research should address these limitations by including a wider range of variables and increasing the sample size to ensure more robust findings. The inclusion of socio-demographic variables in such assessments can provide nuanced insights into how social, economic, and political factors influence perceptions of publicness in these spaces. In doing so, researchers and practitioners can gain a more comprehensive understanding of the responsiveness and inclusiveness of public spaces, and ultimately contribute to the creation of vibrant and socially beneficial urban environments.

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