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# Beyond Green: A Comprehensive Approach to Urban Green Space Quality and Tastes of Users in Tehran

**Farzaneh Azadi [a], Kianoush Suzanchi [b,*], Mahdi Haghighatbin [c], Mahdi Khansefid [d]**

[a] *Department of Art, Faculty of Architecture, university of Tarbiat Modares, Tehran, Iran*
[b] *Department of landscape architecture, Tarbiat Modares University, Tehran, Iran*
[c] *Faculty of art, department of architecture, Tarbiatmodares university, Tehran, Iran*
[d] *Faculty of Agricultural Sciences and Engineering, Tehran university, Tehran, Iran*

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**Abstract**

The research tackles the pressing quality crisis in urban areas, particularly in green spaces. Landscape architects argue that the current approach lacks a comprehensive perspective, prompting the study to explore "landscape" from both objective and subjective angles. Systematically adopting visual and mental perspectives, the research aims to enhance urban space quality, emphasizing landscapes' dual nature beyond mere greenery. The primary goal of the study is to establish indicators for understanding and measuring landscape quality, drawing on the perceptions of local users of urban green spaces. This approach stresses the significance of considering both citizen perspectives and specialists in the field, treating urban spaces as landscapes. The research seeks to bridge the gap between the current and desired quality, ultimately improving the presence and usage of urban green spaces. The methodology involves a literature review for identifying qualitative indicators and exploring the relationship between them, along with a T-test to examine urban dwellers' preferences. In addition to these foundational aspects, the research findings reveal a pronounced quality imbalance between the two studied regions in Tehran (17 and 2). The observed disparities underscore significant differences in the tastes of urban dwellers and reveal a notable gap between these preferences and specialist beliefs, suggesting a potential avenue for achieving balance by concentrating on mediatory indicators. The study provides valuable insights for prioritizing key indicators based on user perspectives to enhance the quality of urban green spaces.

***Keywords***: landscape quality, urban green space, users' tastes, beyond green

## 1. Introduction

Problem statement- Today, in all research, urban green spaces are considered one of the most significant factors for success and vitality in the city. Urban Green Spaces (UGS) has been associated with different aspects of ecosystem services and potential economic benefits (Lategan et al., 2021 & Geneletti et al., 2020), health of urban dwellers (Knobel et al, 2021 & Gascon, 2015), and their quality of life, including multiple benefits for both physical and mental health (Chau, 2023). Unfortunately, realizing all these values, urban environments have declined in the face of meeting all the needs of their residents and having a positive impact on their quality of life. Therefore, looking at this issue from the perspective of landscape architecture illustrates the importance of reviewing the development process and the need to pay attention to both mental and visual aspects of the phenomenon to preserve these natural organs.

Necessity- So far, many studies have been done on green space and its role in today's city. In a study using the Q methodology, Roschel examines users' mental patterns of water and green infrastructure in several large cities (Roschel et al., 2019). In one study, researchers used user-generated geographic information to better understand users' preferences for urban green spaces (Heikinheimo, 2020). Studies have shown the importance and significant impact of green space in the city and the need to study this importance among users. Carmona et al. (2021) in their book "Public Places Urban Spaces", The Dimensions of Urban Design " states: The shape of the city and its appearance should satisfy a wide range of people who experience it. In another study in Germany, 1700 users in different age groups were examined in urban green spaces. In this study, an attempt was made to increase the response to users' needs by identifying the components of urban green space and the services provided by urban dwellers (Palliwoda, 2021). According to the above, the importance of people's perception of urban spaces especially urban green space as one of the main spaces to meet the needs of urban people can be noted. Knowing the user's taste provides a suitable model for decision-makers to shape these spaces to approach the desired space and respond to the users' needs. Other researchers in their study looked at the difference in quality assessment between students who had been trained in design and students who had studied in fields unrelated to design. The results showed that ordinary people perceive beauty and quality completely differently from designers (Whitfield, 1982). Therefore, the mental pattern of experts and specialists of a green space with quality and users' perception of this space will be different, and this highlights the need to identify and study the perception of the user of space in the city.

