Yemi Marandi P. et al.
April 2026
Urban Economics and Planning
Volume 7, Issue 1

Analysis and evaluation of the role of street cafés in enhancing urban space quality (case study: eram boulevard, hamedan)

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Original Article

Received: 2025/09/05
Revised: 2025/10/05
Accepted: 2025/10/10

HOW TO CITE THIS ARTICLE

Yemi Marandi P. Sajad Zadeh H. Analysis and evaluation of the role of street cafés in enhancing urban space quality (case study: eram boulevard, hamedan). *Urban Economics and Planning* 7(1):118-143.

DOI: 10.22034/uep.2025.545079.1705

Abstract

Introduction: Street cafés have gradually emerged as socio-economic spaces in Iranian cities, possessing considerable potential to enhance the quality of public spaces. However, the expansion of these spaces often occurs without precise planning or alignment with the urban physical and social structure. This study aims to examine the relationship between the presence of street cafés and various dimensions of urban space quality along Eram Boulevard in Hamedan.

Methods: This descriptive–analytical and applied study targeted café staff and regular users of Eram Boulevard, including individuals who commute daily, work nearby, or use the boulevard for sports and walking activities. A purposive and convenience sampling method was applied, and a questionnaire with established content validity and a Cronbach's alpha of 0.94 was distributed to 380 participants. Data were analyzed using appropriate non-parametric statistical tests, including Chi-square and Friedman tests, in SPSS software.

Results: The findings revealed that the "Urban Vitality and Liveliness" index achieved the highest mean score of 3.44, indicating the role of street cafés in enhancing spatial dynamics, social interactions, and psychological security. The index for "Local Economy" (mean = 3.40) and "Aesthetics" (mean = 3.33) also performed well. Conversely, the dimensions of "Walkability" (mean = 3.09) and "Urban Environment" (mean = 2.88) received lower evaluations and require greater attention.

Conclusion: The results suggest that street cafés, beyond their mere consumptive function, can provide a platform for strengthening social capital, increasing urban vitality, and improving quality of life. The novelty of this study lies in its simultaneous assessment of social, psychological, aesthetic, economic, and environmental indicators, providing a comprehensive picture of the role of street cafés in enhancing the quality of public space. These findings can serve as a reference for human-centered urban planning and policy-making in similar cities.

Keywords

Eram Boulevard
Hamedan
Quality Enhancement
Street cafés
Urban Spaces

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1. Introduction

In recent decades, urban public spaces have played a crucial role in enhancing the quality of urban life by serving as a setting for social, cultural, and economic interactions (Hataminejad, Yadollahnia, & Mohammadisalmani, 2018; Takmil & Aminzadeh, 2024). These spaces not only provide opportunities for citizens' presence and participation but also enhance liveliness, sense of social belonging, and the visual quality of the environment (Takmil & Aminzadeh, 2024). Street cafés, as examples of semi-public spaces and "third places," provide a setting for informal interactions, relaxation, and collective experience, and can contribute to the dynamism of urban spaces (Dibazar, Toofan, Jamali, & Valizadeh, 2021; Waxman, 2006). The quality of café spaces depends on physical factors, including spatial legibility, visual order, accessibility, safety, and proximity to green spaces. With proper design and management, these factors can enhance user satisfaction and environmental quality (Takmil & Ghane, 2024; Waxman, 2006). Despite these potentials, the development of street cafés in many Iranian cities has occurred without planning and coordination, resulting in consequences such as sidewalk occupation, physical disorder, and a decline in urban landscape quality (Hataminejad et al., 2018). The present study, through a case study of Eram Boulevard in Hamedan, examines the role of street cafés in enhancing the quality of public spaces in eight dimensions: urban liveliness, physical quality, sense of social belonging, citizen interactions, user experience, spatial performance, environmental coherence, and sustainability. Moreover, by analyzing the factors influencing social interactions and user experience, it presents user-centered design, management, and planning strategies to enhance the dynamism, attractiveness, and environmental quality of public spaces (Takmil & Ghane, 2024).

This study seeks to answer the following questions:

1. Why are specific dimensions related to the quality of collective urban life more influential than others in determining the success of street cafés?
2. How can user-centered design approaches, smart management, and urban planning be utilized to enhance positive user experience and social dynamism around street cafés?

2. Research Background

Cafés and similar spaces, by fulfilling social and cultural roles, provide opportunities for informal interaction, strengthening social cohesion, and increasing the sense of belonging (Rosenbaum, 2006). These spaces enhance urban liveliness, social interactions, and environmental sustainability, and their proper design improves social performance and urban resilience (Clark & Sanchez, 2018; Walker & Marconi, 2019; Papageorgiou & Tsairidis, 2020; Rhodes et al., 2020). Domestic studies have also emphasized the importance of lighting, accessibility, social diversity, and human-centered design in realizing the concept of the "third place" and improving the quality of urban spaces (Salaripour & Beheshtizadeh, 2024; Hemmati et al., 2021; Mohammadi Salak et al., 2021; Ghaffarinassab & Mohammad Taghinejad, 2021; Ghalavand et al., 2021).

Recent findings (Mohammadi & Farahbakhsh Daghigh, 2023; Pereira et al., 2024; Amir et al., 2024; Noaime et al., 2025) emphasize the importance of user-centered design, furniture quality, aesthetics, accessibility, and psychological safety in enhancing user experience and social interactions, which form the conceptual framework of the present study.

Table 1. Summary of research background

Row	Author & Source	Year	Title of Article / Book	Research Method	Analysis Conducted	Key Finding / Result	Research Innovation Aspect	Related Index / Instrument
1	Oldenburg	1999	The Great Good Place	Theoretical analysis and case studies	Analysis of the concept of the third place and its social functions	Strengthening social bonds and civic participation	Focus on identity dimensions and sense of belonging	Sense of belonging, social interactions
2	Rosenbaum	2006	Exploring the Social Supportive Role of Third Places in Consumers' Lives	Qualitative study and interviews	Analysis of the social supportive role of third places	Social support, stress reduction, and improved psychological well-being	Integration of economic and social interaction dimensions	Social interactions, psychological security, and economic aspects
3	Papageorgiou & Tsairidis	2020	The Role of Street Cafes in Enhancing Urban Streetscape and Social Interactions	Descriptive and field analysis	Analysis of the effect of cafés on user experience and urban landscape	Improved aesthetics and increased interactions	Analysis of the urban landscape dimension	Environmental aesthetics, user experience

Row	Author & Source	Year	Title of Article / Book	Research Method	Analysis Conducted	Key Finding / Result	Research Innovation Aspect	Related Index / Instrument
4	Rhodes et al.	2020	Planning for Sustainable Open Streets in Pandemic Cities	Urban data analysis and case studies	Examination of flexible street design and walkability	Enhanced spatial experience and social performance quality	Use of measurable indicators	User experience, social interactions
5	Hemmati, Ghobadi & Hemmati	2021	Ethnographic Study of Café Culture in Somayeh Street, Tehran	Ethnography, participatory observation, and in-depth interviews	Everyday practices, cultural habits, human interactions	Cafés as urban subcultures and spaces for lifestyle and cultural exchange	Multidimensional approach to street café analysis	Social interactions, sense of belonging
6	Mohammadi Salak, Asgari & Fateh	2021	Feasibility Study of Ray Oldenburg's Third Place Emergence in Café Interior Design	Comparative field analysis, content analysis	Study of physical elements, café performance, and psychological aspects	Comfort, informality, and human-centered design increase user presence and interaction	Focus on urban quality of life	Liveliness, user experience
7	Ghaffarinassab & Mohammad Taghinejad	2021	Space Consumption and Redefinition of Femininity: Women's Café Experience in Shiraz	Cultural and sociological analysis, qualitative interviews, narrative analysis	Analysis of women's lived experience and gender structures	Redefinition of femininity and increased social interaction among women	Specific case study	Social interactions, sense of belonging
8	Ghalavand, Abdollahi, Soltanifar & Sharifi	2021	Analysis and Explanation of the Everyday in Urban Public Spaces: Case Study of Cafés in Dezful	Field studies and content analysis	User behavior, social interactions, and physical changes	Reproduction of identity and urban dynamism through interactive and cultural spaces	Integration of the third place theory with environmental design	Physical quality, social interactions
9	Saphan, Pipitone & Perez-Garcia	2022	Outdoor Dining and the Transformation of Public Space in NYC	Qualitative analysis and Lefebvre's spatial theory	Study of outdoor restaurants and cafés	Improved social interactions and local economy	Integration of quantitative and qualitative approaches	Social interactions, economic aspects
10	Fan et al.	2023	Diversity Beyond Density	Mobile and social network data analysis	Analysis of interactions and social diversity in streets	Enhanced interactions and social diversity at night	Study of nighttime liveliness	Liveliness, social interactions
11	Salaripour & Beheshtizadeh	2024	The Impact of Third Place Quality on Urban Space Liveliness (Chaharbagh Abbasi)	Mixed (quantitative and qualitative)	Study of physical and social elements and user diversity	Increased social interactions and quality of life	Use of updated domestic and international sources	Liveliness, user experience
12	Korkmaz	2024	Parklets as Public Space	Case study	Examination of parklets and redefinition of small urban spaces	Optimal use of small urban areas	Redefinition of small spaces	User experience, physical quality
13	Pereira et al.	2024	The Impact of Urban Design on Utilitarian and Leisure Walking	Statistical and comparative analysis	Analysis of urban design elements and landscape quality	Increased functional and recreational walking	Urban design and walkability	User experience, liveliness
14	Amir et al.	2024	Urban Public Space as Social Interaction Space (Petaling Street)	Field study and questionnaire	Study of urban furniture, lighting, and green space	Increased sense of belonging and social interaction	Localization model	Sense of belonging, social interactions, user experience
15	Noaime et al.	2025	Sustainable Cities and Urban Dynamics: The Role of Café Culture in Transforming the Public Realm	Qualitative field study	Analysis of the social, cultural, and psychological roles of cafés	Improved sense of place, psychological security, and social interactions	Applicability in urban planning	Liveliness, sense of belonging, psychological security, and social interactions

