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User satisfaction-based landscape planning in historical city centers: Bursa-Turkey

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This study examines the inadequacies in meeting the needs of both tourists and everyday urban users in historic city centers. The aim is to develop a sustainable, tourism-oriented landscape plan and strategies that evaluate open and green spaces—emphasizing historical and cultural values—in line with landscape planning approaches, enhancing urban identity and improving user satisfaction. The study focuses on the city center of Bursa, where historical and cultural values are interwoven with commercial areas. A comprehensive planning approach was undertaken along a corridor encompassing significant historical and cultural sites within the city core, based on spatial adequacy and user satisfaction. A survey conducted with 250 participants assessed spatial use satisfaction and adequacy. The data obtained were analyzed using frequency analysis; the survey questions were grouped, and the Kruskal–Wallis *H* and Chi-square tests (χ^2) were applied. Correlation analysis was used to identify and interpret relationships between variables. The results revealed that demographic factors and usage patterns are significant determinants of user satisfaction. Moreover, factors such as gender and age influence satisfaction levels, indicating the need to customize spatial planning according to the needs of different user groups. This study demonstrates that landscape planning approaches considering the spatial needs of diverse user groups in historic city centers strengthen user satisfaction and urban identity. As a result, it is recommended that inclusive planning strategies that aim for sustainable tourism be developed while preserving cultural heritage and incorporating multifunctional open and green spaces.

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Introduction

Cities are not merely physical settlements but multi-dimensional entities that gain identity through their natural, cultural, historical, and social layers. The urban fabric reflects the technological capabilities, morphological characteristics, lifestyles, and social values of the era it belongs to, thereby shaping the identity of a settlement (Ocakçı 2016). In this context, the natural environment, built-up areas, and social structures of cities emerge as the fundamental components of urban identity (Ocakçı and AydınTürk 2016). The functions that cities host—such as education, transportation, economy, culture, and tourism—play a crucial role in forming this identity, making cities meaningful and attractive to residents and visitors. Particularly, city centers that embody historical and cultural identity are primary areas to be evaluated from a tourism perspective. In such places, the sustainable use and preservation of historical heritage enhance urban quality of life and stimulate economic vitality (Kuntay 2004).

Bursa is one of Turkey's prominent tourism destinations with its historical background, cultural diversity, and natural assets. However, planning open and green spaces along the axes that host intense historical and cultural functions in the city center does not adequately support this potential. Despite integrated landscape planning approaches observed in international cities such as Amsterdam, Florence, Kyoto, Seoul, and Istanbul, Bursa lacks a sufficiently developed planning perspective that sustainably meets the spatial expectations of both residents and visitors.

This study was conducted in a key area within Bursa's urban core. The study area includes the city center, which is characterized by dense urban fabric, transportation corridors, historical and cultural values, and commercial spaces. It is also one of the areas with the city's highest historical and artistic potential, serving both intense tourist activity and daily urban use. The study identifies deficiencies in the ability of open and green spaces within this multifunctional urban landscape to meet users' needs and expectations. Although Bursa is a significant tourism city due to its historical, cultural, and natural values, there is a noticeable lack of landscape planning approaches to resolve these deficiencies. A research gap exists regarding the user-centered planning of open and green spaces that are functionally integrated yet contribute to the urban whole.

In this context, the study aims to develop a tourism-oriented corridor for an area that includes historically and culturally significant urban locations within the core of Bursa—such as Green Tomb, Setbaşı, Heykel, the Historical Hans District, Tophane, National Garden, and Reşat Oyal Culture Park. This area is characterized by scattered and multifunctional land use. The proposed corridor encompasses religious sites, shopping streets, venues offering traditional Bursa cuisine (e.g., Iskender, cantık), caravanserais, covered bazaars, business centers, monumental trees, and cultural landscape elements, along with high-potential recreational areas such as Reşat Oyal Culture Park and National Garden. Within this historically and culturally rich context, the development of landscape planning approaches for tourism-oriented open and green spaces aims to:

- Analyze the relationship between residents and tourists and the space, and evaluate user satisfaction and spatial adequacy.
- Develop landscape planning strategies based on user satisfaction, reflecting urban identity.
- Reevaluate sustainable, multifunctional, and user-oriented open-green space systems by balancing conservation and utilization based on satisfaction and adequacy assessments.

Accordingly, the central hypothesis of this study is that in historic city centers, users' demographic characteristics directly impact spatial adequacy and satisfaction levels. Additionally, the following hypotheses are proposed:

- Despite the high historical and cultural density, existing open green spaces in Bursa's city center are inadequate in meeting user needs.
- Landscape planning approaches have the potential to balance touristic and local uses while strengthening urban identity and tourism appeal.
- A holistic and context-sensitive planning model developed with user feedback will enhance the area's social, cultural, and economic functionality.

To achieve these objectives, this study draws upon previous research conducted by Özkan et al. (2015), Nag et al. (2020), Kim et al. (2021), Saaedi and Dabbagh (2021), Abusaada and Elshater (2021a), Semeraro et al. (2021), Lee et al. (2023), Zamanis et al. (2024), Kılıçaslan et al. (2024), Matsuoka and Kaplan (2008), Fors et al. (2015), Pirselimoğlu Batman and Ender Altay (2019), Zhang et al. (2019), Gozala et al. (2019), Ho et al. (2020), Abusaada and Elshater (2021b), Ender Altay and Uslu (2021), Man Rai et al. (2022), Xie et al. (2024), Ntoa (2024), Setiowati and Koestoer (2024), and Ender Altay and Pirselimoğlu Batman (2025). These studies, which focus on landscape values and user satisfaction in open and green spaces, have been referenced for developing approaches to address touristic and recreational needs in multifunctional urban centers. This study represents a user satisfaction-based example of open and green space utilization along a corridor that develops across both pedestrian and vehicular axes in a historical city center in Turkey. It is unique in the literature for holistically addressing the intersection of tourism, urban identity, and green space planning through the case of Bursa.

Literature review

Urban landscape should be considered as a component of the physical environment and a reflection of the socio-cultural context. The identity-shaping elements of cities are evaluated on three fundamental axes: the natural environment, the built environment, and social dynamics (Ocakçı and Aydın Türk 2016). These elements are critical in shaping spatial character by reflecting a settlement's historical continuity, aesthetic values, and collective memory. The functional diversity of cities directly contributes to their attractiveness for tourism. Urban tourism has increased importance in today's world, where globalization and urbanization dynamics are accelerating. Historic city centers, in particular, have become major tourist attractions not only due to their architectural and cultural assets but also because of their socio-economic functions. Defining urban tourism and highlighting its role in local development, identity formation, and cultural interaction is essential in this context.

Kuntay (2004) emphasizes that cities with tourism potential stand out due to features such as universities, historical structures, cultural activity zones, shopping, and entertainment opportunities. Cultural tourism contributes to preserving heritage and is key to local economic development and social interaction (İpar 2011). For a region to become a tourist attraction, it must possess specific characteristics. Scientific, religious, and artistic values from historical periods, architectural structures, language, local cuisine, festivals, exhibitions, fairs, museums, handicrafts, and artisanal products are among the elements that determine a region's cultural appeal (İpar 2011). In addition, functional

necessities such as transportation, accommodation, and infrastructure services also play an essential role in determining a destination's attractiveness (Giritlioğlu and Avcıkurt 2010).

Urban identity plays a significant role in city branding. Historical and cultural features, natural resources, biodiversity, and tourism assets are key determinants in branding (Temiz et al. 2019). The fundamental aim of urban tourism and recreation activities is to enhance the quality of life for current and future generations, while ensuring the sustainable use of resources by preserving both the cultural and natural environment (Kuntay 2004). However, the increasing tourist pressure on historic city centers has resulted in planning deficiencies, overcrowding, physical deterioration, and the erosion of local identity. To overcome these issues, integrated urban design is critical, particularly landscape planning approaches. In this respect, landscape planning emerges as an effective tool for enhancing tourist appeal, improving visitor experience, and ensuring the sustainability of cultural heritage. Nevertheless, much of the existing literature focuses on tourism development or heritage conservation; studies that address both dynamics within a landscape-oriented and holistic planning framework—especially in historic urban centers—remain scarce. This gap constitutes the main research problem of the current study. In addition, topics such as open and green spaces and recreational area planning are crucial for enhancing user experience and livability in historic environments, yet are insufficiently addressed in the literature. This study aims to fill this gap by exploring how urban landscape planning can solve tourism pressures in historic centers.

Accordingly, areas rich in architectural heritage and cultural values—those that bear traces of the past—require a planning approach that supports artistic and historical heritage preservation, economic development, the strengthening of identity and belonging, education and awareness-raising, social interaction and cultural exchange, sustainable tourism, and the promotion of architectural and aesthetic value. These usage areas must be integrated into the urban landscape.

The concept of historic urban landscapes (HULs), developed and adopted by UNESCO in 2011, is based on protecting individual historical buildings and the entire metropolitan area, along with its historical layers and social, cultural, economic, and environmental components. This approach ensures the holistic conservation of cultural heritage in large cities where traditional methods prove insufficient. At the same time, it supports the sustainable use of heritage without conflicting with modern developments. It aims to create more resilient urban structures facing global challenges such as climate change, migration, and urbanization. Cities like Vienna, Ballarat, and Istanbul have implemented strategies grounded in this approach (UNESCO 2011; Bandarin and van Oers 2012).

Moreover, tourism-oriented revitalization projects implemented in historic city centers across Europe, Asia, and the Middle East offer valuable models for Bursa:

- Amsterdam has developed sustainable tourism practices through its canal system, cultural landscape, and bicycle-centered transportation, striking a balance between conservation and use.
- Florence integrates urban life with cultural heritage through public events and pedestrian-focused designs in its historic squares and Renaissance architecture.
- Kyoto stands out with its preservation of traditional architecture and cultural values, coupled with planning strategies that manage visitor density sustainably.
- Seoul has revitalized its historical and natural urban corridors—such as Cheonggyecheon Stream—creating livable and attractive spaces for residents and tourists.
- Istanbul, particularly in areas like Sultanahmet and the Historic Peninsula, has taken significant steps to preserve historical texture while enhancing tourism through pedestrianized zones, open-air museums, and cultural routes (Kuban 2009; Gülersoy and Tunçer 2010).
- Granada provides a model of visitor management and cultural heritage protection through preservation policies and capacity limitations around the Alhambra (García-Hernández et al. 2017).