* Corresponding Author Email Address: suzanchi@modares.ac.ir

Questions:
What are the quality indicators of urban green space in the two areas studied by users, and what is the difference between them?
Is the opinion of urban green space experts and specialists the same as the users about urban green spaces?

## 2. Research Background

*a. Quality*

The concept of "quality" is multifaceted, encompassing both tangible and intangible dimensions. While it readily applies to tangible attributes such as hardness, softness, and speed, its interpretation becomes multidimensional when dealing with intangible qualities like beauty, glory, and a sense of place (Khan & Moulaert, 2014; Allaire, 2012). Quality is typically understood as denoting the degree of perfection in objects and phenomena. However, defining the precise parameters and characteristics that represent this degree of perfection poses a formidable challenge (Khan & Moulaert, 2014). To address this challenge, there is a pressing need for the development of a comprehensive and universally applicable tool for measuring and evaluating quality that can be employed by a diverse range of individuals (Allaire, 2012).
In the context of urban green spaces, quality plays a pivotal role in enhancing the overall urban environment and the well-being of its inhabitants. Green spaces have been associated with various benefits, including ecosystem services and potential economic advantages (Geneletti et al., 2020; Kong, Yin, et al., 2007), as well as positively influencing the health and quality of life of urban dwellers (Gascon, 2015; Knobel et al., 2021). Despite their potential to contribute to urban vitality and well-being, there is currently no standardized scientific method for evaluating the quality of green spaces, particularly from the user's perspective (Kothencz and Blaschke, 2017; Şenik, 2022).
While some studies have focused on assessing the monetary value and economic benefits of green spaces (Kong, Yin, et al., 2007), others have delved into specific aspects of green space quality, such as visual or auditory quality. A limited number of studies have taken a comprehensive approach, evaluating green space quality based on various measurements and their cumulative impact on specific locations (Cohen et al., 2014; Khan, Moulaert et al., 2014). Furthermore, recent research by Cao et al. in Beijing, China, has underscored the critical role of the quality of urban green spaces in promoting ecological health, resident well-being, and environmental equity. They revealed spatial inequalities in residential exposure to green space, indicating the need for targeted enhancement strategies and a gradual reduction in inequality over time (2023).
These complexities surrounding the concept of quality and the dearth of standardized methods for evaluating green space quality underscore the need for further research to comprehensively understand and measure the quality of urban green spaces, with a particular focus on user perspectives. This research contributes to addressing the multifaceted nature of quality and its implications for urban green spaces.

*b. The landscape quality and preference of urban dwellers*

In contemporary society, the pursuit of a high-quality life, especially in urban areas, is a fundamental aspiration (Simoni, 2006). Effective urban landscape management can significantly contribute to creating a high-quality environment (Tahir et al., 2006). Consequently, there is a growing need for visually appealing landscapes that resonate with urban residents. Achieving such popular landscapes requires the adoption of design criteria rooted in the preferences of individuals from a particular perspective. Şenik emphasizes that in urban green spaces, both the natural and cultural elements are crucial in shaping the quality of these spaces (2022). However, there is limited data available regarding people's visual preferences for urban landscapes in Tehran. Understanding environmental preferences relies on the contents and spatial organization of the landscape. The role of landscape content in people's preferences became evident when users showed stronger support for environments with natural elements. Green spaces emerge as one of the most favored preferences (Staats & Hartig, 2004; Kaplan, 1977; Kaplan et al., 1972; Staats et al., 2003).
Moreover, since people's perceptions vary across different landscapes, the response to these perceptions may require distinct design criteria tailored to specific environmental features. The study of landscape perception and preferences falls within the realm of environmental psychology (Van Den Berg et al., 2010). Therefore, while the visual aspect of an environment's quality doesn't necessarily equate to superiority, concerning architecture and satisfying the audience, quality is associated with mental quality, akin to a sense of goodness (Rahmani, 2019). In the planning and management of public resources, including urban green areas, it is imperative to focus on understanding the needs and desires of users. Any disconnect between the expectations of urban landscape users and the current state of the city can lead to adverse outcomes. Thus, landscape quality is shaped by the interplay between objective and subjective landscape features. Establishing the right relationships between these two categories can enhance the quality of urban landscapes. Measurement of this quality serves as a crucial tool and is vital for the satisfaction of users (Daniel, 2001). Fig. 1