3. Theoretical Framework

The theoretical framework of this study has been developed with the aim of a multidimensional examination of street cafés as one of the key factors in enhancing the quality of urban spaces. In recent years, these spaces have attracted special attention in urban studies, environmental design, and human-centered planning. Street cafés do not merely serve a consumptive function; rather, they play significant social, economic, cultural, aesthetic, and even psychological roles that directly contribute to improving environmental quality and urban vitality (Farashkhiabani, Shahabian, & Pouyan, 2019; Rahmani & Rafiepour, 2022).In connection with Oldenburg's "third place" theory (Oldenburg, 2013), street cafés are considered spaces situated between the home (the first place) and the workplace (the second place), where face-to-face interactions, conversation,

relaxation, and social participation occur. These spaces are not only venues for rest and consumption but also act as social, economic, and aesthetic elements that contribute to the dynamism of urban life and the lived experience of citizens (Abedini & Saket Hasanaloui, 2021).From a design perspective, the combination of appropriate furniture, human-scale lighting, and the presence of natural vegetation is a key element in improving the environmental quality of these spaces (Gehl, 2011; Amir, Azizan, Zahari, & Asmawi, 2020). Moreover, spaces with visual openness and legible signage enhance citizens' sense of security and environmental control (Rhoads, Solé-Ribalta, González, & Borge-Holthoefer, 2020). Street cafés can be examined across functional, social, physical, economic, environmental, identity-related, walkability, and flexibility dimensions. From a functional perspective, these spaces provide a setting for everyday interactions—a place for meeting, conversation, work, recreation, and leisure that remains active throughout the day and night, thereby enhancing the liveliness and safety of urban spaces (Salari Pour & Beheshtizadeh, 2024; Dibazar, Toofan, Jamali, & Valizadeh, 2021). Rahmani & Rafiepour (2022) also emphasize that such spaces play a peace-oriented role within the urban fabric by fostering psychological relaxation, reducing stress, and promoting civil behavior.From a social perspective, street cafés provide suitable grounds for forming face-to-face relationships, fostering neighborhood cohesion, and cultivating a stronger sense of place attachment. Studies by Mortazhejri, Modiri, & Atousa (2019) and Dibazar et al. (2021) indicate that social interactions in public spaces depend on design, accessibility, and the psychological atmosphere of the space; street cafés, by providing an open, casual, and everyday environment, reinforce these factors.Research by Abedini & Saket Hasanaloui (2021) in Urmia also demonstrates that these spaces function as social and cultural hangouts, effectively supporting the continuity of social behaviors. The semi-public nature of such cafés facilitates conversation, sociability, and face-to-face communication among different social groups. The presence of people in these environments not only enhances the quality of social relationships but also strengthens individuals' bonds with the place by generating shared memories and collective experiences (Rahrovi Poudeh et al., 2019).The sense of place attachment results from individuals' emotional and psychological connection to an environment. Studies show that continuous presence in spaces such as street cafés, along with meaningful experiences and social interactions, can strengthen this sense of belonging among citizens (Waxman, 2006; Takmil & Aminzadeh, 2024). In fact, places that provide opportunities for social experiences and face-to-face interactions increasingly acquire individual and collective meaning and identity. Street cafés, through visual elements, urban furniture, and appropriate design, can contribute to enhancing the visual quality and streetscape. The use of diverse layouts, proper lighting, and a mix of active street-front uses promotes liveliness, psychological security, and environmental attractiveness (Takmil & Ghane, 2024; Noaime et al., 2025).By attracting people and stimulating the local economy, street cafés strengthen the social fabric and increase neighborhood commercial activities. Continuous presence in these spaces enhances economic participation and supports social sustainability in the community (Hataminejad, Yadollahnia, & Mohammadisalmani, 2018). Research shows that streets with open spaces, such as street cafés, exhibit higher levels of urban liveliness. This liveliness not only increases people's presence and reduces mere pass-through traffic but also improves the overall quality of urban life (Rahrovi Poudeh et al., 2019; Saphan et al., 2022).From a physical perspective, street cafés—especially in pedestrian-oriented areas, such as walkways or historic passages—possess a high visual and perceptual quality. Takmil & Ghane (2024) identify the use of appropriate urban furniture, human-scale lighting, and attention to the nighttime streetscape as key factors in enhancing the attractiveness and identity of these spaces. Moreover, the study by Fan et al. (2023) shows that café spaces, by reflecting local and cultural cues, contribute to improving the legibility and aesthetics of the urban streetscape.From an economic perspective, street cafés play a significant role in enhancing the local economy. According to Noaime et al. (2025), these spaces foster economic sustainability at the neighborhood scale by increasing foot traffic, attracting tourists, and boosting small businesses.In terms of environmental quality and sustainability, studies such as Takmil & Ghane (2024) and Hataminejad et al. (2018) emphasize that street cafés, through low-consumption designs, the use of sustainable materials, and attention to natural elements, can reduce environmental pollution and improve urban environmental quality.The role of street cafés in promoting walkability is also noteworthy. Research by Saphan et al. (2022) and Pereira, Santana, & Vale

(2024) demonstrates that cafés, when situated along pedestrian paths and in open urban spaces, enhance the experience of movement and stopping, creating a sense of invitation through interactive design. Regarding urban identity, street cafés reflect local culture and everyday life, thereby contributing to place identity and social belonging (Takmil & Aminzadeh, 2024).Finally, from a functional flexibility perspective, street cafés can adapt to diverse and changing user needs. Open designs, usability in varying climatic conditions, and the integration of cultural, recreational, and economic functions make them multifunctional elements within urban spaces (Korkmaz, 2024; Walker & Marconi, 2019).

In summary, street cafés are not only physical and service elements in urban spaces but also act as key factors in creating interactive environments, enhancing quality of life, strengthening place attachment, and supporting social, economic, and environmental sustainability. These characteristics are particularly impactful in cities with rich historical and cultural textures, such as Hamedan, where they contribute to realizing the principles of human-centered and dynamic urban design. The conceptual model of this study is designed to explain the mechanisms through which street cafés influence the quality of urban public spaces. Within this framework, street cafés, as active elements in semi-public spaces, play a crucial role in enriching the urban lived experience.

This model is based on eight key indicators, each representing a dimension of urban space quality:

- Liveliness is enhanced through the active and dynamic presence of citizens in the space.
- Social interactions are facilitated by providing opportunities for face-to-face communication and the formation of social bonds within café settings.
- Aesthetics of the space are improved through attractive environmental design, urban furniture, and lighting.
- Sense of security is strengthened by increased presence of people, natural surveillance, and reduction of blind spots.
- In the economic dimension, these spaces support small businesses and attract visitors, thereby contributing to local economic strengthening.
- Walkability is enhanced by encouraging pedestrian movement, reducing car dependence, and improving safe access.
- Spatial flexibility refers to the adaptability of the space for use under varying conditions and times.
- Finally, environmental sustainability is achieved through pollution reduction, efficient use of small urban spaces, and expansion of green areas, making it a key goal in the formation of such spaces.

This model provides a suitable theoretical framework for analyzing research data and explaining the role of street cafés in enhancing the quality of public urban spaces.

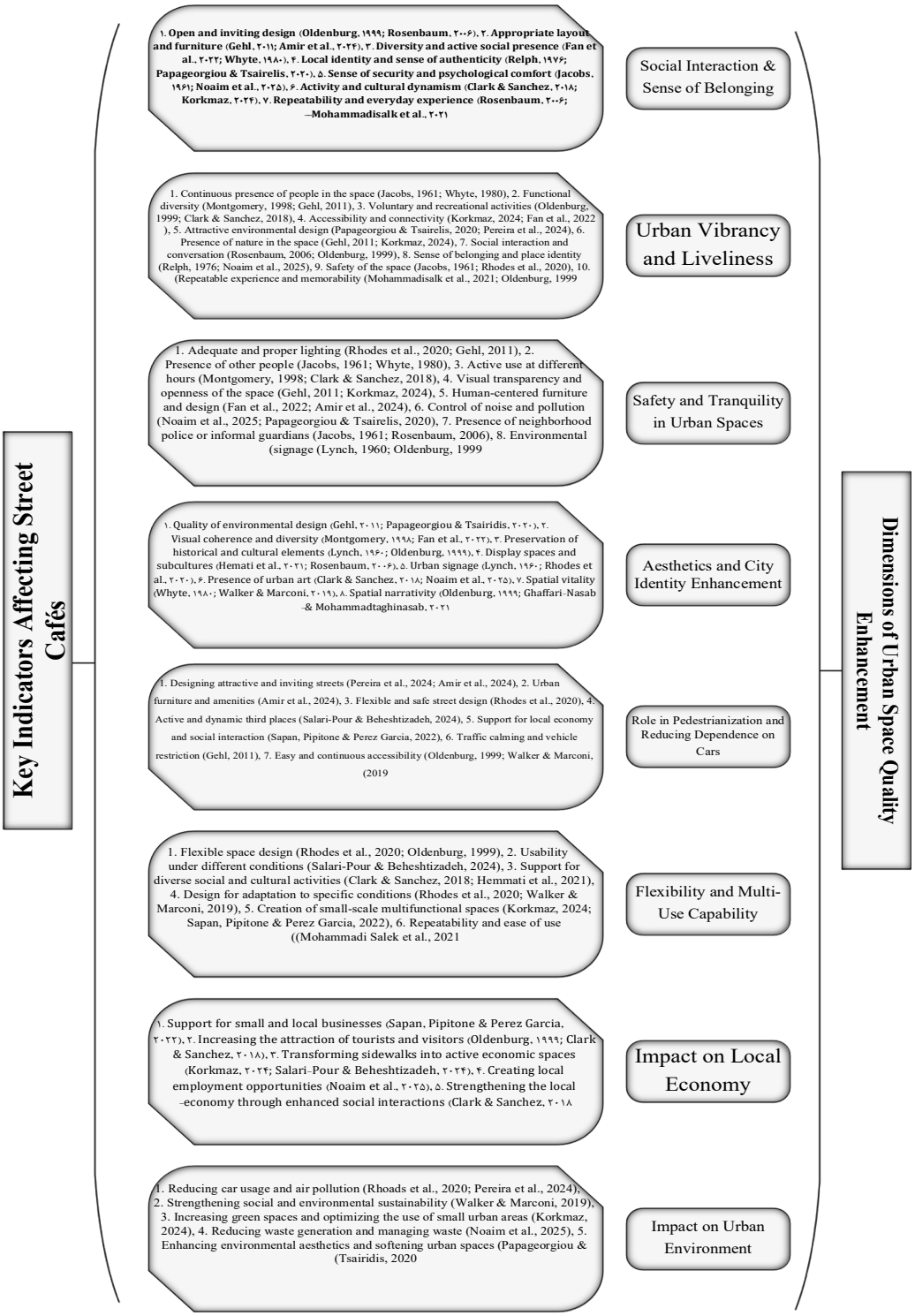

Figure 1. Conceptual framework of the study, illustrating the relationship between the main topic, dependent variables, and questionnaire indicators

4. Research Methodology

This study employs a descriptive–analytical approach with an applied focus, examining the impact of street cafés on the quality of public urban spaces along Eram Boulevard in Hamedan. The research aims to analyze the multidimensional indicators of liveliness, physical quality,
sense of belonging, social interactions, and user experience, and to provide strategies for user-centered design and management.