These examples clearly illustrate that the successful revitalization of historic city centers depends on the holistic integration of open-green spaces, cultural heritage, sustainable transportation, and user-centered design approaches (Abusaada and Elshater 2021a; Semeraro et al. 2021; Zamanis et al. 2024; García-Hernández et al. 2017; Gülersoy and Tunçer 2010). These cases demonstrate that urban landscape planning is an aesthetic concern and a strategic planning tool. The comprehensive treatment of open-green spaces, cultural heritage, user-centered design, and sustainable mobility is essential for effective tourism planning in historic centers (Zamanis et al. 2024; Abusaada and Elshater 2021b; Semeraro et al. 2021). However, environmental and aesthetic problems stemming from rapid urban growth and unplanned urbanization strongly underscore the need for systematically planned urban open green and recreational spaces. In creating healthy urban environments, planned green spaces—and landscape planning—play a crucial role. The main objective is to develop healthy, sustainable, and aesthetically high-quality living spaces. This involves evaluating existing conditions and ensuring their use within a conservation–utilization balance while introducing new design elements when necessary (Çakır 2016).

Study area

The study area is located within the urban core of Bursa, specifically in the central district of Osmangazi, which has an estimated population of approximately 863,000. Bursa was the first capital of the Ottoman Empire, following periods of Roman, Byzantine, and Seljuk rule. Architectural structures and urban spaces dating back to the Ottoman and Republican eras have been preserved and remain prominent city features today. Alongside various district-specific festivals and events, Bursa is also renowned for its rich cultural and artistic heritage, including traditional performances such as Karagöz and Hacivat shadow plays and sword-and-shield folk dances. In addition to its cultural significance, Bursa is a natural treasure. The city is home to Mount Uludağ, numerous thermal springs, expansive and fertile plains, waterfalls, and diverse vegetation. Bursa, along with Cumalıkızık, is listed as a UNESCO World Heritage Site under the designation *"Bursa and Cumalıkızık: The Birth of the Ottoman Empire"*. Moreover, Bursa is one of Turkey's leading industry and technology centers, comparable to developed countries in industrial and commercial capacity. The city is known for several agricultural and food products synonymous with Bursa, such as Gemlik olives, chestnut candy, İskender kebab, and İnegöl meatballs. Fruits like peaches, strawberries, cherries, raspberries, pears, figs, olives, and chestnuts are distributed from Bursa across the country. The city also has nearly a thousand monumental trees and boasts significant botanical richness (Anonymous 2019a; Ender Altay and Zencirkıran 2024). Bursa lies at an elevation of 155 m above sea level and generally has a temperate climate, although climatic conditions vary by region. The northern part is influenced by the mild and humid climate of the Marmara Sea, whereas the southern regions experience the harsher climate of Mount Uludağ. The warmest

months are typically between July and September, while February and March are the coldest (Anonymous 2019a).

The study area was selected as the urban core of Bursa. This region possesses rich historical, cultural, and architectural values due to its status as the first capital of the Ottoman Empire and its heritage from various civilizations such as the Roman, Byzantine, and Seljuk periods. Furthermore, Bursa's inclusion on the UNESCO World Heritage List highlights the universal significance of the area. Beyond its historical sites, the region is an essential urban center regarding cultural activities, natural landscapes, and economic structure. The study area extends along the city's main arteries, including Namazgah Street, Atatürk Street, and Altıparmak Street. These streets host numerous significant structures, such as historic inns, mosques, museums, and cultural centers, while providing an active urban environment characterized by mobility and user satisfaction. It is an area that serves both touristic functions and daily urban use. Therefore, selecting this area directly contributes to the study's objectives concerning user satisfaction, social sustainability, and urban heritage management.

Situated along an axis starting from Reşat Oyal Culture Park—National Garden in the west and ending at Green Tomb in the east, the study area encompasses many important historical and touristic sites. Within its boundaries are landmarks such as Green Tomb, the Historic Inns District (including Ulu Mosque, Koza Khan, Kapan Khan, İpek Khan, Pirinç Khan, Grandbazaar, Emir Khan, Geyve Khan, and Fidan Khan), Orhan Mosque, Long Bazaar, the Historic Municipality Building, Heykel, City Museum, Ahmet Vefik Paşa State Theatre, Tayyare Cultural Center, Zafer Plaza, Tophane, Veled-i Saray Mosque, Şehabettin Paşa Mosque, Osmangazi District Governorate, and the Floating Stone Sculptures. Additionally, surrounding areas interact with the study zone, including historical, cultural, and natural sites.

This corridor forms a meaningful whole in terms of its historical sites, touristic locations, natural, cultural, and historical landscape values, and interactions. The land uses within the defined boundaries were analyzed based on digital map data and field observations. The collected data were processed on a Google Earth (Google Earth 2025) base map, and the resulting maps were supported with visual representations (Fig. 1).

Method

The methodology of this study is based on a user-satisfaction survey approach, which plays a critical role in spatial arrangements within historical and touristic settings (Zamanış et al. 2024; Kılıçaslan et al. 2024; Olgun et al. 2022; Wartmann et al. 2021; Sun and Shao 2020; Koçhan and Metin 2020a, 2020b, 2020c) (Fig. 2). Indeed, data derived from users' experiences, needs, and suggestions enable design decisions to be made more participatory and sustainable. The literature frequently emphasizes that urban design projects neglecting user needs often underperform in terms of physical and social sustainability, experience lower levels of public acceptance, and tend to lose functionality over time (Abusaada and Elshater 2021b; Saeedi and Dabbagh 2021).

Accordingly, the questionnaire employed in this study comprises three sets of items addressing socio-demographic characteristics, usage patterns, and satisfaction assessment:

1. Socio-demographic profile—includes variables such as gender, age, educational level, occupation, and income.
2. Usage patterns—covers topics such as mode of transportation, time of use (season, day, and hour), frequency of visits, and purpose of visit.
3. Satisfaction assessment is divided into two categories: satisfaction with the area and adequacy of the region. These were measured using two five-point Likert scales: "Strongly Disagree (1), "Disagree (2)," "Neutral (3)," "Agree (4)," to "Strongly Agree (5)" and "Completely Inadequate (1)," "Inadequate (2)," "Moderate (3)," "Good (4)," to "Very Good (5)" (Sağlık and Kelkit 2014; Pirselimoğlu Batman et al. 2019; Gürer and Uğurlar 2017; Özkan 2017; Seyidoğlu Akdeniz and Yener 2023; Pişkin and Seyidoğlu Akdeniz 2023; Saeedi and Dabbagh 2021; Abusaada and Elshater 2021b; Aydın and Koç 2024).

The sample size for the survey was determined based on the population of Osmangazi District, where the study area is located (862,516 inhabitants) (Anonymous 2019b), using the following formula (Vural 2012):

$$n = N{\cdot}t2{\cdot}p{\cdot}qd2{\cdot}(N-1) + t2{\cdot}p{\cdot}qn$$

According to the formula:

- N: Population size.
- n: Sample size.
- p: Probability of occurrence (taken as 0.80).
- q: Probability of non-occurrence (taken as 0.20).
- d: Accepted margin of error (0.05).
- t: Value corresponding to the confidence level (1.96 for 95% confidence level).

This formula calculated the sample size as $n = 245$, and 250 surveys were conducted. Ethical approval for the surveys was obtained from the Ethics Committee of Bursa Uludağ University, in accordance with the university's Directive on Research and Publication Ethics Committees. To capture users' perceptions, needs, and satisfaction levels directly, the surveys were conducted face-to-face during the spring and summer months, when user activity in the area is highest. The research team visited the study site 30 times at different intervals to administer the surveys.

Data evaluation. The data obtained from the study were analyzed using SPSS 28 statistical software. The socio-economic status and area usage data were evaluated through frequency analysis and presented using tables and graphs.

To assess the internal consistency and homogeneity of the scale used for questions related to user satisfaction, a reliability analysis was conducted by calculating the Cronbach's Alpha coefficient, a widely used indicator of scale reliability. The levels of reliability were interpreted as follows: not reliable ($0.00 \le \alpha < 0.40$), low reliability ($0.40 \le \alpha < 0.60$), fairly reliable ($0.60 \le \alpha < 0.80$), and highly reliable ($0.80 \le \alpha \le 1.00$) (Kartal and Dirlik 2016; Terzi 2019).

Subsequently, questions regarding satisfaction and spatial adequacy were grouped and analyzed using frequency analysis based on their 5-point Likert scale scores, and the results were visualized in graphs. The relationships between satisfaction/spatial adequacy and demographic characteristics were analyzed using the Chi-square and Kruskal–Wallis H tests. The Chi-square test, a non-parametric test used to examine the relationship between two categorical variables, was applied to assess gender-related differences (Akyıldız 2009; Otrar 2025; Anonymous 2025). For other demographic variables, the Kruskal–Wallis H test—a non-parametric alternative to one-way ANOVA—was employed to determine whether statistically significant differences existed among three or more groups when the data did not follow a normal distribution.

The significance levels for both tests were set at $p < 0.01$ and $p < 0.05$.