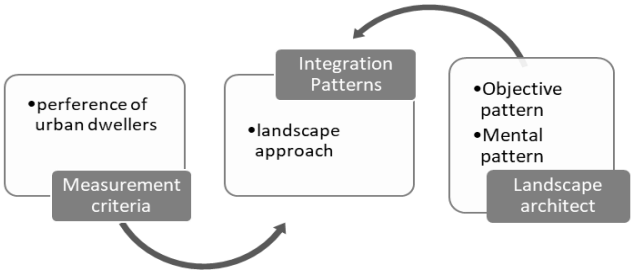


Fig. 1. Quality assessment pattern

*C. Beyond green*

The concept of "beyond green" in the context of urban environments refers to an expanded and holistic approach to assessing and improving the quality of urban spaces that goes beyond a mere focus on greenery. This approach recognizes that the quality of urban environments is influenced by a variety of factors beyond the presence of vegetation. While specific references to the term "beyond green" may not be prevalent in academic literature, the underlying principles align with broader discussions on holistic urban planning, environmental psychology, and landscape architecture. These fields emphasize the importance of considering various elements, such as social, cultural, aesthetic, and functional aspects, in addition to ecological factors, when evaluating and designing urban spaces. In Zhang's 2017 article, 'Quality over Quantity in Urban Green Spaces,' the author underscores the significance of prioritizing the quality of these crucial areas within cities. Zhang suggests that, from a holistic perspective, the quality of urban green spaces may outweigh their quantity. The article delves into the idea that the intrinsic value of these urban spaces is enhanced when emphasis is placed on their qualitative aspects. This perspective challenges the conventional focus on quantity (just being green) and encourages a more nuanced approach to urban planning and design, where the emphasis on quality contributes significantly to the overall well-being and functionality of these essential urban environments."

## 3. Theoretical Framework

Although the concept of landscape was initially more related to landscape and nature, over time it underwent many changes; To the extent that today it is a concept beyond designing open spaces or nature and creating a landscape (Zandieh, 2014). According to the meaning of the word landscape and the dimensions that affect it (visual and mental dimensions), the appropriate approach to face it should also be a landscape approach. It is the landscape approach that establishes a direct connection between the pattern and the processes that make up the earth, our perception of them, and the permanent connection with beauty, and transforms the physical (visual) aspects of the earth into the perceptual (mental) aspects. Kand (Simon Bell, 1386). In this approach, the city is no longer considered just a single body and creature, but the collective memories and experiences of individuals from its spaces and part of the meanings of the place in human experiences and mental states should be sought (Norberg - Shulz, 2003). In other words, the urban landscape is not the face of the city and a forced physical view of it cannot be a way forward. Therefore, to achieve the quality of landscapes in urban green space, by studying 15 sources related to the quality of green space (Table 1), effective objective and subjective indicators have been explained. This dual-categorization was achieved by the mentioned sources. In the following, 7 indicators have been identified as mediating indicators in achieving the quality of urban green space landscapes in the literature.

*D. Visual indicators*

*i. Being natural and diverse*

This term includes natural ecosystems with the least amount of human intervention and therefore refers to untouched and free nature (Grahn, 2010). The degree of naturalness is a factor that has positive effects on human well-being and biodiversity (Grahn, 2010; Knez, 2018), which will also lead to more activities and aesthetic values. The indicator of naturalness emphasizes the tangible aspect, highlighting the pristine and untouched nature of the green space. It can be said that desirable visual qualities are directly and constructively related to the desirability of the values and environmental qualities of a place. Areas with untouched nature can be a serious priority among users, but they can also create fear or a sense of vulnerability (Jansson, 2013).

*ii. Responding to users' needs*

Urban green space should have features that meet the needs of all users of that space. In this indicator, the emphasis is on creating a space and suitable facilities for the user's enhanced utilization. Meeting the needs is sometimes achieved by creating space conditions and sometimes with tools and facilities. Kemperman believes that quality green spaces can be a good platform for improving the quality of the living environment (Kemperman, 2014). Meanwhile, "facilities" can meet a wide range of user needs. It can also be a quality space containing balance, outdoor amenities such as adequate walking paths (Stessensa, 2020), recreational facilities such as challenging play space (Cabe, 2004), and sports activities (Sanesi, 2006) or include sports equipment. In addition to the values mentioned, it can include signs and lighting, toilets (Grahn, 2010), and hedges (Cabe, 2005). According to Lang, there are inviting environments that

can accept the desired behaviors of urban dwellers (Lang, 1978).