The statistical population consists of two main groups:
1. Citizens and visitors of Eram Boulevard who use public spaces and street cafés.
2. Urban design experts with experience in urban space quality and social interactions (20 individuals).
For the first group, simple random sampling was used, resulting in a final sample of 380 participants. Data were collected from Khordad to Mehr 1403 (May–October 2024), with an effective response rate of 92%. Non-responses were managed through follow-up visits. For the second group, purposive sampling included 15 experts.
Data collection relied on two primary sources:
- Library studies, including theoretical foundations, literature review, and international experiences.
- Field studies, including user questionnaires and on-site observation.

The questionnaire consisted of 45 items across eight indicators—liveliness, physical quality, sense of belonging, social interactions, user experience, aesthetics, accessibility, and psychological security—each measured on a five-point Likert scale (1 = very low, 5 = very high). Field observation recorded social behaviors, space utilization, interaction types, and objective assessments of environmental quality.
Each research indicator was operationalized as follows:
- Urban liveliness: lighting, diversity of activities, presence of different social groups, sound, and movement.
- Physical quality: furniture design, accessibility, and spatial order.
- Social belonging: interactions among users and psychological sense of security.
- User experience: satisfaction and frequency of returning to the space.

Other indicators were defined through measurable and relevant items aligned with the study's objectives. To ensure the validity and reliability of the questionnaire, it was reviewed by five university professors and urban design experts, and necessary modifications were applied. The overall reliability of the instrument was calculated using Cronbach's alpha, which yielded a value of 0.93. Each dimension showed the following alpha values: liveliness (0.89), physical quality (0.91), sense of belonging (0.88), social interactions (0.90), user experience (0.87), aesthetics (0.89), accessibility (0.85), and psychological security (0.86). Factor analysis and item screening were performed with the Kaiser-Meyer-Olkin (KMO) measure of 0.912 and Bartlett's test ($\chi^2 = 2385.67$, $p < 0.001$). Exploratory factor analysis using principal components with Varimax rotation revealed that eight factors accounted for the indicators. Weak items were removed to optimize reliability; the item-screening table is provided in the appendix. Data normality was assessed using the Kolmogorov–Smirnov test. Results indicated that variables such as urban liveliness (Sig = 0.009), social interactions and sense of belonging (Sig = 0.001), aesthetics and identity (Sig = 0.000), security and comfort (Sig = 0.029), and local economic impact (Sig = 0.005) approximately followed a normal distribution, while role in walkability (Sig = 0.088) did not. Skewness and kurtosis values were also calculated to determine data dispersion. Values near zero for some variables, such as social interactions and sense of belonging, indicated suitability for parametric tests. In contrast, positive or negative skewness and kurtosis for variables such as aesthetics and identity exhibited slight deviations from normality. Based on the normality results, parametric tests (t-test, ANOVA, and Pearson correlation) were applied to variables that were found to be normally distributed. For non-normal variables, such as walkability, non-parametric tests (Friedman and Spearman correlation) were used, ensuring scientific justification and reliability of correlation and group-difference analyses. Quantitative data analysis was conducted using SPSS. Chi-Square tests examined the relationship between café design quality and social interactions, while the Friedman test ranked café design features from the users' perspective. Descriptive statistics, including mean and standard deviation, were also calculated. The innovation of this study lies in integrating quantitative and qualitative analyses, evaluating multidimensional social, economic, and environmental indicators, focusing on a case study of Eram Boulevard in Hamedan with a user-centered approach, and providing a comprehensive view of the impact of cafés on public space performance, along with practical strategies for urban design and management. In this study, kiosks or municipal "quarqara" units were defined as small structures approximately 12–15 m² in area, located along sidewalks or within Eram Park. Their operation is permitted directly by the municipality or through contracts with private contractors. These kiosks typically offer a short menu including beverages, fast food, souvenirs, and handicrafts, with a capacity of 4–12 people per unit. Seating is primarily located outdoors, directly facing the sidewalk, to facilitate easy access for citizens and tourists. According to official announcements from the Hamedan Municipality and reports from Hamadan Payam and IRNA news

agencies, 30 kiosk units have been established along Eram Boulevard, primarily near Eram Park and Rainbow Amusement Park. Peak activity occurs in the evenings, nights, and on weekends. This categorization and operational description provide documented data for urban decision-making, enabling better planning for sidewalk allocation, lighting, urban furniture, and visitor flow management.

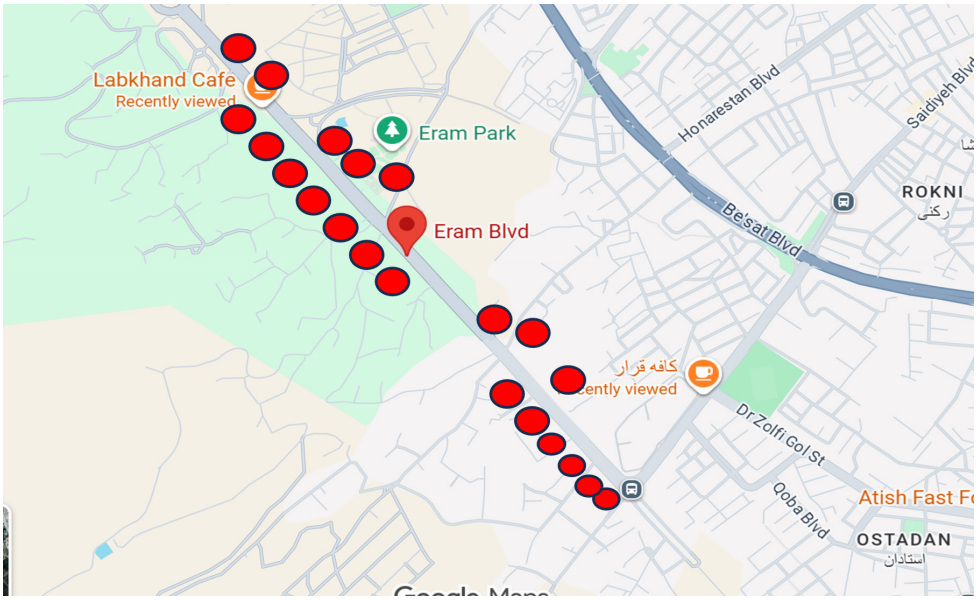

Figure 2. Location of street cafés along eram boulevard, hamedan

To better understand the study context and analyze the impact of street cafés, it is essential to consider the physical changes and urban interventions implemented along Eram Boulevard in recent years. Previously, this boulevard was primarily a high-traffic, car-oriented route; however, through urban renewal and improvement projects, its physical structure, social functions, and urban quality have undergone significant changes. These interventions include the expansion of sidewalks, the installation of urban furniture, the creation of green spaces, the design of seating areas and street cafés, enhanced lighting, and improved environmental safety. Attention to these developments provides the necessary context for examining the effects of street cafés and kiosks on the experiences of citizens and tourists, social interactions, and the quality of public spaces. Street cafés not only serve as points for food services but have also become social hubs and semi-public gathering spots along the sidewalks, playing a crucial role in defining the spatial identity of the boulevard and enhancing its attractiveness for visitors. The timeline below (Figure 3) illustrates the chronological progression of the most significant interventions along Eram Boulevard, from initial studies to the current established condition. This developmental trajectory provides a framework for analyzing the effects of cafés on public space quality and urban lived experience, enabling the identification of peak gathering points, the distribution of social functions, and interactions among different user groups.

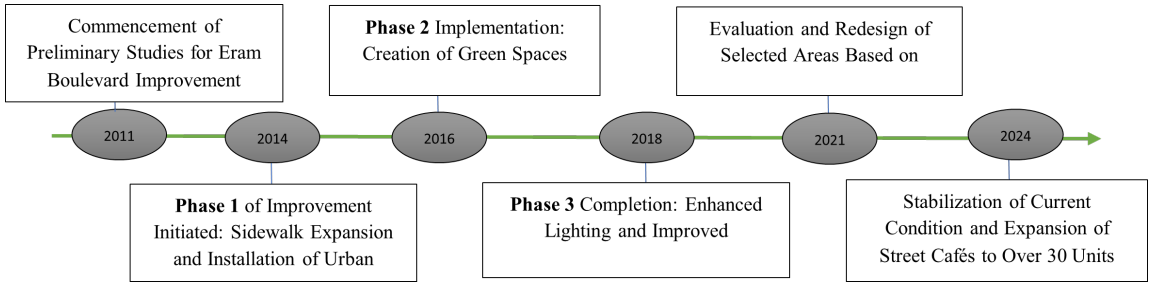

Figure 3. Timeline of developments and urban improvement interventions along eram boulevard (2011–2024)