Additionally, the relationships between variables from the survey question groups and participants' demographic characteristics were examined using correlation analysis. This statistical method provides insight into both the direction (positive or negative) and the strength of the relationship between two variables. When a statistically significant correlation is found, it becomes possible to predict the value of one variable based on the

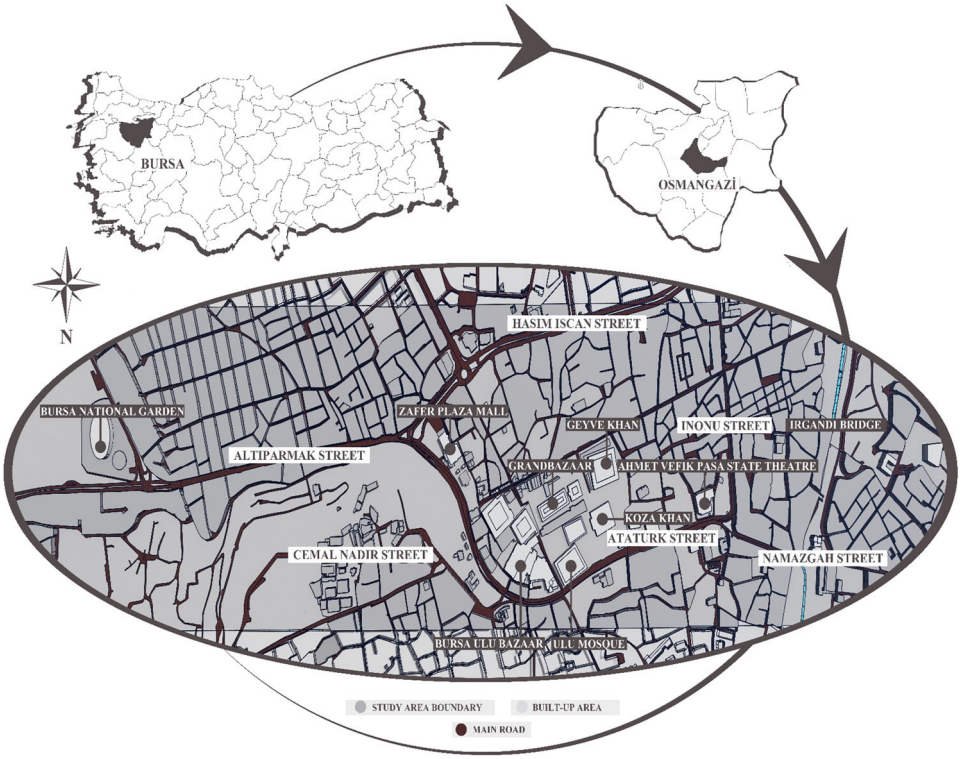

Fig. 1 Study area.

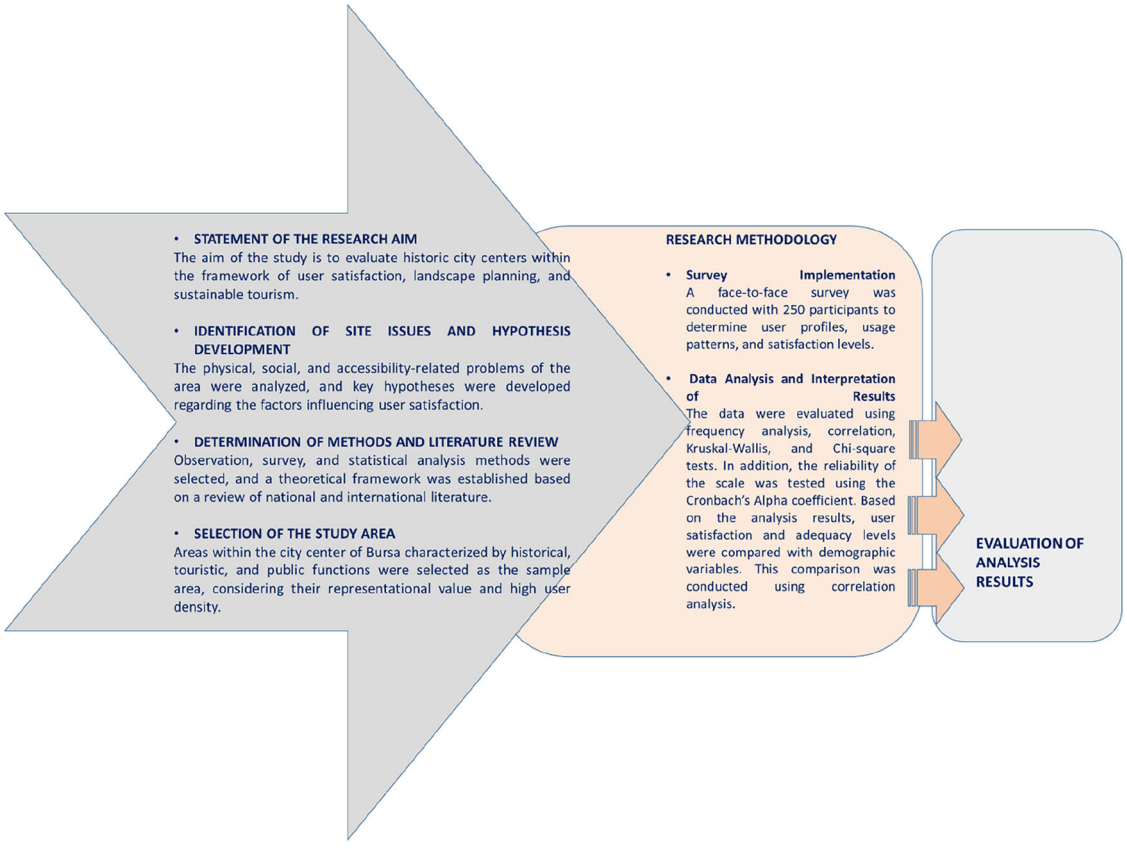

Fig. 2 Flow chart.

Table 1 Socio-economic and area uses profile of the study area.

Socio-economic structure		(%)	Area uses		(%)
Gender	Female	47.60	Duration of residence	Visitor	4.80
	Male	52.40		1–5 years	15.20
Age	18–24	24.80		6–10 years	16.80
	25–34	33.60		11–15 years	15.20
	35–44	22.00		16+ years	48.00
	45–54	12.00	Area usage days	Weekdays	6.00
	55 +	7.60		Weekends	21.20
Education level	Illiterate	0.80		Everyday	22.40
	Primary school	11.20		Variable	50.40
	Secondary school	20.00	Time spent in the area	Less than 1 h	6.00
	High school	40.00		1–2 h	24.80
	University	28.00		2–4 h	38.40
				More than 4 h	30.80
			Transportation	Pedestrian	13.20
				Private car	18.40
				Bus-minübüs	44.40
				Taxi	4.00
				Shuttle	2.80
				Tram-metro	10.80
				Motorcycle	3.20
				Other	3.20

other. The correlation coefficient ranges between −1 and +1: a positive correlation (+) indicates that both variables increase or decrease together, while a negative correlation (−) indicates that one variable increases as the other decreases. In the analysis, statistically significant correlation values were marked at the 0.01 and 0.05 levels (Öztürk 2020).

Findings

In line with the aim of the study, a user survey was conducted to evaluate the demands and preferences of area users. The surveys were administered at different locations within the study area and at varying times of the day to capture the diversity of the user profile. A total of 250 respondents participated in the survey, which included questions on socio-economic characteristics, patterns of space use, activities conducted in the area, demands for improvements or new functions, and levels of user satisfaction.

Based on the analysis of the surveys conducted with randomly selected participants within the study area located in Osmangazi District of Bursa, it was found that 47.6% of the respondents were female and 52.4% were male. While women predominantly use the area for shopping, men show a higher rate of use related to work and commercial activities. Regarding age distribution, the largest user group was between 25 and 34, representing 33.6% of the total, followed by the 18–24 age group with 24.8%. The smallest user group was those aged 55 and over, comprising 7.6%.

Regarding educational background, most users were high school graduates (40%), followed by university graduates (28%). Most of the users were identified as residents. Notably, 48% of the respondents had been residing in the area for 16 years or more, while the smallest group (4.8%) consisted of temporary visitors or guests. In response to the question about which days users typically visit the area, 50.4% indicated that their visits vary depending on the day. As for the time spent in the area, 38.4% reported staying between 2 h and 4 h, while only 6.0% reported spending less than 1 h in the area. Regarding transportation to the city center of Bursa, the most common mode of access was bus/minibus, used by 44.4% of respondents. The least common method was shuttle service, with only 2.8% of respondents indicating its use. Despite the known challenges in finding parking in the area, 18.4% of users reported accessing the area by private car (Table 1). The user profile indicates that the local population predominantly and intensively uses the study area. The differing usage tendencies between male and female users reveal the gender-based functionality of the space. The high concentration of young users (aged 25–34) points to the dynamic nature of the area and active usage patterns. However, the low proportion of elderly users suggests that this group may require additional support regarding spatial accessibility or motivational factors.

According to the data from surveys conducted at different locations and times within the study area, users' most frequently performed activity was eating and drinking, accounting for 15.90% of responses. This was followed by shopping at 14.30% and walking/passing through activities at 14.40%, among the l. The most frequent activities were bird feeding and playing sports, each with a rate of 1.40%. The activity with the lowest participation was painting, recorded at 0.50%. Although the study area includes a significant urban and green space component, the most common request by respondents was for more organized and better-maintained green areas, with a rate of 15.85%. Additionally, 15.13% of users expressed a demand for improved accessibility paths for people with disabilities, requesting the regulation and enhancement of existing routes and ramps (Fig. 3a, b).

User satisfaction

In this section of the study, where user satisfaction was measured, the reliability of the questionnaire was first tested using Cronbach's Alpha analysis. The alpha coefficient was found to be 0.818, which falls within the range of $0.80 \leq \alpha < 1.00$, indicating a high level of reliability (Table 2).