*iii. Cleanliness and maintenance*

Cleanliness (Cabe, 2004) and proper maintenance contribute to the quality of perceived green space. These results come from sound park management (Gobster, 2007; Sanesi, 2006) and adequate budgeting as well as user behavior. Cleanliness involves the shared responsibility of users and management entities. Arrangements for using users for cleanliness and maintenance will bring them more contact with the space and will invite them to be more present in the space.

*iv. Spatial diversity*

Spatial diversity is related to the functional-experimental-visual diversity provided in space. Spatial diversity, despite the sense of distinction it creates in space, maintains a visual and physical connection with the whole space as a whole (Roshani, 2017). According to Salingaros, a variety of different elements are necessary for some elements to act as intermediaries between other elements (Salingaros, 2000). According to Lang, there are inviting environments that can be the context of various behaviors and activities (Lang, 1978).

*v. Access*

This index can be grouped into three: facilitating movement in the environment, increasing the relationship between the environment and the surrounding areas (permeability), and increasing the Invitational feature of the area. Facilitating movement includes items that facilitate movement and encourage people to keep moving within the environment by offering a variety of options for choosing a route and opportunities to move and access spaces. Increased communication includes things that take the environment out of isolation and create communication platforms with the surrounding parts so that the environment can connect with them. Finally, the Invitational feature includes things that supply desirable qualities to increase the demand of people to attend, watch and use the environment, and even encourages them to re-experience the environment (Sinafar, 2015).

*b. Mental indicators*

*i. Sensory richness*

Throughout history, many experts have introduced sensorial richness through visual personality and the use of visual power to achieve the goal of quality. Pallasmaa (2005), however, under the influence of Merleau-Ponty's philosophical view, by emphasizing the connection that is established between the individual and space through all sensorial stimuli, rejects the mere dependence on a vision for the perception of the world. Degan uses the term sensory landscape to describe the stratification of overlap and the simultaneous presence of multiple sensory experiences in urban space and derives it from the term smellscape, first mentioned by Porteous (2008). Shahcheraghi considers the sensory richness in the Iranian garden as the result of the presence of all five senses at the same time. She believes that the concentration of the senses creates a feeling of confinement and leads to a feeling of calm (Shahcheraghi, 2009).

*ii. The sense of belonging*

In the studies of environmental psychologists about the emotional relationship between humans and green environments, it has become clear that a kind of soul in space and the possibility and understanding of its meaning cause a special emotional relationship between the individual and the green environment. They believe that the more people feel a sense of belonging to a place and a part of it, the stronger the connection. At this time, the green space moves out of a simple natural green space and approaches a meaningful place. In other words, it is not only the physical aspects that define a place but also the current atmosphere in it, and its meaning is also effective and involved in the feeling of being in that place (Charles, 1987). Vahdat believes that visual and physical identity (traits and characteristics that distinguish the body from the non-body) causes the perception of identity from the environment and ultimately leads to a sense of belonging in humans (Vahdat, 2015).

*iii. Vitality*

Simply put, slow traffic is one of the most effective factors in revitalizing the city. Relying on this theory, it may be concluded that one of the ways to revitalize the public green spaces of the city is to enable more activities for the people. In this way, more people are present in green spaces for more activities (Sadeghipey, 2012). For the vitality of space, human presence will depend on collective activities and the induction of this vitality into collectiveness. Therefore, vitality with a social approach is measured by the levels of social activities and interactions plus the nature of social communication (Landry, 2000: 4). The state of permeability of territories and borders of the territory reduces permeability (access), increases social supervision and crime prevention, and increases vitality (Alimardani et al., 2017). In a study, Tabibian considers "vitality" in urban spaces to be associated with identity and quality and believes that its traces can be found in elements such as visual diversity, readability, sense of belonging, sensory richness, and security (Tabibian, 2017).