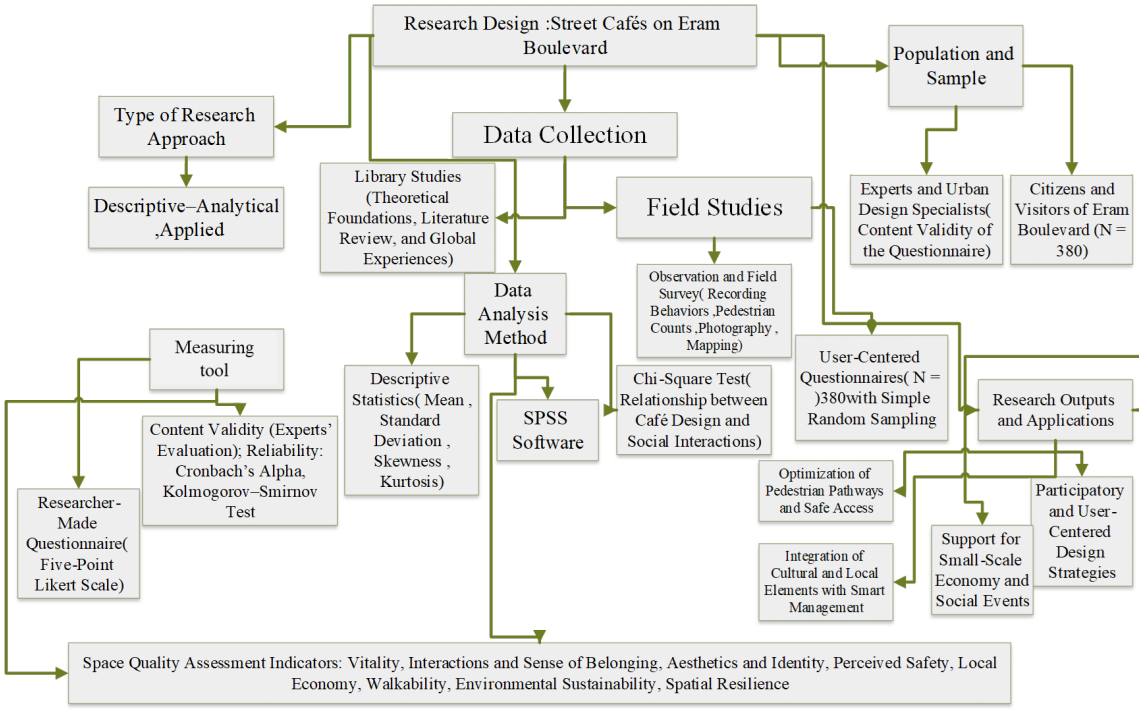

Figure 4. Research process: operational framework and implementation stages

4.1. Case Study Introduction: Eram Boulevard, Hamedan

Eram Boulevard in Hamedan—previously known primarily as a heavily trafficked, car-oriented route—has, in recent years, undergone extensive urban regeneration and improvement projects (from 2017 to late 2018), transforming it into one of the city's most vibrant and pedestrian-friendly spaces. The boulevard is located in central Hamedan, at coordinates 34.7993°N and 48.5207°E, with a total length of approximately 1.5 kilometers. Along this axis, there are more than 30 active street cafés offering food services, cultural activities, and public resting spaces. The boulevard's enhancement plan included sidewalk expansion, creation of green areas, installation of urban furniture, and the design of street cafés as key components of public space revitalization. These environmental improvements have led to a significant enhancement of urban aesthetics, increased vibrancy and social interaction, and improved citizens' urban living experience. Today, Eram Boulevard serves as a vibrant social, cultural, and artistic hub, reinforcing urban identity, attracting tourists, and boosting the local economy. To document these transformations, base maps of the boulevard before and after interventions (including the location of cafés and green spaces) are provided in the appendix.

Given its social significance, accessibility, and tangible spatial transformations, Eram Boulevard was selected as the case study of this research to analyze the impact of street cafés on the quality of public spaces and urban living experience. This boulevard offers a practical model for designing and managing similar urban corridors in other cities. Field data show that out of 30 total café kiosks managed by the municipality, 23 units are active while seven are inactive. Data were collected through a combination of official municipal reports, news agency archives, online directories, and on-site observations conducted between June and July 2025. Inclusion criteria covered all food-service units with direct access to sidewalks or park areas, excluding indoor or off-axis establishments. This documented mapping provides a reliable framework for analyzing spatial distribution and informing urban planning decisions.

Figure 5. Various views of eram boulevard, hamedan(a) aerial view (google maps), recorded on march 9, 2025(b) general view, recorded on january 6, 2025, at 10:52 a.M.(C) view of street cafés along eram boulevard, recorded on may 8, 2022(d) example of social activity and interaction, recorded on may 8, 2022

5. Findings

In this section, the results obtained from analyzing the data collected through the research questionnaire are presented. After data entry into the relevant statistical software, analyses were conducted using descriptive and inferential statistical methods. Initially, descriptive statistical indicators, including the mean and standard deviation, were reported for the main variables. Then, to examine the relationships and differences among the variables and to test the research hypotheses, various statistical tests were applied, such as the one-sample t-test, independent t-test, one-way analysis of variance (ANOVA), Friedman test, and Pearson correlation coefficient.

Table 2. Questionnaire reliability statistics

Cronbach's Alpha	Number of Items
0.942	56

Questionnaire Reliability Test (Cronbach's Alpha – Table 2)

- Relevance to Research Questions

Cronbach's alpha was used to assess the internal reliability of the questionnaire. It indicates the extent to which the items related to each variable (e.g., urban liveliness, social factors, aesthetics, etc.) are correlated with each other and, overall, are reliable.

- Reason for Use

Before data analysis, it is necessary to ensure that the questionnaire is a valid measurement tool. The Cronbach's alpha value of 0.94 indicates very high reliability, allowing the data to be considered valid for subsequent statistical analyses (e.g., correlation, ANOVA, etc.).

Table 3. Kolmogorov–smirnov test for assessing data normality

Variable	Sample Size (N)	Mean	Std. Deviation	Maximum Absolute Difference	Test Statistic	Significance (Two-Tailed)
Urban Liveliness and Activity	380	3.44	0.62	0.08	0.08	0.009
Social Factors and Sense of Belonging	380	3.34	0.68	0.09	0.09	0.001
Aesthetics and Identity	380	3.33	0.69	0.15	0.15	0.001
Safety and Comfort	380	3.36	0.62	0.07	0.07	0.029
Impact on Local Economy	380	3.40	0.68	0.09	0.09	0.005
Role in Pedestrian Mobility	380	3.09	0.79	0.06	0.06	0.088
Local Economy	380	3.21	0.70	0.11	0.11	0.001

Table 3 presents the results of the Kolmogorov–Smirnov test used to assess the normality of data distribution across different variables. For each variable, the table shows the test statistic, maximum absolute difference, and two-tailed significance level (Sig.).For most variables—Urban Liveliness and Activity, Social Factors and Sense of Belonging, Aesthetics and Identity, Safety and Comfort, and Impact on Local Economy—the significance level is less than 0.05, indicating that the data distribution for these variables is approximately normal. The only exception is Role in Pedestrian Mobility, where the significance level is 0.08, indicating that the distribution of this variable is not normal.

Relevance to Research Questions

This test examines whether the data for each variable (e.g., urban liveliness, social factors, aesthetics, etc.) follow a normal distribution.

- Reason for Use:

The choice of subsequent statistical tests depends on data normality. If the data are normally distributed, parametric tests such as the t-test and ANOVA can be applied; otherwise, non-parametric tests like the Friedman test should be used.

- Scientific Conclusion:

Normality was not rejected for most variables (liveliness, social factors, aesthetics, safety, impact on local economy). However, for Role in Pedestrian Mobility (Sig = 0.08), normality was rejected, and therefore, non-parametric tests should be used for analyses involving this variable.

Table 4. Descriptive statistics of research variables

Variable	N	Range	Minimum	Maximum	Mean	Variance	Skewness	Kurtosis
Urban Liveliness and Activity	380	3.33	1.67	5.00	3.44	0.39	-0.17	0.52
Social Factors and Sense of Belonging	380	3.67	1.33	5.00	3.34	0.46	0.08	0.79
Aesthetics and Identity	380	4.00	1.00	5.00	3.33	0.47	-0.86	2.72
Safety and Comfort	380	3.20	1.80	5.00	3.36	0.39	0.12	0.57
Impact on Local Economy	380	3.00	2.00	5.00	3.40	0.46	0.35	-0.28
Role in Pedestrian Mobility	380	3.67	1.33	5.00	3.09	0.62	0.22	-0.07
Local Economy	380	3.57	1.43	5.00	3.21	0.49	0.46	0.41
Impact on Urban Environment	380	3.83	1.17	5.00	2.88	0.81	0.36	0.12

Table 4 presents the descriptive statistics of the research variables, including mean, variance, skewness, and kurtosis. For each variable, the range, minimum and maximum values, mean, and variance are reported. For example, Urban Liveliness and Activity has a mean of 3.44 and a variance of 0.39, indicating a relatively uniform distribution of the data. Regarding skewness and kurtosis, positive and negative values indicate the shape of the distribution. For instance, Aesthetics and Identity have negative

skewness and positive kurtosis, suggesting a left-skewed distribution with a higher peak in the data.

- Relevance to Research Questions:

Descriptive statistics provide insight into the observed levels of each variable within the sample. For example, the mean value of urban liveliness (3.44) indicates that the level of liveliness in Eram Boulevard is moderate to relatively high.

- Reason for Use:

Descriptive statistics are essential for an initial understanding of the data, assessing dispersion, and preparing for subsequent analyses such as correlations and group comparisons.

Table 5. Correlation matrix of research variables

Variables	Liveliness	Social Factors	Aesthetics	Safety	Local Economy	Pedestrian Mobility	Local Economy²	Urban Environment
Liveliness	1	0.49	0.6and 0	0.52	0.69	0.34	0.46	0.49
Social Factors	0.49	1	0.46	0.61	0.42	0.30	0.44	0.36
Aesthetics	0.60	0.46	1	0.52	0.47	0.35	0.44	0.43
Safety	0.52	0.61	0.52	1	0.54	0.48	0.55	0.51
Local Economy	0.69	0.42	0.47	0.54	1	0.52	0.64	0.54
Pedestrian Mobility	0.34	0.30	0.35	0.48	0.52	1	0.68	0.62
Local Economy²	0.46	0.44	0.44	0.55	0.64	0.68	1	0.66
Urban Environment	0.49	0.36	0.43	0.51	0.54	0.62	0.66	1

From the correlation matrix in Table 5, it can be observed that most variables exhibit positive and significant correlations. For example, the correlation between urban liveliness and the local economy is 0.69, indicating a strong positive relationship between these two variables. Similarly, the correlation between pedestrian mobility and the local economy is 0.68, reflecting the impact of pedestrianization on improving urban economic conditions. This test is used to examine mean differences across different groups. In this section, the results of the analysis of variance (ANOVA) for various variables are presented to determine whether significant differences exist between the groups.