Along with the reliability analysis, the questions related to user satisfaction were categorized under specific satisfaction parameters and are presented in Table 3. In this study, satisfaction-related questions were classified under thematic headings to evaluate user satisfaction in a multidimensional manner. Each parameter included in the classification represents key factors influencing user experience in the context of urban open space use:

Comfort and image. This category was created to assess users' perceptions of the physical environment, the aesthetic value of the

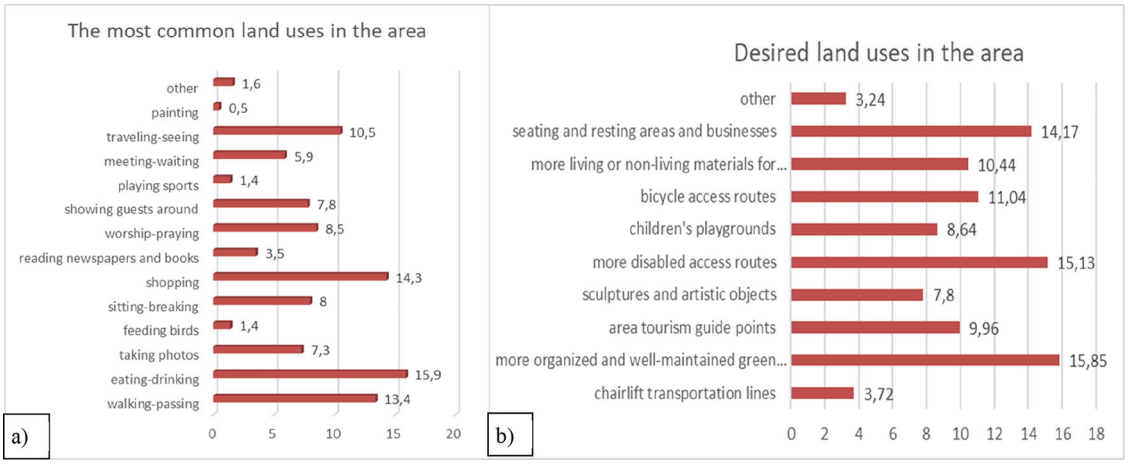

Fig. 3 User preferences and desired activities in the area. a Most common activities in the area. **b** Activities and areas desired to see in the area.

Table 2 User satisfaction Cronbach's alpha reliability analysis.

Reliability statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
0.818	0.820	24

space, and the level of individual psychological attachment. Sense of belonging, visual appeal, and perception of identity were evaluated under this heading.

Sociability and safety. The potential for social interaction and the perception of safety in public spaces are critical for sustainable use. This parameter aimed to measure users' tendencies to share the space with others and their perceptions of safety.

Urban equipment and maintenance. Physical features directly impact the functionality of a space. This parameter concerns the adequacy of elements such as seating units, information boards, and signage, as well as their harmony with the historical context and general maintenance condition.

Recreation and tourism opportunities. Evaluated in the context of usage by both residents and tourists, this category includes spatial diversity, the condition of activity areas, and the adequacy of tourism-oriented guidance systems.

Accessibility. This category examines ease of access to the area, connections to public transportation, accessibility for individuals with disabilities, and locational advantages. It covers key factors influencing user density and access rights.

Green space and living material presence. Landscape elements enhance user interaction with the environment and improve the time spent in the space. This heading involves the functional use of plant materials (for shading, guiding, or delimiting) and the evaluation of green spaces in terms of their role in providing rest areas.

The scores given to satisfaction parameters, classified based on usage conditions, were analyzed using frequency analysis and are illustrated in Fig. 4. The high level of indecision among users regarding satisfaction parameters (exceeding 40%) indicates a degree of uncertainty in the perception of spatial quality, particularly concerning green spaces, recreation, and safety. This may suggest that users have not had sufficiently strong experiences in these areas, or that physical deficiencies negatively impact user experience.

A frequency analysis was conducted for the satisfaction questions, which were evaluated using a five-point Likert scale ranging from "Strongly Disagree (1)," "Disagree (2)," "Neutral (3)," "Agree (4)," to "Strongly Agree (5)." According to the results, many users reported mainly being neutral regarding several parameters: 47.9% for Green Space and Living Material, 43.2% for Recreation and Tourism, and 41.2% for Social Safety. Additionally, 37.1% of the respondents agreed with statements related to Amenities and Maintenance. The relationships between demographic characteristics and satisfaction parameters were also evaluated. Based on the Chi-square analysis, no statistically significant relationship was found between satisfaction parameters and gender (Table 4).

In addition, satisfaction levels vary significantly according to demographic variables—particularly age and duration of space use—which reveals that different user groups perceive the area differently and have distinct needs. This finding underscores the necessity of tailoring urban design interventions to the priorities of each user group. In addition, the relationships between other demographic characteristics—such as age, education level, length of residence, day of area use, and time spent in the area—and satisfaction parameters were evaluated using the Kruskal–Wallis *H* test (Table 5 and Fig. 5a–c).

The statistical analyses conducted reveal a significant relationship between the 'accessibility' parameter and age groups. This indicates that satisfaction with access to the area increases with age, while younger individuals tend to be more critical regarding accessibility. In this context, it may be inferred that younger users have higher expectations for public transportation, or that the existing urban transport network is insufficient in meeting contemporary needs. According to the evaluation presented in Table 5, the accessibility parameter showed a statistically significant relationship with the age variable, while the recreational and tourism opportunities and presence of green spaces and living materials parameters were found to be significantly associated with the duration of time spent in the area. Other satisfaction parameters did not show statistically significant differences in the demographic variables. When assessed by age groups, participants aged 25–34 and 35–44 were undecided regarding the accessibility parameter,

Table 3 Classification of user satisfaction questions according to satisfaction parameters.

Satisfaction parameters	
Comfort and image	People take photographs of the environment.
	Does this space give you a sense of belonging?
Sociability and safety	I frequently use this area during the day.
	I participate in activities with multiple people.
	While using these areas, I sense the presence of designated personnel (e.g., security, cleaning staff, and sales units).
	I feel comfortable using the space in the evenings.
	I feel comfortable using the areas in the evenings.
Urban equipment and maintenance	Are the existing urban furniture elements compatible with the historical context?
	Plastic objects highlight focal points, provide information about the city, or help with wayfinding.
	The existing urban furniture is compatible with the historical fabric.
	The reinforcement elements are sufficient.
Recreation and tourism opportunities	Tourist information offices are available for tourism-related activities.
	In tourist areas, the environment is often polluted due to improper use, and there is a lack of environmental sensitivity.
	There is signage and wayfinding for tourism purposes.
	Directional signs and information panels for tourists are sufficient in number.
	Users of the central areas of Bursa are knowledgeable about the touristic features and historical sites in the area.
	The availability and design of event spaces vary depending on the specific location.
Accessibility	The distances between public transport stops are short, and transportation from the city center to all parts of the city is convenient.
	This area is accessible to users with disabilities.
	This area is close to residential zones, public institutions, shopping areas, and historical districts.
Green spaces and the presence of living materials	The plant materials in the area serve as elements for wayfinding and signaling.
	The plant materials in the area are used to provide shading.
	The plant materials emphasize the spatial identity of the area.
	Vegetation is used to define spatial boundaries.
	Green spaces serve as resting areas along transit routes.
	The plant materials in the area serve as elements for wayfinding and signaling.

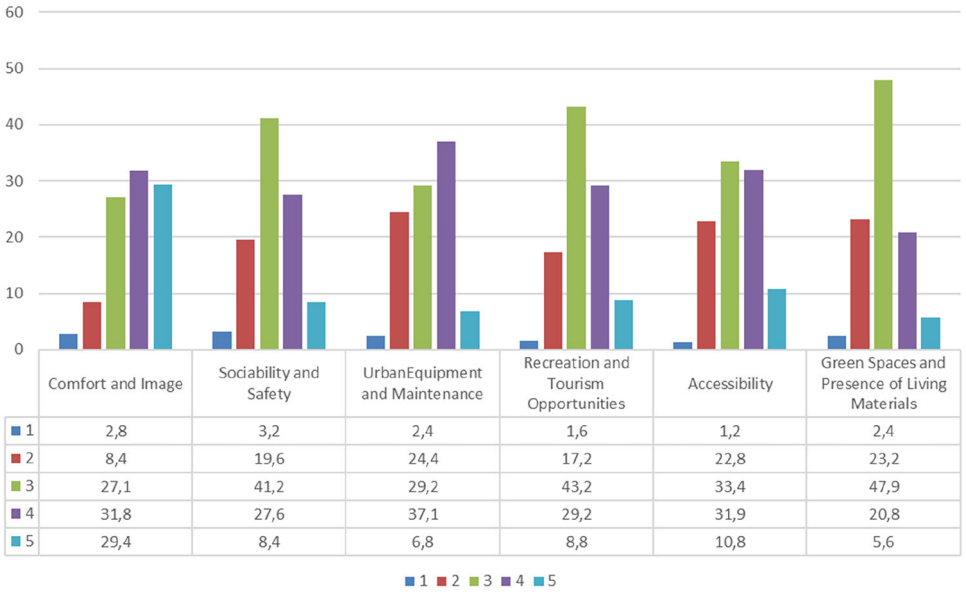

Fig. 4 Frequency distribution of satisfaction parameters classified by usage patterns.

whereas individuals in the 45–54 age group agreed with this parameter. About time spent in the area, users who spent 2–4 h mainly were undecided about recreational and tourism opportunities; however, as the time spent increased, so did the level of satisfaction related to this parameter. Similarly, users who spent more than 4 h in the area expressed positive opinions regarding green spaces and living materials. In contrast, participants who spent less time in the area tended to be undecided.

Relationship between user satisfaction and demographic characteristics

When evaluating the relationship between user satisfaction and demographic characteristics, it was found that all variables, except for gender, were statistically significant at the $p \leq 0.05$ and $p \leq 0.001$ levels. No significant relationship was found between gender and satisfaction factors. Accordingly, the age group was negatively associated with statements such as *"performing activities with multiple people in the area,"* and *"feeling comfortable*

using the Heykel and Hanlar areas during the evening." Younger participants in the 25–34 age group tended to agree with these statements, whereas as age increased, respondents were more likely to report indecision or disagreement.

Table 4 Relationship between gender and satisfaction parameters (chi-square analysis).

Satisfaction parameters	X^2	*p*
Comfort and image	13,337	0.101
Sociability and safety	18,944	0.525
Urban equipment and maintenance	6952	0.861
Recreation and tourism opportunities	16,832	0.817
Accessibility	5812	0.886
Green spaces and the presence of living materials	23,875	0.248

Age was also negatively associated with statements like *"use of descriptive features such as plastic objects"* and *"use of plant materials to define space."* Participants aged 18–24 mostly reported being undecided about these statements, while older respondents were more likely to disagree.