*iv. equality for different groups of people*

Considering the needs of all groups that use green space; has a direct impact on the efficiency of the space and increases its desirability and popularity (Sadeghipey, 2012). By increasing the accessibility of individuals and groups with disabilities and increasing the invitation to the presence of vulnerable groups in society, the feeling of equality between them will increase. Numerous surveys and studies in different parts of the world show that although there is a common positive perception of green spaces as a factor in improving and enhancing health and well-being, different social groups and people with physical disabilities have different perceptions of green spaces, which leads to different patterns of how to use these spaces (Croucher, 2008).

***v.*** *Safety and Security (Croucher, 2008)*

Some believe that dense vegetation will have the opposite effect on understanding safety and amenity. Cabe (2005) found that what endangers urban green spaces the most is

the insecurity in these spaces. The feeling of safety is influenced by individual and social factors as well as environmental factors such as the type of vegetation (Jansson, 2013). The user should not automatically feel threatened. Security is a quality criterion that improves the quality of the environment. So that the lack of security in public places is one of the most important factors in reducing the attractiveness and lack of vitality of spaces (Carmona, 2021: 101).

*vi. Silence and calm*

When people are affected by stress, fatigue, worries and troubles, they have a great need for support from a restorative environment: homogenous coherent spaces, areas which can offer silence and spaces where one can be shielded from exposure to the eyes of the outside world (Grahn, 2023). This index will be very effective for both user groups that have direct access to green space and the user group without access to green space. Reducing access to green space reduces long-term harassment and the prevalence of psychosocial symptoms caused by stress (Stessensa, 2020) and invites the individual to be more present in space. According to Van Herzele (2002), the degree of coordination of sound and spatial space, and the cultural or social contexts in which it is produced, play an important role in defining this mental response (Stessensa, 2020).

Table 1
Dimensions and characteristics of the literature

| Study Number | Author (s) | Year of Publication | Research Method | Index | Type | Country | Approach |
|---|---|---|---|---|---|---|---|
| (1) | Grahn | 2010 | experimental | silence - the shape of space - naturalness - plant diversity - culture - security and safety- visual diversity | urban green space | Sweden | users' perception |
| (2) | Stessensa | 2020 | experimental | naturalness - silence - cultural context - spatial breadth and cohesion - facilities – cleanliness- safety | urban green space | Belgium | perception of users |
| (3) | Jansson | 2013 | theoretical | type of design-vegetation density-observation and control- maintenance and cleanliness | urban vegetation users' | Sweden | perception of safety |
| (4) | Sanesi | 2006 | experimental | meeting and leisure-play space for children - climatic conditions and environment | user-behavior pattern | Italia | public green space |
| (5) | Knobel | 2019 | overview | environment - access - Facilities - security - visual appeal and aesthetics - violence - activity, and use - plant diversity - animal diversity - activities - covers - policies - | public green space | Spain | Quality assessment tools |
| (6) | kheyroddin | 2015 | experimental | diversity and inclusion - social capital - identity - accessibility, and permeability - safety and security - vitality | urban green space | Iran | citizens' perceptions |
| (7) | Sinafar | 2015 | experimental | permeability | environmental quality | Iran | satisfaction or dissatisfaction of citizens |
| (8) | Zhang | 2022 | case Study | social activities- physical activities- activities related to nature- cultural activities | urban green space | Shanghai | quality of urban green spaces and health expenditures |
| (9) | Grahn | 2023 | experimental | silence | green zones | Sweden | Smart cities |
| (10) | Van Herzele | 2016 | theoretical | access- attractiveness | urban green space | Belgium | public preferences |
| (11) | Gobster | 2010 | case study | qualitative diversity - multifunctionality | common perspective | America | relationships between social groups |
| (12) | Smith | 2014 | case study | vitality-personality-access-personal freedom-diversity-facilities | neighborhood quality | Canada | residents need |
| (13) | Cabe | 2005 | experimental | sustainability-personality-environment-accessibility-readability-compatibility-biodiversity | urban green space | England | --- |
| (14) | NurHayati | 2010 | literature review | natural factors-social experiences-design considerations-services and maintenance | neighborhood parks | Malaysia | ----- |
| (15) | ya | 2015 | experimental | living standards - quality of vegetation - accessibility - continuity in green space - maintenance | urban green spaces | China | residents' satisfaction |