Correlation Matrix (Table 5)

- Relation to Research Questions:

This table investigates the positive or negative relationships among variables. For example:

A correlation of 0.69 between liveliness and the local economy indicates a strong positive association.

A correlation of 0.68 between pedestrian mobility and the local economy shows that increased pedestrian activity is associated with higher local economic performance.

- Reason for Use:

Pearson's correlation coefficient was applied because most variables follow a normal distribution. This test is used to address research questions regarding relationships among variables, i.e., whether changes in one variable are associated with changes in another.

Table 6. Results of the analysis of variance (anova) test

Variable	F Statistic	Between-Groups Degrees of Freedom	Within-Groups Degrees of Freedom	Significance Level (P-value)
Urban Vitality	4.56	3	146	0.004
Social Factors and Sense of Belonging	3.12	3	146	0.029
Aesthetics and Identity	5.72	3	146	0.000
Safety and Comfort	2.89	3	146	0.037
Impact on Local Economy	3.30	3	146	0.023
Role in Walkability	3.15	3	146	0.027
Local Economy	4.12	3	146	0.008

In Table 6, the Analysis of Variance (ANOVA) test was conducted for each variable. In general, the significance level (P-value) for most variables is less than 0.05, indicating significant differences between groups for these variables. For example, for the variable "Aesthetics and Identity," the F statistic is 5.721 and the significance level is 0.001, showing significant differences among the groups. Similarly, for the variable "Safety and Comfort," the significance level is 0.037, also indicating significant differences between groups.

ANOVA Test – Table 6

- Relation to Research Questions:

ANOVA was used to examine whether the means of variables differ significantly across different groups (e.g., age groups, gender, and education levels collected in the questionnaire).

- Reason for Use:

If we want to determine, for instance, whether the impact of street cafés on urban vitality differs among various groups, ANOVA is the most suitable test.

- Prerequisites:

The data for each variable must be approximately normal, and variances should be relatively equal, as these are parametric assumptions required for ANOVA. To ensure the validity of statistical analyses, the distribution of research variables was first examined using the Kolmogorov–Smirnov (K–S) test (Table 3). Results showed that most variables, including "Urban Vitality" (Sig = 0.009), "Social Factors and Sense of Belonging" (Sig = 0.001), "Aesthetics and Identity" (Sig = 0.001), "Safety and Comfort" (Sig = 0.029), and "Impact on Local Economy" (Sig = 0.005), have distributions close to normal and can be analyzed using parametric tests. Only the variable "Role in Pedestrianization" (Sig = 0.088) did not follow a normal distribution; therefore, non-parametric tests such as the Friedman test or Spearman correlation were used for this variable. To complement the analysis, skewness and kurtosis indices (Table 4) were also examined.

Table 7. Skewness and kurtosis indicators of research variables and interpretation of data distribution

Variable	Skewness	Kurtosis	Data Distribution Interpretation
Urban vitality	-0.17	0.52	Approximately normal distribution, moderate data concentration
Social factors and sense of belonging	0.08	0.79	Nearly balanced distribution, suitable for parametric tests
Aesthetics and identity	-0.86	2.72	A left-skewed distribution, characterized by higher dispersion, requires caution in interpretation.
Safety and tranquility	0.12	0.57	Approximately normal distribution, suitable for parametric tests
Impact on the local economy	0.35	-0.28	Slight positive skew and kurtosis, compatible with parametric tests
Role in pedestrian movement	0.22	-0.07	Asymmetric distribution, non-parametric tests required
Local economy	0.46	0.41	Relatively normal distribution, suitable for parametric analyses
Urban environmen;	0.36	0.12	Low data concentration, near-minimum normality; interpretation requires caution

Based on this analysis, the rationale for selecting the tests was as follows:

1. For variables with a normal distribution (Sig < 0.05 and skewness/kurtosis close to zero or balanced), parametric tests such as t-test, ANOVA, and Pearson correlation were used. These tests, assuming data normality and homogeneity of variances, provide accurate and reliable results.

2. For irregular variables or those deviating from normality (e.g., role in pedestrian movement), non-parametric tests were employed to ensure that analyses align with the actual data distribution and reduce the likelihood of error.

This approach ensured that correlation analyses, group differences, and other statistical tests were performed under the actual conditions of the data, thereby guaranteeing the scientific validity of the research findings.

Detailed item-level analysis

In addition to macro-level analyses, a detailed examination of individual questionnaire items within each research dimension provides precise insight into the most and least influential factors.

Table 8. Comparative analysis of items across different research dimensions

No.	Main Indicator	Sub-Indicator	Mean	Descriptive Result
1	Urban Vibrancy and Liveliness	Increase in public space dynamism and activity	3.57	Highest mean: "Increase in urban activities" (3.48); lowest: "Enhancing enjoyment of urban environment" (3.38), indicating a need to improve aesthetic aspects of street cafés.
		Attractive environment for prolonged citizen presence	3.56	
		Diversity and an increase in urban activities	3.54	
		Sense of sociality and companionship	3.46	
		Liveliness	3.47	
		Enhancement of enjoyment in the urban environment	3.40	
2	Social Interaction and Sense of Belonging	Increase in citizen interactions	3.76	Greatest impact: "Fostering intimacy" (3.44) and "Opportunities for social interaction" (3.43); lowest: "Increase in interactions among citizens" (3.14), indicating the need for effective policies to strengthen social ties.
		Opportunities for dialogue and social connections	3.63	
		Increase in empathy and attachment to place	3.69	
		Sense of familiarity and closeness	3.54	
		Formation of new friendships and acquaintances	3.26	
		Increase in social participation among groups	3.13	
3	Aesthetics and Urban Identity	Improvement of visual aesthetics	3.88	"Nighttime lighting impact on attractiveness" (3.88) ranks highest, emphasizing the importance of enhancing urban spaces; lowest: "Fostering identity and sense of belonging" (3.02) and "Cultural harmony" (3.12), highlighting the need for attention to cultural and identity features.
		Local identity and urban culture	3.80	
		Nighttime city attractiveness	3.79	
		Environmental attractiveness	3.38	
		Positive city image in citizens' minds	3.12	
		Identity-building and sense of belonging	3.02	
4	Safety and Comfort in Urban Spaces	Public space safety	4.05	Highest: "Creating a safe and friendly environment" (4.49); lowest: "Reducing defenseless areas" (3.16), indicating a need for structural safety improvements.
		Defenseless areas and increased surveillance	3.16	
		Crime and insecurity reduction	3.91	
		Nighttime safety	4.10	
		Pleasant and calming environment		
		Stress reduction and psychological security	4.14	
		Creating safe and friendly spaces	4.49	
5	Impact on Local Economy	Economic prosperity and job creation	3.84	Highest: "Attracting tourists and increasing local income" (4.55); lowest: "Affordability of prices and services" (3.22), highlighting the need to improve accessibility and economic accessibility.
		Attracting tourists and increasing local income	4.55	
		Increasing economic value of streets and neighborhoods	4.29	
		Strengthening local businesses	3.83	
		Increasing duration of citizen presence	4.21	
		Entrepreneurship opportunities for youth	4.07	
		Affordability of prices and services	3.22	

No.	Main Indicator	Sub-Indicator	Mean	Descriptive Result
6	Role in Pedestrianization and Reducing Car Dependency	Increasing citizens' tendency to walk	3.84	Highest: "Reducing reliance on personal vehicles" (4.55); lowest: "Creating attractive pedestrian paths" (3.22), indicating a need to improve pedestrian infrastructure near cafés.
		Reducing reliance on personal vehicles	4.55	
		Safe design of pedestrian paths	4.29	
		Enhancing pedestrian interaction with the urban environment	3.83	
		Encouraging public transport use	4.21	
		Reducing air and noise pollution	4.07	
		Assisting in creating attractive pedestrian routes	3.22	
7	Flexibility and Multi-Purpose Use	Usability at different times of day	3.78	Highest: "Citizen appreciation of functional diversity" (4.68); lowest: "Temporary change of use for special occasions" (3.58), indicating a need to improve flexibility and adaptability.
		Suitable for cultural, artistic, and social events	4.07	
		Usable in various weather conditions	4.04	
		Meeting diverse group needs	4.05	
		Temporary change of use possibilities	3.58	
		Adaptability to changing urban needs	3.79	
		Citizen acceptance of functional diversity	4.68	
8	Impact on Urban Environment	Reducing visual pollution	3.62	Highest: "Promoting nature and calmness" (3.78); lowest: "Improving urban air quality" (3.16), highlighting the need for further air and noise pollution mitigation.
		Use of environmentally-friendly materials	3.26	
		Use of plants and natural elements	3.59	
		Reducing noise pollution	3.58	
		Improving urban air quality	3.16	
		Enhancing the sense of nature and tranquility	3.78	