On the other hand, the item *"short walking distances between public transport stops and easy accessibility to the city center"* was positively associated with age and education. Many high school graduates aged 18–24 and 25–34 disagreed with this statement, indicating that they did not find urban accessibility particularly easy. Additionally, this item was negatively related to the length of residence: visitors or short-term residents in Bursa were more likely to disagree, whereas satisfaction increased with more extended residency. Especially users who had lived in Bursa for over 10 years reported mainly being satisfied.

Length of residence was also negatively associated with the statement *"availability of sufficient urban furniture."* Visitors and

Table 5 The relationship between user satisfaction parameters and demographic characteristics (Kruskal–Wallis *H* test).

		Comfort and image	Sociability and safety	Urban equipment and maintenance	Recreation and tourism opportunities	Accessibility	Green spaces and presence of living materials
Age	Kruskal–Wallis *H*	8391	4847	3847	9078	10,891	3326
	Asymp. Sig.	0.078	0.303	0.427	0.509	0.028*	0.505
Education level	Kruskal–Wallis *H*	1062	1933	3152	0.635	2538	1049
	Asymp. sig.	0.900	0.748	0.533	0.959	0.638	0.902
Duration of residence	Kruskal–Wallis *H*	4235	3929	1.79	2552	1948	2747
	Asymp. sig.	0.375	0.416	0.740	0.635	0.745	0.601
Area usage days	Kruskal–Wallis *H*	5871	1852	2145	5563	0.866	4239
	Asymp. sig.	0.118	0.604	0.543	0.135	0.834	0.237
Time spent in the area	Kruskal–Wallis *H*	6731	3939	3765	7679	6678	9285
	Asymp. sig.	0.081	0.268	0.288	0.053*	0.083	0.026*

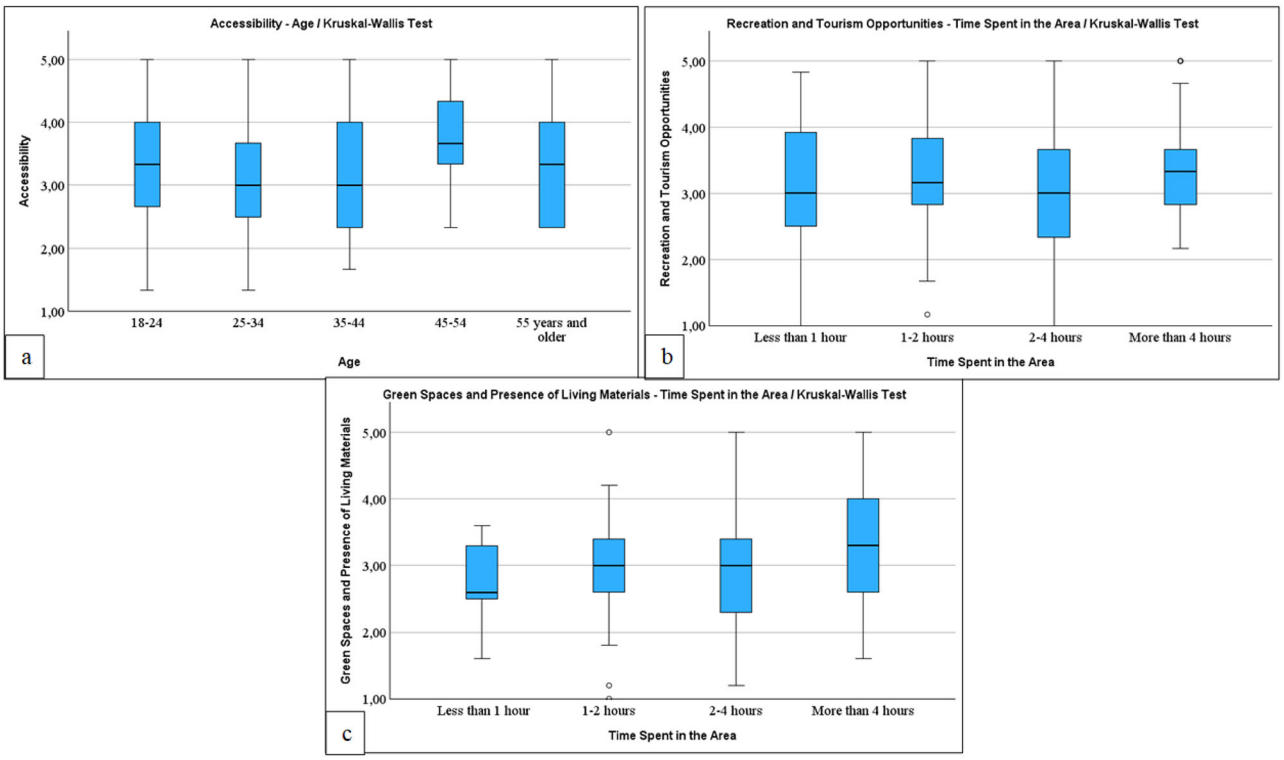

Fig. 5 Analysis of satisfaction parameters based on demographic and usage variables. Distribution of satisfaction parameters by demographic and usage characteristics (Kruskal–Wallis test): **a** accessibility – Age, **b** recreation and tourism opportunities – time spent in the area, **c** green spaces and presence of living materials – time spent in the area.

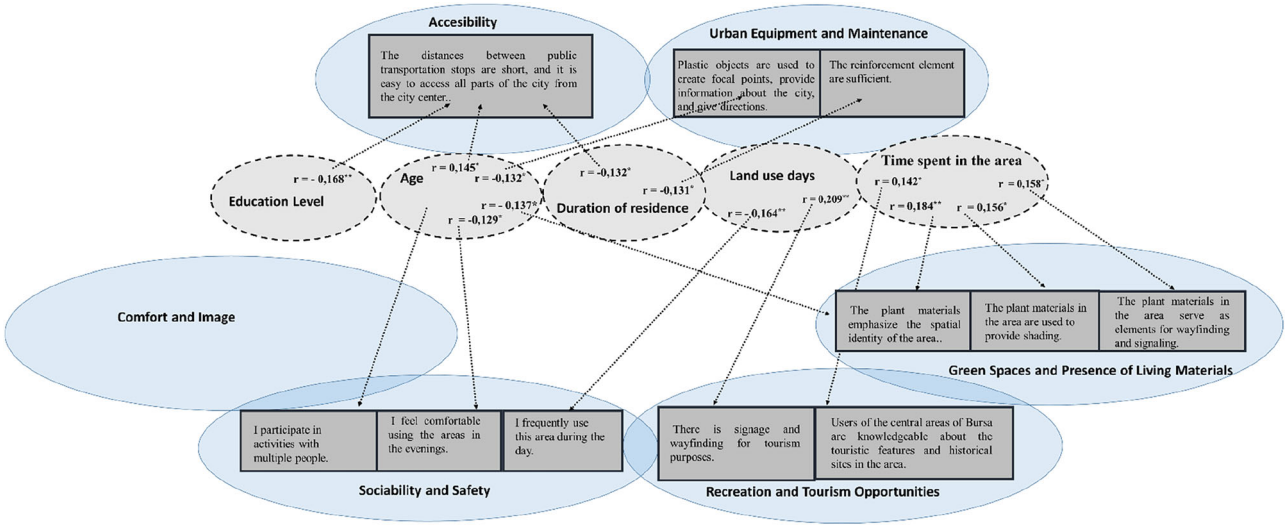

Fig. 6 Relationship between user satisfaction and demographic characteristics (correlation is significant at the 0.01 and 0.05 levels). *Note: correlation coefficients are based on Spearman's rho. Positive values indicate positive relationships; negative values indicate negative relationships.

those residing in Bursa for up to 5 years expressed dissatisfaction, while individuals with 6–10 years of residence were generally undecided.

Moreover, time spent in the area was positively associated with the use of plant materials and awareness of tourism opportunities in the city center. Participants who spent 2–4 h or more in the area agreed that plants provided shade and directional cues; however, they were undecided about whether plants contributed to defining space, suggesting a lack of awareness regarding the spatial structuring function of vegetation. Additionally, participants who spent more than 4 h in the area agreed that users were informed about tourism and tourist attractions.

It was observed that the area was predominantly used at varied times, and this variable was positively associated with the statement *"there are guiding signs for tourism-related uses."* Users who visited the area at different times agreed with this statement, though some respondents remained undecided (Fig. 6).

According to this evaluation, the comfort and image parameter was not found to be significantly associated with any demographic variables. Based on the Kruskal–Wallis analysis, it was found that among the parameters showing statistical significance, the questions under the accessibility parameter exhibited a positive correlation with age. In particular, the question about public transportation showed a significant positive correlation with age. Additionally, the questions under the user satisfaction categories were analyzed using correlation analysis of demographic characteristics. As a result, it was observed that two questions under the recreation and tourism parameter and several questions under the accessibility parameter were significantly correlated with specific demographic variables.

Area adequacy for users

In this section, which evaluates adequacy based on area usage, the reliability of the questions was first tested using Cronbach's Alpha analysis. The alpha value was found to be 0.818, indicating a high level of reliability as it falls within the range of $0.80 \leq \alpha < 1.00$ (Table 6).

In conjunction with the reliability analysis, the questions related to adequacy were categorized according to adequacy parameters and are presented in Table 7. The scores assigned to adequacy parameters, classified based on usage patterns, were evaluated using frequency analysis and illustrated in Fig. 7. The adequacy parameters are assessed under the following categories:

Table 6 Adequacy assessment for users—Cronbach's alpha reliability analysis.

Reliability statistics

Cronbach's alpha	Cronbach's alpha based on standardized items	*N* of items
0.874	0.874	20

Comfort and image. This category evaluates the extent to which the selected adequacy indicators ensure user comfort in the urban space and the potential of the physical environment to reflect an overall positive image.

Urban equipment and maintenance. This category focuses on the functionality of the area's technical infrastructure, physical components, and maintenance status. The parameters examine whether the space adequately meets users' needs.