## 4. Mediating indicators (Interstitial)

Here, the mediator index is a variable that helps us achieve our goals and facilitates the way to reach the mental dimensions by using visual dimensions. These indicators do not increase the quality of landscapes by themselves, but by influencing other indicators, they help us to achieve the goal. For example, the indicators of sociability, presence, and invitation are three important mediating indicators that achieve vitality in urban green space through the visual indicator of responding to the needs of users. At first, the relationship between the indicators was obtained through the research literature, and then the Delphi research method was questioned by 11 urban landscape experts and specialists. In this regard, the extracted relationships were provided to the experts in three stages. Out of 15 questionnaires submitted, 9 questionnaires were examined, but due to the limited volume of the article, all stages were omitted. Out of 18 proposed relationships, 12 relationships were approved by experts (Table 2). Kendall coordination coefficient has been used to determine the degree of unity of opinion. The Kendall coefficient for this study is 0.768, which represents approximately 70% of the agreement between the viewpoints. Table 2

Table 2
Investigating the relationships of indicators through Delphi

| Study Number | Primary index | Mediator index | Secondary index | score |
|---|---|---|---|---|
| (1) | Naturalness and variety | visual personality | Sensory richness | 4.6 |
| (2) | Naturalness and diversity | Visual diversity | sense of belonging | 4.3 |
| (3) | Respond to the needs of users | Being inviting | vitality | 4.7 |
| (4) | Cleanliness and maintenance | Being inviting | Vitality | 4.8 |
| (5) | Spatial diversity | Being inviting | Vitality | 3.9 |
| (6) | Access | Being inviting | Vitality | 4.9 |
| (7) | Access | Penetration and social monitoring | Safety and Security | 4.6 |
| (8) | Silence and calm | ---------- | Sensory richness | 3.9 |
| (9) | Silence and calm | ---------- | sense of belonging | 3.6 |
| (10) | Safety and Security | ---------- | Vitality | 4.7 |
| (11) | Sensory richness | ---------- | sense of belonging | 3.6 |
| (12) | Naturalness | ---------- | Spatial diversity | 3.1 |

Fig. 2 is based on Table 2 and examines the relationship between primary and secondary indicators and the impact of mediating indicators on them.