6. Discussion

Street cafés in recent years have emerged in the city of Hamadan as one of the new factors in enhancing the quality of urban spaces. The research findings indicate that these spaces have had a significant impact on various aspects of urban life, although the extent of this impact varies across different dimensions. In terms of urban vitality and liveliness, the most significant impact is related to the increase in dynamism and vibrancy of public spaces, with a mean of 3.57; this indicates that these cafés have successfully created active and lively spaces. In contrast, the sense of enjoyment of the urban environment, with a mean of 3.40, is at its lowest level, indicating that the surrounding areas of cafés still have room for improvement from both aesthetic and experiential perspectives. In the area of social interactions and sense of belonging, the highest mean pertains to the increase in interactions among citizens (3.76), and the lowest is related to the enhancement of social participation among different groups, with a mean of 3.13. This difference shows that street cafés have been able to increase surface-level and everyday interactions, but the necessary foundation for deeper social cohesion has not yet been established. The aesthetic quality of space has noticeably improved in terms of appearance, with visual enhancement having the highest mean of 3.88. However, identity creation and fostering a sense of belonging to the city, with a lower mean of 3.02, reveal a significant weakness. This suggests that the presence of cafés has only added a physical aspect to the city, without having a significant impact on enhancing cultural or historical attachment. In the dimension of security and comfort, the most significant effect is observed in creating a safe and friendly environment (mean = 4.49), which reflects an increased perception of mental security in urban spaces. However, the mean related to reducing defenseless urban spots is 3.16, indicating that physical changes and public space design for addressing urban vulnerabilities have not yet reached a desirable level. The economic impact of street cafés is also significant. The highest mean in this section relates to tourist attraction and local income increase (4.55), indicating

the active role of these spaces in promoting the micro-economy. In contrast, the affordability of services, with a mean of 3.22, suggests that lower-income groups may face economic constraints in utilizing these spaces, highlighting the need for supportive policies and price adjustments. In the area of pedestrianization and sustainable transportation, the data show that cafés have played an important role in reducing dependence on private vehicles (mean = 4.55). However, the satisfaction level regarding the creation of attractive walking paths, with a mean of 3.22, indicates that the quality of pedestrian routes and related facilities still requires improvement. Café spaces are also appreciated from the multifunctionality perspective, with citizen acceptance of functional diversity reported as high (mean = 4.68). Nevertheless, the possibility of temporary functional changes for special occasions only achieved a mean of 3.58, indicating that the design of these spaces still lacks sufficient flexibility to respond to varying social conditions. In the urban environmental dimension, the enhancement of a sense of nature and mental calm scored the highest mean (3.78), reflecting mainly psychological and relaxation benefits. However, improvements in urban air quality, with a mean of 3.16, remain low, showing insufficient attention to technical and operational environmental aspects in the design of these spaces. In summary, street cafés in Hamadan have performed relatively well in areas such as enhancing perceived security, boosting the local economy, reducing car dependence, and creating multifunctional spaces. However, shortcomings remain in areas such as cultural identity enhancement, economic equity, quality of pedestrian design, and environmental efficiency. Therefore, the development and expansion of these spaces should be approached more comprehensively, considering diverse spatial, social, and environmental needs, to effectively contribute to the improvement of urban quality of life. In this section, the data collected through the research questionnaires were analyzed using statistical software and descriptive and inferential statistical methods. First, the reliability of the measurement tool was thoroughly examined to ensure that the instrument had high credibility in measuring the research variables. Then, the normality of the data was assessed using appropriate statistical tests to determine the suitable methods for data analysis. Subsequently, descriptive statistics of the variables, correlation analysis, hypothesis testing, and regression models were presented in detail, step by step.

To evaluate the reliability of the questionnaire, Cronbach's alpha coefficient was used, which is one of the most credible indicators in this field. The calculated Cronbach's alpha was 0.94, indicating very high internal consistency among the items and a strong reliability of the data collection instrument. This level of reliability demonstrates that the questionnaire had a coherent and robust structure for measuring the research variables, and the results obtained from it are trustworthy. To assess the normality of the variable distributions, the Kolmogorov–Smirnov test was applied. The results showed that most research variables did not follow a normal distribution (Sig. < 0.05), except for the variable "role in pedestrianization", which had a significance level of 0.088, indicating an acceptable normal distribution. Therefore, in subsequent statistical analyses, a combination of parametric and non-parametric methods was employed to ensure maximum accuracy and validity of the results. The mean scores of most research variables were above the midpoint of the Likert scale (3), indicating a positive attitude of respondents toward the examined components. This suggests that the participants had a favorable perception and understanding of street cafés and their role in improving urban quality of life. Pearson correlation analysis revealed a positive and significant relationship between urban vibrancy and citizens' perceived psychological security. The correlation coefficient between these two variables was 0.52, with a significance level of $p < 0.001$. A simple linear regression model also confirmed this relationship, showing that urban vibrancy explained 27.3% of the variance in perceived psychological security. These findings indicate a direct and meaningful impact of urban vibrancy on residents' sense of calm and psychological security. The correlation analysis further showed that positive evaluations of street cafés are strongly associated with higher levels of social interactions and place attachment. The correlation between these two variables was 0.79, with $p < 0.001$, indicating a very strong and significant relationship. The regression model demonstrated that over 63% of the variation in café evaluation could be explained by these two variables. These results highlight the key role of street cafés in strengthening social ties and spatial cohesion within the urban fabric. The correlation between these two variables was 0.79 with a significance level of $p < 0.001$, indicating a very

strong and significant relationship. The regression model also showed that over 63% of the variations in café evaluations could be explained by these two variables. These findings clearly highlight the key role of street cafés in strengthening social relationships and spatial cohesion within the urban fabric. Furthermore, correlation results between café evaluation and the variables “aesthetics” (0.70) and “pedestrianization” (0.73), both with $p < 0.001$, revealed a positive, strong, and significant relationship. Multiple regression analysis indicated that these two variables, combined, explained approximately 76% of the variance in attitudes toward street cafés. This demonstrates that the multifunctionality of café spaces not only enhances the visual quality of the environment but also promotes a pedestrian-oriented lifestyle and reduces reliance on cars.Previous studies have widely emphasized the importance of the “third place” and its role in enhancing social interactions and urban quality of life. For instance, Oldenburg (1999) introduced the concept of the third place, highlighting cafés as key in forming social bonds. Subsequent studies, such as Rosenbaum (2006) and Perez-Garcia et al. (2022), confirmed the impact of cafés on increasing place attachment, social support, and the quality of public spaces. Contemporary research, including Korkmaz (2024) and Naayem et al. (2025), also demonstrates the significance of creative urban design and café culture in strengthening place identity and urban vibrancy. Compared to these studies, the findings of the present research not only emphasize the positive and significant impact of street cafés on social interactions and urban vibrancy but also provide strong statistical evidence for the mediating role of these spaces in enhancing psychological security and promoting a pedestrian lifestyle. Unlike some studies that approached the topic qualitatively or conceptually, this research employs multiple regression analyses and quantitative correlation tests to clarify the precise relationships among aesthetics, pedestrianization, and café evaluation. The high correlation coefficients (up to 0.77) and the substantial explained variance (up to 76%) indicate that this study provides a higher level of accuracy and comprehensiveness in analyzing the role of street cafés.Moreover, this study uniquely considers psychological security and positive attitudes toward cafés, addressing both the social and psychological dimensions of urban spaces simultaneously—a perspective that previous studies rarely examined quantitatively. This comprehensive approach significantly differs from most prior research, which focused mainly on cultural, architectural, or design aspects of spaces. Ultimately, the findings suggest that street cafés function not only as third places but also as practical tools for enhancing urban quality of life, increasing psychological security, and supporting sustainable urban development, offering a new and actionable perspective for policymakers and urban designers. Among the examined dimensions, the “urban environment” indicator, with a mean of 2.88, received the lowest score.This result indicates that although the street cafés along Boulevard Eram have been successful in enhancing social interactions and urban vibrancy, their performance in terms of the environmental dimension has been weaker. Field observations revealed that waste management issues, high usage of disposable containers, and a lack of green infrastructure in some cafés have reduced citizens’ environmental satisfaction. Therefore, it is essential for the street cafés along this corridor to adopt approaches such as energy-efficient equipment, environmentally friendly design, and sustainable waste management to play a more active role in achieving environmental sustainability. This research, adopting a multidimensional approach, examines the effects of street cafés on urban quality of life and integrates several innovative aspects. Among these innovations is the simultaneous analysis of social, psychological, aesthetic, economic, and environmental indicators, providing a comprehensive, data-driven view of cafés’ role in enhancing public space quality. Ethnographic studies in Tehran indicate that cafés, as an urban subculture, provide spaces for alternative lifestyles and cultural exchange, and by strengthening social interactions and place attachment, they improve urban quality of life (Hemmati et al., 2021). Furthermore, field and analytical studies in Shiraz and Dezful have shown that intelligent environmental design, strategic placement, and integration of cultural and local elements increase vibrancy, user experience, and reinforce urban identity (Ghaffarisab & Mohammadtaghinejad, 2021; Ghalavand et al., 2021). Comparative studies in indoor and street spaces, emphasizing human-centered design and user behavior analysis, demonstrate that psychological, economic, and aesthetic indicators can simultaneously enhance social interactions and users’ mental well-being (Mohammadi Salek et al., 2021; Rosenbaum, 2006; Clark & Sanchez, 2018). Recent studies on nighttime vibrancy, redefinition of small spaces, and

localization patterns indicate that proper placement of furniture, lighting, and green spaces increases active citizen presence and strengthens place attachment and psychological security (Fan et al., 2022; Korkmaz, 2024; Amir et al., 2024).Finally, the integration of quantitative and qualitative methods, combined with field and survey data, allows for an accurate assessment of the effects of street cafés on vibrancy, social interactions, and physical and economic quality of urban spaces, providing a generalizable model for human-centered urban planning and sustainable cities (Saphan et al., 2022; Noaime et al., 2025). This comprehensive approach to methods and indicators is the main distinction of this study compared to previous research, and its outcomes include enhancing spatial experience, increasing social interactions, strengthening place attachment, and improving users' psychological well-being.

Question 1:

Why do some dimensions related to collective urban life quality have a greater impact on the success of street cafés than other aspects?

Answer:

Statistical analysis indicated that dimensions of urban life associated with spatial vitality, continuous citizen presence, and psychological security—with a mean of 3.44 and standard deviation of 0.62—have the greatest impact on the success of street cafés. The normality of the data distribution (Sig = 0.009) confirms that such spaces, by increasing foot traffic and reducing fear, create lively and dynamic environments. Additionally, social aspects and place attachment with a mean of 3.34, skewness of 0.08, and kurtosis of 0.79 highlight the importance of the collective function of cafés. These findings suggest that the success of street cafés relies on their ability to strengthen human interactions, enhance social capital, and foster a sense of place—a process that not only enriches meaningful urban experiences but also contributes to social cohesion and the formation of urban identity.