Presence of green space and living materials. This category analyzes the environmental and psychological impacts of landscape elements and natural infrastructure on users.

Users' moderate evaluations regarding the adequacy of amenities and green spaces suggest that the area's physical infrastructure falls short of meeting expectations. The fact that individuals who have lived in the area for a more extended period tend to be more critical indicates that heightened expectations regarding spatial quality accompany increased awareness over time.

Based on a five-point scale ranging from "Completely Inadequate (1)," "Inadequate (2)," "Moderate (3)," "Good (4)," to "Very Good (5)," users rated the Urban Equipment and Maintenance (adequacy) parameter predominantly as moderate, with a response rate of 62.4%. Similarly, the Comfort, Identity, and Image (adequacy) parameter was also assessed as moderate by 46.4% of respondents. The Green Space and Living Material Presence (adequacy) parameter was likewise considered moderate by 33.4% of participants (Fig. 7).

The relationship between demographic characteristics and adequacy parameters was evaluated. According to the Chi-square analysis, a statistically significant relationship was found between gender and the green space and living material presence

Table 7 Classification of adequacy parameters according to adequacy parameters.

Adequacy parameters	
Comfort and image (adequacy)	Presence of parking facilities within the area.
	Presence of pedestrian crossings and underpasses in the region.
	Security in the area is adequate.
	Open space and resting areas within this region are sufficient.
	Lack of observation terraces.
	Inadequacy of food and beverage establishments.
Urban equipment and maintenance (adequacy)	Presence of directional signage within the area.
	Lack of internal directional signage.
	Presence of seating units within the area.
	Safety of ground surface materials in the area.
	Presence of lighting elements.
	Presence of boundary elements in the area.
	Inadequacy of waste bins.
	Presence of statues and monuments in the area.
	Presence of water features in the area.
	Presence of service units.
	Lack of drinking fountains.
	Presence of informational panels introducing the area.
Green spaces and the presence of living materials (adequacy)	Presence of vegetation along transportation axes.
	Presence of green space within the area.

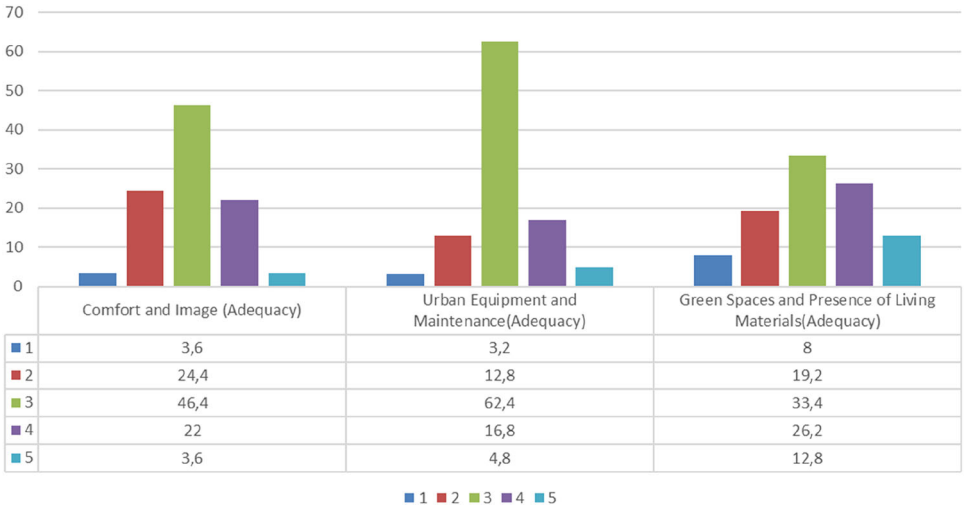

Fig. 7 Frequency distribution of adequacy parameters classified by usage patterns.

parameter at the $p \leq 0.05$ significance level. Accordingly, female users indicated indecisiveness regarding the adequacy of green spaces, while male users reported indecisiveness or disagreement (Table 8).

In addition, the relationships between other demographic variables—such as age, educational level, duration of residence, frequency of area use, and time spent in the area—and the adequacy parameters were analyzed using the Kruskal–Wallis H test. According to the analysis results, the parameters of comfort, identity and image, and facility elements and maintenance were found to be significantly related to the variable of educational level at the $p \leq 0.05$ level. Similarly, the parameters of facility elements and maintenance and green space, and living material presence also showed a statistically significant relationship with duration of residence at the $p \leq 0.05$ level. In contrast, no significant relationship was found between the adequacy parameters and the variables of age, frequency of area use, and time spent in the area (Table 9 and Fig. 8).

Based on the findings, it was observed that participants with high school and university education evaluated the adequacy of facility elements more negatively, whereas primary and secondary school graduates expressed more positive (i.e., "partially adequate") views. Users who were guests in the area, and therefore spent less time on-site, tended to respond "agree" regarding the adequacy of facilities. In contrast, users who had been living in the region for 16 years or more mostly responded "neutral." Furthermore, long-term residents reported that the presence of green spaces was inadequate, while guest users evaluated the green space as sufficient.

Users who frequented the area daily were generally undecided regarding the adequacy of green space, whereas those who used

Table 8 Relationship between gender and adequacy parameters (chi-square analysis).

Adequacy parameters	X^2	p
Comfort and image (adequacy)	18,368	0.498
Urban equipment and maintenance (adequacy)	56,505	0.117
Green spaces and the presence of living materials (adequacy)	15,206	0.054*

Table 9 Relationship between adequacy parameters and demographic characteristics (Kruskal–Wallis *H* test).

		Comfort and image	Urban equipment and maintenance	Green spaces and presence of living materials
Age	Kruskal–Wallis *H*	6896	2630	0.706
	Asymp. sig.	0.141	0.622	0.951
Education level	Kruskal–Wallis *H*	12,191	9188	2494
	Asymp. sig.	0.016*	0.057*	0.646
Duration of residence	Kruskal–Wallis *H*	3672	10,458	15,192
	Asymp. sig.	0.452	0.033*	0.004*
Area usage days	Kruskal–Wallis *H*	6116	4877	10,082
	Asymp. sig.	0.106	0.181	0.018*
Time spent in the area	Kruskal–Wallis *H*	2080	4271	2748
	Asymp. sig.	0.556	0.234	0.432

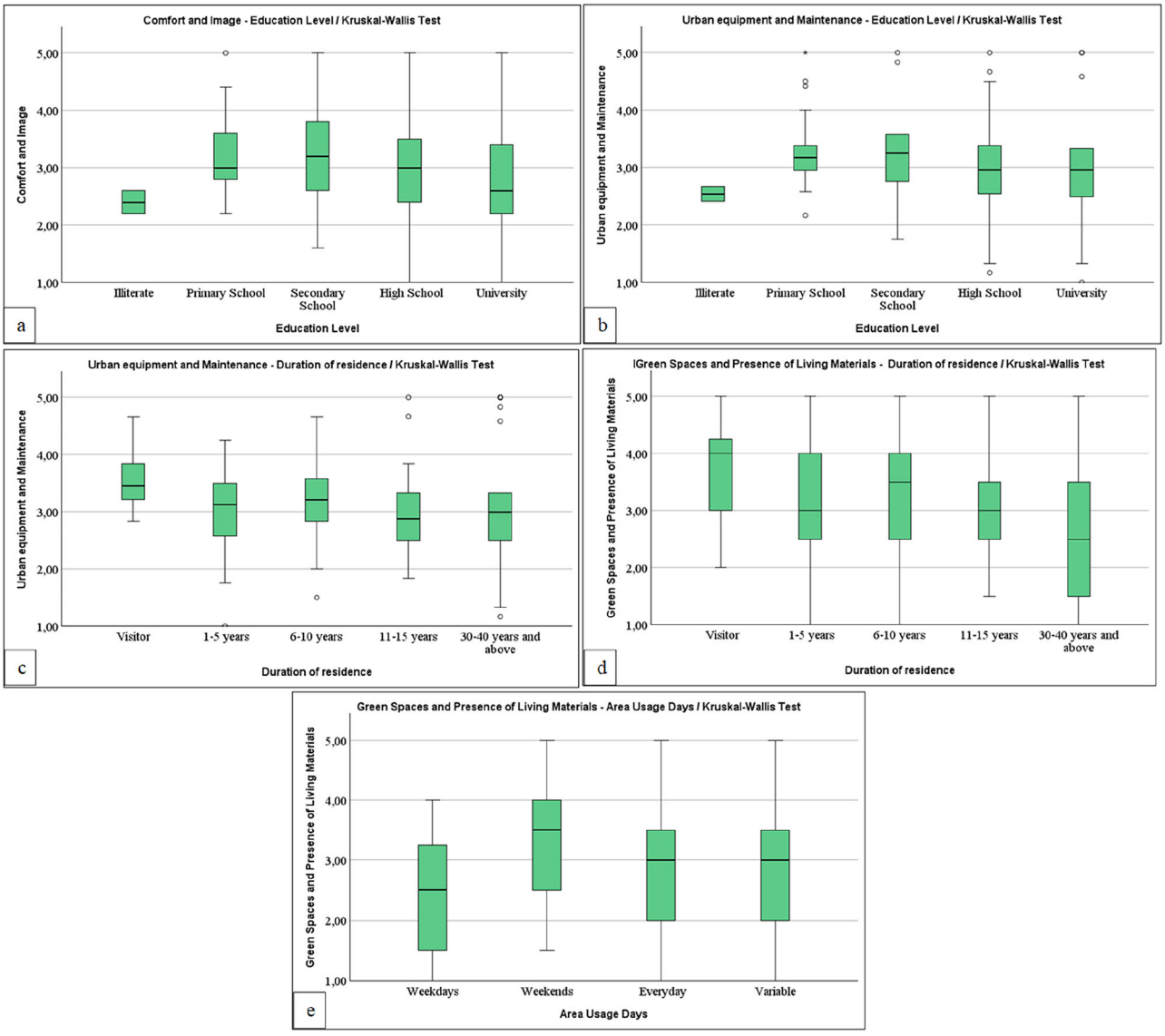

Fig. 8 Analysis of adequacy parameters in relation to demographic and usage characteristics. Distribution of adequacy parameters by demographic and usage: **a** comfort and image – education level, **b** urban equipment and maintenance – education level, **c** urban equipment and maintenance – duration of residence, **d** green spaces and presence of living materials – duration of residence, **e** green spaces and presence of living materials – area usage days.