Question 2:

How can user-centered design, smart management, and urban planning be leveraged to enhance positive user experiences and social vitality around street cafés?

Answer:

Analysis shows that design and environmental management indicators, such as lighting, appropriate furniture, and strategic placement, play a crucial role in increasing space attractiveness and safety. The indicator "Security and Comfort" with a mean of 3.36 and significance level Sig = 0.02 confirms that quality environmental design can enhance psychological security and encourage voluntary user presence. From an economic perspective, the indicator "Impact on Local Economy" with a mean of 3.40 demonstrates that street cafés have high potential for boosting micro-economy and urban tourism. Practical strategies include participatory design with citizens, optimizing lighting and furniture, integrating cultural and local elements, strengthening pedestrian pathways, and continuous monitoring of café performance using quantitative and qualitative indicators. These measures are direct outcomes of data analysis and demonstrate that enhancing user experience and social vitality around street cafés depends on smart management and integrated urban planning.

7. Conclusion

This study, adopting a multidimensional and comprehensive analytical approach, examined the impact of street cafés on urban quality of life along Eram Boulevard in Hamedan. The novelty of this research lies in the simultaneous assessment of social, psychological, aesthetic, economic, and environmental indicators, providing a precise, data-driven understanding of the role of cafés in enhancing public spaces. Such an approach enables the identification of strengths and weaknesses of street cafés and offers practical strategies for human-centered urban planning in similar cities. Statistical findings from 380 questionnaires revealed that street cafés go beyond purely service functions; by enhancing social interactions, spatial vitality, and a sense of place, they play a key role in improving urban quality of life. The indicator "Urban Vitality and Liveliness" with a mean of 3.44 and a standard deviation of 0.62 had the greatest impact, reflecting increased spatial dynamism, continuous citizen presence, and reduced fear in public spaces. The indicator "Social Factors and Sense of Belonging" (mean 3.34, skewness 0.08, kurtosis 0.79) also emphasizes that cafés, as social nodes, strengthen interpersonal interactions, urban identity, and the connection between memory of place and everyday urban experiences. For aesthetic and identity indicators (mean 3.33, kurtosis 2.72) and security and comfort (mean 3.36, Sig = 0.02), it was observed that appropriate environmental design, strategic placement, and lighting encourage longer stays, conversations, and engagement in the space, while

enhancing psychological security and aesthetic satisfaction. The economic indicator (mean 3.40) demonstrates the significant role of street cafés in promoting micro-economy, creating job opportunities, and attracting local investments. Indicators related to pedestrian accessibility (mean 3.09, Sig = 0.08) and urban environment (mean 2.88) were lower compared to other dimensions, highlighting the need for greater attention to improving walkability, developing sustainable transport, and enhancing environmental infrastructure in café design and management. These findings underscore that simultaneous attention to environmental, social, economic, and psychological components is essential to achieve a balanced urban experience. Field observations further indicated that areas equipped with street cafés exhibited higher pedestrian density, stronger social interactions, and greater liveliness, whereas areas lacking such uses experienced reduced citizen presence and weaker social engagement. This emphasizes the role of cafés as catalysts for activating public spaces and enhancing urban user experience. Based on the findings, practical recommendations include user-centered design, optimized placement and furniture, adequate lighting, continuous and safe pathways, integration of cultural and local elements, and ongoing monitoring of café performance. Implementing these measures can enhance citizen engagement, social interactions, and urban vitality, providing a practical model for the development of similar urban corridors in other cities. Overall, this research demonstrates that street cafés in Hamedan not only facilitate urban liveliness, social interactions, psychological security, aesthetics, and local economy, but with a comprehensive, multidimensional approach, they can become key elements in achieving sustainable, livable, and human-centered cities.

7.1. Practical Recommendations for Eram Boulevard, Hamedan

1. User-Centered and Participatory Design
- Proposed Location: Along main sidewalks of Eram Boulevard, especially near Eram Park and Rainbow Amusement Park.
- Intervention Description: Organize participatory sessions with citizens and café users to select street furniture, colors, terrace design, and seating spaces.
- Rationale: High-traffic and gathering points have the greatest impact on spatial experience; citizen participation increases sense of belonging and satisfaction.
- Stakeholders: Hamedan Municipality, Organization for Job Regulation, local businesses, citizens, and tourists.
- Implementation Steps: Identify key points, invite stakeholders, conduct participatory workshops, summarize suggestions, implement designs.
- Requirements: Suitable workshop spaces, urban design specialists, participatory budget.
- Evaluation Indicators: User satisfaction, number of participants, improvement in spatial quality based on surveys.

2. Optimization of Urban Spaces and Pedestrian Pathways
- Proposed Location: Continuous paths connecting Eram Park, street cafés, and public transport stations.
- Intervention Description: Create safe and pleasant pathways, reduce conflicts between vehicles and pedestrians, strategically place benches and shade structures.
- Rationale: High-traffic routes have the greatest potential to enhance social interactions and pedestrian experiences.
- Stakeholders: Municipality, traffic police, local businesses, pedestrians.
- Implementation Steps: Identify busy paths, design routes and equipment, install furniture, monitor performance.
- Requirements: Municipal budget, urban design consultants, furniture, directional signage.
- Evaluation Indicators: Pedestrian density, walking speed, user satisfaction, reduced vehicle-pedestrian conflicts.

3. Integration of Cultural and Local Elements
- Proposed Location: Around street cafés and seating areas along the boulevard and near parks.
- Intervention Description: Use local symbols, colors, materials, and architectural elements in café and public space design.
- Rationale: Enhances local identity and creates meaningful spatial experiences for citizens and tourists.
- Stakeholders: Local artists, investment and community participation organizations, businesses.
- Implementation Steps: Identify local elements, design prototypes, install and supervise maintenance.
- Requirements: Art consultants, budget for design and implementation, cooperation of businesses.
- Evaluation Indicators: Public recognition of local elements, increased tourist presence, aesthetic evaluation of the environment.

4. Smart Management and Continuous Monitoring
- Proposed Location: Entire length of the boulevard, especially café clusters and busy pedestrian paths.
- Intervention Description: Install sensors and smart systems to collect data on usage, user satisfaction, crowd density, and space performance.
- Rationale: Accurate data enables continuous improvement of spatial quality and services.
- Stakeholders: Municipality, IT organization, urban researchers.
- Implementation Steps: Install equipment, collect data, analyze, provide recommendations for improvements.
- Requirements: Technology equipment, data analysis specialists, maintenance budget.
- Evaluation Indicators: Space utilization, user satisfaction, changes in social behaviors.

5. Strengthening Economic and Social Dimensions
- Proposed Location: Around cafés, pedestrian paths, and open spaces of Eram Park.
- Intervention Description: Support small and local businesses, organize cultural programs and events, seasonal markets, and art activities.
- Rationale: Active presence of citizens and tourists promotes economic growth and enhances social interactions.
- Stakeholders: Local businesses, municipality, cultural organizations, citizens, and tourists.
- Implementation Steps: Identify businesses, design event programs, publicize and implement, monitor performance.
- Requirements: Program budget, suitable event space, stakeholder coordination.
- Evaluation Indicators: Increase in visitor numbers, business revenue growth, participation in events.

Figure 6. Symbolization of practical recommendations on the map of eram boulevard, hamedan.

In map illustrated in Figure 6; each recommendation is represented with a distinct symbol and color:
- User-Centered and Participatory Design: Green triangle
- Optimization of Pedestrian Paths: Blue continuous line
- Integration of Cultural and Local Elements: Orange star
- Smart Management and Continuous Monitoring: Purple circle
- Strengthening Economic and Social Dimensions: Red triangle

This symbolization allows a direct connection between the textual recommendations and their corresponding locations on the map.

Appendices

Appendix 1. Spatial Boundaries and Characteristics of the Study Area

The case study for this research is Eram Boulevard in Hamedan, located in the city center. Previously, it was known as a high-traffic, car-oriented corridor. Following urban regeneration and revitalization projects, this boulevard has transformed into one of the city's

dynamic and pedestrian-friendly spaces. The approximate geographic coordinates of this corridor are 34.7993°N and 48.5207°E.

- Corridor length: approximately 3 kilometers
- Number of active cafés: more than 30 street cafés with diverse functions, including food services, cultural activities, and public seating areas
- Urban interventions implemented: expansion of sidewalks, increased green space, installation of street furniture, and placement of street cafés as key elements of public spaces

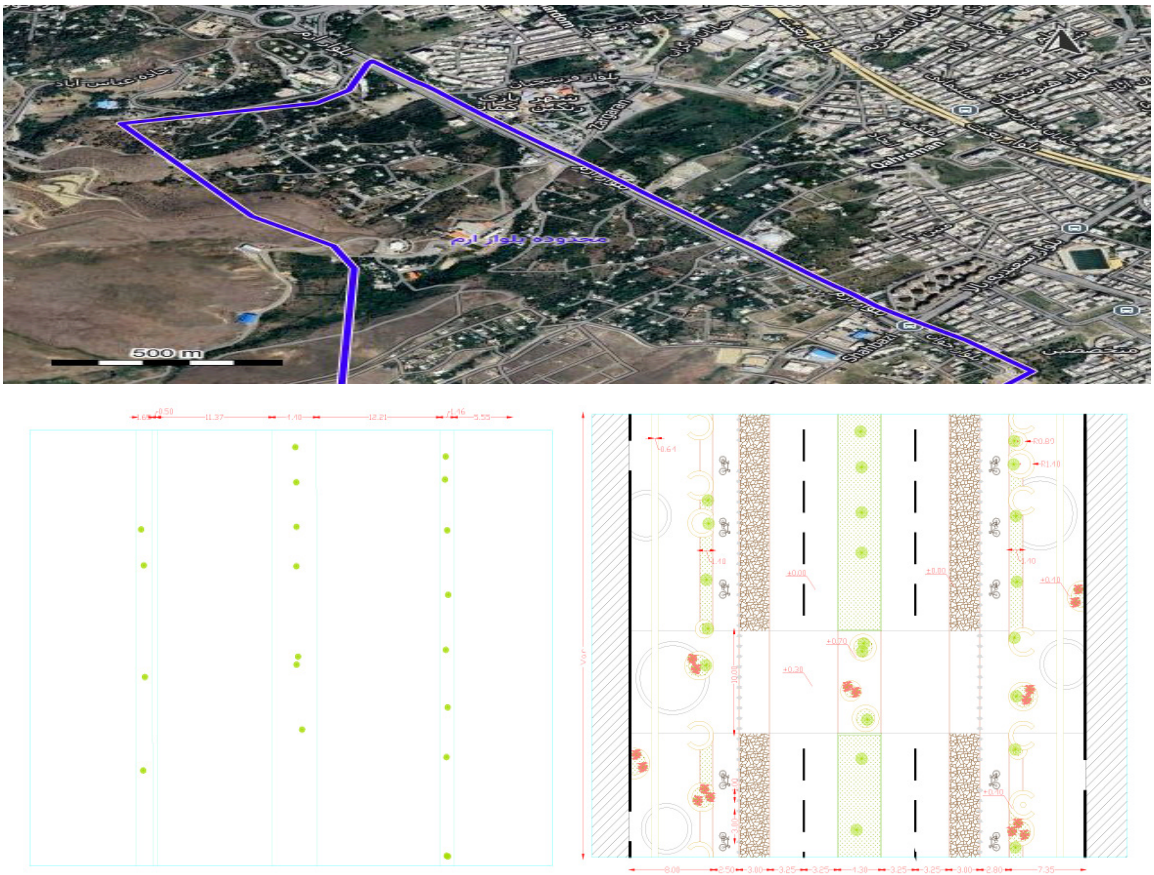

Figure 7. Base map of the study corridor (Eram Boulevard, approximately 2.5 km long, including 30 cafés) before and after intervention

Appendix 2:

To ensure the reliability and validity of the questionnaire, statistical analyses were conducted for each item. Considering the large number of items (56) and the importance of examining the impact of each question on the total score, the item screening table includes the following key indicators:

1. Item Mean: Indicates the influence of each question on its corresponding dimension and respondents' answers.
2. Item–Total Correlation: Measures the correlation of each item with the total questionnaire score, showing how well each question aligns with the overall construct.
3. Cronbach's Alpha if Item Deleted: The reliability coefficient if a particular item is removed, indicating how deleting a specific question affects the overall reliability of the questionnaire.

The purpose of this table is to identify items with high reliability and suitable correlation with the total questionnaire. Low correlation values or an increase in alpha upon deletion may suggest the need to revise or remove the item. This table is an important tool for researchers and urban planners, ensuring that each question effectively contributes to evaluating different dimensions of street cafés in improving urban space quality. The values in this table indicate that all items provided very high reliability for the questionnaire, with no weak or removable items.

Table 9. Item screening of the questionnaire for evaluating street cafés in enhancing urban spaces (case study: eram boulevard, hamadan)

Item Mean	Item–Total Correlation	Alpha if Item Deleted	Category	Item Text	Item Number
3.57	0.62	0.940	Urban Vitality	To what extent have street cafés contributed to increasing the dynamism and liveliness of public spaces?	1
3.56	0.60	0.941	Urban Vitality	To what extent have these cafés created an attractive environment for prolonged citizen presence?	2
3.54	0.58	0.941	Urban Vitality	To what extent have street cafés diversified and increased urban activities?	3
3.46	0.55	0.942	Urban Vitality	How much have these spaces contributed to enhancing social interaction and companionship in the city?	4
3.47	0.57	0.941	Urban Vitality	To what extent have street cafés reinforced urban liveliness and vitality?	5
3.40	0.50	0.943	Urban Vitality	To what extent has being in these cafés increased enjoyment of the urban environment?	6
3.76	0.65	0.940	Social Interaction & Sense of Belonging	To what extent have street cafés increased interactions among citizens?	7
3.63	0.60	0.941	Social Interaction & Sense of Belonging	How much have these spaces provided opportunities for dialogue and social connections?	8
3.69	0.62	0.941	Social Interaction & Sense of Belonging	To what extent have these cafés increased empathy and attachment to place?	9
3.54	0.55	0.942	Social Interaction & Sense of Belonging	To what extent has being in these spaces created a sense of intimacy and familiarity among people?	10
3.26	0.50	0.943	Social Interaction & Sense of Belonging	To what extent have street cafés served as a place for forming new friendships and acquaintances?	11
3.13	0.48	0.944	Social Interaction & Sense of Belonging	To what extent have these spaces increased social participation and interaction among different groups?	12
3.88	0.67	0.940	Aesthetics & Identity	To what extent have street cafés improved the visual aesthetics of the city?	13
3.80	0.63	0.941	Aesthetics & Identity	To what extent is the design of these spaces aligned with local identity and urban culture?	14
3.79	0.65	0.941	Aesthetics & Identity	How much has the lighting of these spaces influenced the nighttime attractiveness of the city?	15
3.38	0.55	0.942	Aesthetics & Identity	To what extent have the colors and materials used in these spaces increased environmental attractiveness?	16
3.12	0.50	0.943	Aesthetics & Identity	To what extent have these spaces created a positive image of the city in citizens' minds?	17
3.02	0.48	0.944	Aesthetics & Identity	To what extent have street cafés contributed to identity formation and a sense of belonging to the city?	18
4.05	0.70	0.940	Safety & Comfort	To what extent have street cafés increased the safety of public spaces?	19
3.16	0.55	0.942	Safety & Comfort	To what extent have these spaces reduced defenseless urban spots and increased social supervision?	20
3.91	0.68	0.941	Safety & Comfort	To what extent has increased pedestrian presence in these cafés reduced crime and insecurity?	21
4.10	0.70	0.940	Safety & Comfort	How much has proper lighting in these spaces contributed to nighttime safety?	22
4.16	0.71	0.940	Safety & Comfort	To what extent have these spaces enhanced citizens' sense of calm and well-being?	23
4.14	0.69	0.941	Safety & Comfort	To what extent have street cafés reduced stress and increased psychological security?	24

Item Mean	Item–Total Correlation	Alpha if Item Deleted	Category	Item Text	Item Number
4.49	0.73	0.939	Safety & Comfort	How much has the design of these spaces created a safe and friendly environment for citizens?	25
3.84	0.62	0.941	Local Economy	To what extent have street cafés promoted economic activity and created job opportunities?	26
4.55	0.70	0.940	Local Economy	How much have these spaces helped attract tourists and increase local income?	27
4.29	0.68	0.940	Local Economy	To what extent have these cafés increased the economic value of streets and neighborhoods?	28
3.83	0.63	0.941	Local Economy	To what extent have street cafés strengthened local businesses?	29
4.21	0.67	0.941	Local Economy	How much have these spaces increased the duration of citizens' presence in streets and commercial centers?	30
4.07	0.65	0.941	Local Economy	To what extent have street cafés increased entrepreneurial opportunities for youth?	31
3.22	0.50	0.943	Local Economy	To what extent are prices and services in these cafés affordable for citizens?	32
3.84	0.60	0.941	Walkability	To what extent have street cafés increased citizens' willingness to walk?	33
4.55	0.68	0.940	Walkability	How much have these spaces reduced people's reliance on personal vehicles?	34
4.29	0.66	0.941	Walkability	To what extent are pedestrian paths around these cafés safe and well-designed?	35
3.83	0.62	0.941	Walkability	To what extent have these spaces increased interaction of pedestrians with the urban environment?	36
4.21	0.65	0.941	Walkability	To what extent have these spaces encouraged citizens to use public transport?	37
4.07	0.63	0.941	Walkability	To what extent have street cafés reduced air and noise pollution from vehicle traffic?	38
3.22	0.50	0.943	Walkability	To what extent have these spaces contributed to creating attractive and lively pedestrian routes?	39
3.78	0.61	0.941	Flexibility	To what extent have street cafés created spaces usable at different times of day?	40
4.07	0.64	0.941	Flexibility	How suitable are these spaces for hosting cultural, artistic, and social events?	41
4.04	0.63	0.941	Flexibility	To what extent are these cafés usable under different weather conditions?	42
4.05	0.65	0.941	Flexibility	How well do these spaces meet the diverse needs of different social groups?	43
3.58	0.52	0.943	Flexibility	To what extent is it possible to temporarily repurpose these spaces for special occasions?	44
3.79	0.60	0.941	Flexibility	To what extent can these spaces adapt to changing urban needs?	45
4.68	0.72	0.939	Flexibility	To what extent have citizens welcomed the multifunctionality of these spaces?	46
3.62	0.60	0.941	Urban Environment	To what extent have street cafés helped reduce visual pollution in the urban environment?	47
3.26	0.55	0.942	Urban Environment	To what extent have these spaces used eco-friendly materials?	48
3.59	0.61	0.941	Urban Environment	To what extent has the use of plants and natural elements in these spaces improved environmental quality?	49

Item Mean	Item–Total Correlation	Alpha if Item Deleted	Category	Item Text	Item Number
3.58	0.60	0.941	Urban Environment	To what extent have these spaces reduced noise pollution in the city?	50
3.16	0.52	0.943	Urban Environment	To what extent have street cafés contributed to improving urban air quality?	51
3.78	0.63	0.941	Urban Environment	To what extent have these spaces enhanced the sense of nature and tranquility in urban areas?	52
2.95	0.48	0.944	Urban Environment	To what extent have street cafés raised citizens' environmental awareness?	53
2.88	0.45	0.945	Urban Environment	To what extent have these spaces reduced energy consumption and urban waste?	54
3.05	0.50	0.943	Urban Environment	To what extent has the design of these cafés helped reduce pollution from private transportation?	55
3.12	0.53	0.942	Urban Environment	To what extent have these spaces promoted the use of local and sustainable materials?	56

Authors' contributions

All authors equally participated in all stages of the research, from design to writing and final revision of the manuscript.

Acknowledgments

The authors sincerely appreciate all individuals who contributed, guided, or supported this research in any way. This study did not receive any specific financial or material support.

Conflict of Interest

The authors declare that there are no conflicts of interest related to the conduct, writing, or publication of this article.

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