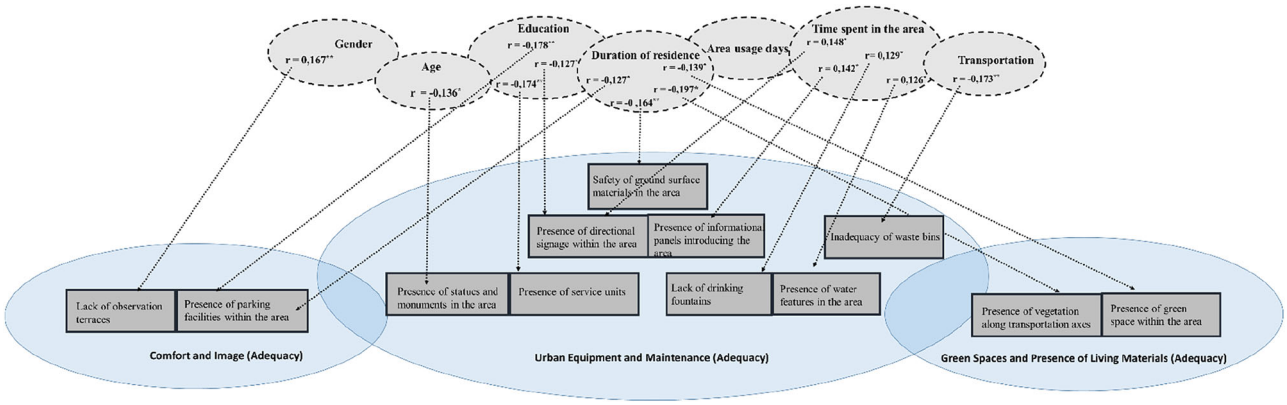

Fig. 9 Comparison of criteria perceived as inadequate or adequate by users in the area with demographic characteristics (correlation is significant at the 0.01 and 0.05 levels). *Note: correlation coefficients are based on Spearman's rho. Positive values indicate positive relationships; negative values indicate negative relationships.

the area on weekends were more inclined to respond "agree" to this parameter.

When examining differences by educational level, high school graduates were mostly undecided about the area's comfort and image, while university graduates expressed disagreement with this parameter. In contrast, individuals with a secondary school education tended to agree with the statements concerning comfort and image.

Relationship between adequacy parameter and demographic characteristics

When evaluating the relationship between users' dissatisfaction with the area and their demographic characteristics, all features except for the day of area usage were found to be statistically significant at $p \leq 0.05$ and $p \leq 0.001$ levels. Specifically, the insufficiency of parking spaces in the area was identified and found to be negatively correlated with both educational level and duration of residence. University graduates who have resided in Bursa for 10 years or more perceived the availability of parking as inadequate. As educational level and duration of residence decreased, the perception of inadequacy declined accordingly.

Education level was also negatively correlated with the presence of service units and directional signage. High school graduates perceived service units as inadequate, while they assessed directional signage as moderate. Additionally, questions regarding the presence of vegetation, green spaces, and the safety of ground pavements were negatively correlated with duration of residence. Users living in Bursa for 16 years or more stated that the green spaces and plant presence along the transportation axis were inadequate. On the other hand, users residing for shorter periods or spending less time in the area found the plant presence sufficient. Long-term residents evaluated the safety of ground pavements as inadequate, while those with shorter residence durations assessed it as moderately adequate (Fig. 9).

Furthermore, time spent in the area was found to be positively correlated with the presence of directional signage, water features, informational boards, and the lack of fountains. Users who spent more than 4 h in the area considered the presence of signage and water elements to be of moderate adequacy. Users who spent 2–4 h in the area emphasized the inadequacy of fountains but evaluated the informational boards as good.

Additionally, the absence of a viewing terrace was found to be positively correlated with gender, while the inadequacy of waste bins was negatively correlated with the mode of transportation to the area, and the presence of sculptures and monuments was negatively correlated with age. Both male and female users rated the absence of a viewing terrace as moderately inadequate; however, some female users strongly expressed it as completely inadequate. The presence of sculptures and monuments was generally rated as moderate by users aged 25–34, while older age groups considered it sufficient. Users who predominantly accessed the area via bus or minibus rated the waste bins as moderately inadequate, whereas those who used the tram or metro considered them inadequate.

All these findings indicate that the use of the area by users is largely limited to temporary engagement, highlighting the need for spatial configurations that support long-term, functional, and socially interactive use. Furthermore, the varying spatial needs of different demographic groups necessitate the adoption of inclusive and flexible design principles in landscape planning. The user-based data clearly demonstrate that interventions in historic environments must consider not only physical aspects, but also social and cultural dimensions.

Discussion

Contemporary city centers experience continuous and intensive use due to high population density and vehicular traffic, significantly increasing pedestrian and vehicle movement throughout the day. This pressure poses substantial risks to urban sustainability and quality of life (Yılmaz Türkoğlu 2010). In this context, preserving historic environments and implementing landscape planning strategies that align with the city's identity become increasingly critical. These environments serve as representations of cultural and historical values embedded in the urban fabric and as reinforcing elements of urban identity. Accordingly, integrating urban furniture that supports connectivity and harmonizes with the natural topography and open space structure is essential for achieving a coherent and culturally sensitive landscape design. Pirselimoğlu Batman and Ender Altay (2022) emphasize the necessity of integrating landscape planning within historical environments into the evolving, yet heritage-rooted, urban identity. Today, historic areas are not merely remnants of the past but are increasingly adapted to contemporary urban life under conservation principles. Therefore, strategic planning is fundamental to ensure these spaces' protection, functional adaptation, and intergenerational transmission. Gedik (2015) highlights that preserving historical environments requires careful planning to mitigate the adverse impacts of urban transformation. Moreover, these areas should be restructured to meet emerging functional needs such as tourism and recreation. Cities rich in geographical, cultural, and historical assets offer distinctive experiences, enhancing international recognition. Şarkaya

İçellioğlu (2014) argues that tourism promotes urban competitiveness and contributes positively to urban development.

This study evaluates user satisfaction and the physical adequacy of open and green spaces situated along a significant transportation axis within Bursa's historical and commercial urban core. The analysis focuses on various demographic variables and includes statistical evaluations based on survey data collected from 250 randomly selected participants. Findings reveal significant diversity in the usage patterns, expectations, and perceptions of the city center's users. Of the participants, 47.60% were female and 52.40% male, indicating no considerable gender-based disparity in recreational participation. The 25–34 age group constituted the most significant proportion (33.60%), while 40% were high school graduates. Notably, 48% of respondents had been residing in Bursa for over 16 years, and 38.40% reported spending between 2 h and 4 h per visit to the study area. The most frequently reported activities included dining, shopping, and walking, while engagement in sports or cultural activities such as painting was considerably limited. These findings suggest that the area primarily functions as a transitional or utilitarian space rather than a destination for extended recreational or cultural experiences.

Comparable research conducted by Olgun et al. (2022) in Serik (Antalya) identified deficiencies in the size and quality of urban green spaces, noting the lack of playgrounds, sports areas, shading elements, and urban furniture. Elderly users (65+) emphasized green areas' social, ecological, and health-related benefits. In contrast, users with higher levels of education and age demonstrated greater awareness of their recreational and climatic functions. In the Bursa case, 44.40% of users accessed the area via public transportation, and 18.40% used private vehicles despite parking challenges. Although the region benefits from dense tree cover and a central location, 15.85% of users criticized the green spaces as unorganized and poorly maintained, pointing to a qualitative rather than quantitative insufficiency. Furthermore, 15.13% noted significant limitations in accessibility for disabled users, particularly concerning path continuity.

Survey questions were categorized and analyzed regarding user satisfaction and spatial adequacy. The satisfaction parameters included comfort and image, sociability and safety, urban facilities and maintenance, recreation and tourism potential, accessibility, green areas, and vegetation availability. Among these, satisfaction was highest regarding urban furniture and maintenance. However, respondents expressed uncertainty about the adequacy of green areas, recreational opportunities, and safety, indicating a perceived deficiency in spatial quality. Regarding adequacy, urban furniture was generally rated as "moderately adequate," while green areas and comfort levels were assessed more critically. Educational attainment and residency duration emerged as significant variables influencing perceptions of adequacy. Long-term residents were particularly critical of the green space design, signage, and vegetation, suggesting that extended engagement with the area results in heightened expectations regarding spatial quality.

Bursa's rising tourist population underscores the need for significant infrastructure investments. Inadequate planning can lead to overcrowding and strain on public services. Şarkaya İçelliğoğlu (2014) highlights that infrastructure deficiencies negatively impact tourist experience and satisfaction. Similarly, Aydın and Koç (2024) found that park lighting, parking, and recreational facilities are insufficient, limiting evening use. They recommend improved urban forestry, enhanced safety, regular maintenance, and more evenly distributed urban amenities.

Survey results from this study show that green spaces are primarily perceived as resting zones along transit corridors. Event spaces vary by location; most users engage in photography or brief visits, and prolonged recreational use is limited. Accessibility issues for disabled users were also frequently reported. Demographic analysis demonstrates meaningful relationships among satisfaction parameters—particularly age, residency duration, education level, and duration of stay. Younger respondents (25–34 years) expressed uncertainty about accessibility, while satisfaction increased with age. Longer stays correlate with positive feedback regarding recreation and green space quality, suggesting familiarity leads to greater satisfaction.

A study by Korkut et al. (2021) on Istanbul's Maltepe-Kartal coastline found that weekend visitation exceeded carrying capacity, especially in picnic areas. Inadequacies in seating, sanitation, and parking contributed to dissatisfaction, emphasizing the need for user-centered, landscape-based planning.

One of the most compelling findings of our research is the strong linkage between user satisfaction and demographic factors. Younger participants evaluated amenities critically, whereas older or long-term residents displayed more neutral satisfaction. Lower-education respondents reported dissatisfaction with transportation, while longer-term residents expressed higher satisfaction. Time spent in the area increased awareness of vegetation and tourism-related features—leading to more informed user perspectives.

Akay (2022) examined tourism development through Social Exchange Theory and found that positive economic and socio-cultural impacts significantly influence satisfaction, support for tourism, and tourism entrepreneurship. While perceived environmental benefits were not significantly linked to satisfaction, users recognized the benefits of tourism more than its costs—consistent with the theory.

This study presents a multidimensional analysis of user satisfaction, landscape planning, and sustainable tourism within the historical city center of Bursa. The findings largely align with UNESCO's (2011) HUL approach, which advocates for the integrated conservation of historic environments in physical terms and their social, cultural, environmental, and economic dimensions. The key issues identified in the study—such as limited accessibility, insufficient urban furniture, poor green space quality, and inadequate signage—indicate that the four main principles of the HUL framework—integration, participation, multidisciplinarity, and sustainability—have not been sufficiently implemented at the Bursa scale. Furthermore, resistance from residents and business owners toward change highlights the importance of participatory planning. Applying the HUL framework in re-functionalizing Bursa's historic core necessitates a holistic approach that protects urban identity, addresses user needs, and ensures sustainability. This approach should extend beyond physical design to include governance, financing, and social acceptance mechanisms.

Our study aimed to emphasize the historical and cultural assets of the urban core through a tourism-oriented landscape planning approach, transforming the area into a sustainable and functional living environment for both tourists and local users. In this context, the goal was to strengthen tourism functions and meet the spatial and social needs of daily users. A design approach that integrates user satisfaction, urban identity, sustainability, and cultural heritage can enhance the experience for both locals and visitors, making the area a tourist destination and a vibrant public space.

The research conducted in the city center of Bursa revealed that inclusive, accessible, and user-centered planning practices have not yet been fully adopted in public space design. Users reported deficiencies in a wide range of areas, including physical infrastructure, signage systems, the quality of green spaces, and spaces for social interaction. The correlations between demographic variables and satisfaction levels suggest that user diversity

is often overlooked in the design process, negatively impacting spatial use and perception.

Although the landscape planning and design strategies proposed in this study are based on an integrated framework focused on sustainability, urban identity, and user satisfaction, various constraints and challenges must be considered during implementation. These include local governance processes, financial limitations, and stakeholder resistance.

Zainol et al. (2014) outlined the criteria for creating pedestrian-friendly environments, emphasizing that pedestrian prioritization in historic cities should be comprehensively addressed within urban planning. Their study contributed to the literature by proposing a street-based model for evaluating walkability. Similarly, Song et al. (2024) focused on tourist satisfaction in conserving and reusing narrow streets in historic urban areas. Their research emphasized the importance of improving landscape elements and developing alternative spatial scenarios—including scheduled folklore events and intangible heritage experiences—to enhance tourist engagement and place identity.

Zhang and Xu (2021) analyzed the demographic characteristics and spatial needs of tourists and local users in historic districts. Participants were categorized by age, user type, and frequency of use, and through surveys and interviews, their cognitive perceptions and priorities regarding functional, social, artistic, and spiritual needs were examined. The study developed a satisfaction assessment system, revealing shortcomings in revitalized areas. It was found that younger and middle-aged tourists prioritized artistic needs, while elderly local users emphasized spiritual aspects.

Nevertheless, it is essential to acknowledge that complex administrative structures and multi-layered planning processes shape interventions in city centers. Delays in project approvals, lack of coordination among institutions, and rigid legal frameworks often limit the feasibility of proposed designs (Ersoy 2015). In particular, the lengthy approval procedures required by heritage conservation boards present a significant barrier in historic areas.

Moreover, physical interventions such as green infrastructure, signage systems, urban furniture, and accessibility upgrades often involve high implementation costs. The limited budgets of local governments can be a significant constraint in realizing such investments. In contrast, successful European cases demonstrate the effectiveness of public–private partnerships and the strategic use of international funding in delivering sustainable urban landscape projects (Beatley 2012). In the Turkish context, however, such financial support remains insufficient, and projects often unfold over extended timeframes (Keleş 2020).

Resistance from stakeholders—particularly local shopkeepers, property owners, and residents in historic environments—may also pose challenges. Small businesses dependent on the area's economic activity may be hesitant about changes due to the perceived uncertainty of outcomes. In addition, historical mistrust stemming from previous urban transformation projects can negatively affect the acceptance of new landscape planning proposals. To overcome these challenges, it is essential to adopt participatory planning methods and to involve all stakeholders from the early stages of the planning process.

Given these constraints, it is clear that the proposed design and planning strategies must be supported not only by ideal models but also by realistic implementation frameworks. The success of such interventions depends not only on design quality but also on administrative coordination, financial feasibility, and community acceptance. In conclusion, the strategies presented in this study offer a flexible and adaptive approach that extends beyond idealism and aligns with on-the-ground realities. To address implementation challenges, these strategies should be supported by phased action plans, pilot projects, and robust mechanisms for community participation.

Conclusion

The study recommends designing landscape areas tailored to the distinct demands of young and elderly users—dynamic, modern spaces for the former (e.g., art installations, digital screens, interactive sculptures); tranquil, nature-integrated rest zones with seating for the latter. Temporal flexibility is critical: mornings should be calm, while afternoons accommodate events, exhibitions, and open-air concerts.

The city's historic and cultural fabric must serve as a core element of the landscape planning process. Key historical and tourist sites should be connected by strategic "tourism corridors," enhanced with wayfinding signage, informational panels, and visual–aural guidance to deepen users' connection to the past.

Given the heightened awareness of tourism value among lower-education users, the number of informational displays, interactive maps, and directional signs should be increased. These tools will foster more informed and conscious usage by residents and tourists. Interactive information points such as digital kiosks and historical narratives can raise tourism awareness.

Time spent in the space and growing cultural awareness suggest integrating cultural and artistic events—festivals, exhibitions, performances—into the landscape. This supports tourism and solidifies the area's social and cultural centrality. To balance tourism and daily use, spaces should be flexible, accommodating community life and visitor activities.

Strengthening transport infrastructure is essential, especially since users with lower educational levels reported dissatisfaction. Improvements should include better transit routes, bike lanes, pedestrian paths, and enhanced integration among public transport modes. Additional parking and service units should be introduced to alleviate current deficiencies.

Long-term residents expressed dissatisfaction with green spaces and vegetation. These areas should be ecologically enriched—featuring native flora, water features, and biodiversity integration—to enhance environmental sustainability and aesthetic value. Investment in green infrastructure will address wear over time and elevate overall spatial quality.

The co-occurrence of extended user duration and cultural awareness underlines the importance of cultural events in space. Featuring festivals, exhibitions, and performances supports resident and tourist engagement, repositioning the area as a socio-cultural hub. Adaptive spaces and event programming are vital to balance tourism and local usage.

As a central tourism corridor, the space must meet tourists' expectations and serve everyday users. A holistic planning approach should respond to diverse user needs and support the area's sustainable development. Landscape design should reflect urban identity, integrate cultural values, and include natural elements to satisfy residents' and visitors' requirements.

Tourism-based landscape planning that merges urban identity, culture, and sustainability can enhance the area's tourism appeal and user satisfaction. Strategies—such as tailored areas for young and elderly users, improved transport infrastructure, enriched green zones, and integrated cultural programming—will foster social, cultural, and economic sustainability. This approach ensures a flexible, multifunctional urban space benefiting all user groups.

To create more inclusive, accessible, and user-centered public spaces in Bursa's city center, physical improvements must ensure equal access for people of all ages and abilities. Enhanced wayfinding systems integrated with public transport, improved parking and resting facilities, and inclusive design standards are

essential. Participatory planning methods should be used to embed user needs into the design process. Green spaces, plantings, and urban furniture should be aesthetically pleasing and functional, supporting versatile use of the area.

Preserving and enhancing historic environments is vital for strengthening urban identity and promoting sustainable development. Design interventions must balance heritage with contemporary needs and meet local and international tourist expectations. Moreover, involving local communities and prioritizing eco-friendly practices will help ensure that historic areas are preserved and transmitted to future generations. Reimagining Bursa's public open spaces through green infrastructure, diverse event programming, and improved accessibility and navigation offers critical insights for enhancing user experience and spatial quality, guiding future landscape design and planning initiatives.

Data availability

All data generated or analyzed during this study are included in this manuscript.

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Author contributions

The authors confirm their contributions to the manuscript as follows: FT: investigation, data collection, visualization, and writing; ZPB: conceptualization, methodology, writing, and editing. All authors reviewed and approved the final version of the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This study was approved by the Ethics Committee of Bursa Uludağ University, Science and Engineering Sciences Research and Publication (approval no: 2019-03, dated May 27, 2019). The approval covers the survey and methodology employed in the research. All procedures involving human participants were carried out in accordance with relevant ethical guidelines and regulations. All procedures conducted in this study adhered to the ethical standards outlined in the Declaration of Helsinki. The authors further declare that the submitted manuscript is original, has not been published elsewhere, and fully complies with the Ethical Guidelines applicable to this journal.

Informed consent

In accordance with Articles 10(a) and 10(b) of the Bursa Uludağ University Directive on Research and Publication Ethics Committees, it is stipulated that (a) ethical approval must be obtained for the collection of data through surveys, interviews, or similar methods in studies conducted by members of Uludağ University, and (b) participants' rights must be protected, harm must be prevented, and informed consent must be obtained before, during, and after the research. Within this framework, informed consent for this study was obtained orally from participants prior to the administration of the survey conducted between June and August 2019. As the study was non-interventional and low-risk in nature, written consent was not deemed necessary. Participants were informed about the purpose, procedures, confidentiality, and data usage of the study, and their voluntary participation was documented by the researchers. The consent covered participation, the use of anonymized data for research purposes, and the publication of results in academic outlets. Only adult participants who were capable of providing consent on their own behalf were included in the study.

Additional information

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