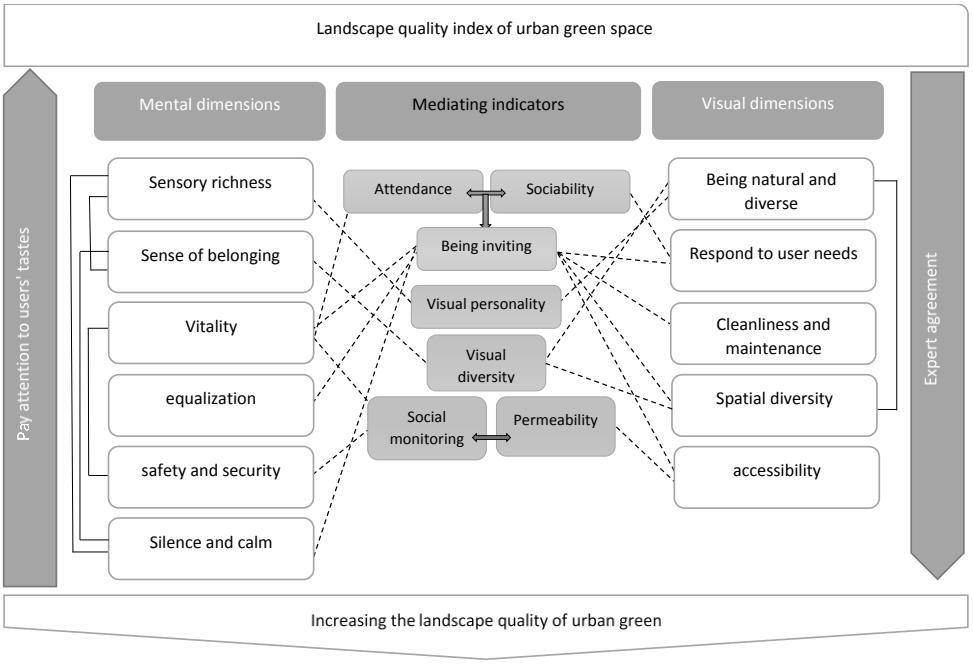


Fig. 2. Indicator relationships

## 5. Area's understudy

After becoming the capital, the metropolis of Tehran underwent a rapid growth and transformation process. So that today this city has become the main economic and social hub in the country. In the present study, two regions of this city (17,2) have been selected as an example and an attempt has been made to provide a suitable proposal for creating a quality green space by using the opinions of the users of these two areas. In a study conducted by Sasanpour et al., the amount of livability of these two areas in terms of the environment with the sub-indicators of pollution, visual quality, and quality of space has been announced as follows. In region 2, the viability rate is 192.58 and in region 17, this index is 62 (Sasanpour et al., 2015). The choice of these two areas was based on the difference in the amount of viability. Also, roodsari in her research indicated that there is a sharp inequality in UGS between these two regions (Nasiri Roodsari, 2021). Fig. 3


Fig. 3. The study area

Region 17, with a green space ratio of about 3.18 square meters per person, is one of the areas with the lowest green space ratio in Tehran. The total green space area in this region is 60.2 hectares, with approximately 8.22 hectares allocated to its gardens. Considering the area of the gardens and the population of the region (approximately 302,852 people), the per capita park space in this area is approximately 0.72 square meters. In other words, this region includes 47 gardens, the largest of which is the Twenty-Second of Bahman Park with an area of 23,148 square meters (Tehran Urban Planning and research, 2015). On the contrary, Region 2, with

approximately 154 gardens, has a much higher per capita ratio compared to Region 17. The reason for this lies in the extensive nature of Region 2 and its lower population compared to Region 17 (Tehran Urban Planning and research, 2015).

## 6. Research Methodology

The research method in the present research is mixed (quantitative and qualitative). As far as purpose is concerned in the quantitative part, this study is classified as applied research. Its results are used to raise the awareness of landscape architects and urban planners about improving the quality of urban green space, and in the qualitative part, it is a case study. In collecting information, library and survey methods were used using a questionnaire.

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*a. Step 1. Identify the dimensions/ indicators*

In this research, first, by reviewing 15 articles and a case study from the last three decades for the proposed variables in the field of urban green space, the dimensions and quality indicators of landscapes in the city were identified. Then, the acquired dimensions and indicators were evaluated and finalized by eleven experts and specialists in the field of the urban landscape, using the Delphi method. The measures and characteristics of the literature after applying the views of experts are listed in Table 1. Based on the literature and opinions of experts, thirteen main topics of the green landscape quality model were distinguished for this study, which is used as a sub-indicator of urban green space quality. These thirteen indicators are divided into two main groups: a)"visual indicator" of naturalness and diversity, silence and tranquility, response to user needs, accessibility, cleanliness and maintenance, and spatial diversity, b) "mental indicator" of vitality, richness Sensory, the sense of belonging, equality, and equality for all groups of people, safety, and security. Also, by reviewing the literature, seven indicators have been identified to achieve the desired quality, which in themselves will not achieve the desired goal, but by influencing other indicators, will play their part in achieving the goal. So, they are considered mediating indicators.

*b. Step 2. Investigating the relationships between indicators*

In the second step, after determining the effective indicators in the landscape quality of urban green space, the relationships between the indicators through mediating indicators are examined. In examining the relationships of 9 experts in the field of green space and landscape architecture, they have determined the relationships through the Delphi research method and the Likert spectrum. The result of establishing relationships is shown in Figure 3.

*c. Step 3. Measurement of indicators using a t-test*

The questionnaire, designed according to the Delphi results, consists of two parts: demographic characteristics (age, gender, and level of education) and questionnaire questions (11 questions) in two parts: current status and desired status. The questionnaire also uses the Likert scale to answer the questions, which includes five options and includes very few to very many options. Formal validity has also been used to ensure the validity of the questionnaire. In face validity, the questionnaire was first approved by expert professors before distribution and the necessary corrections were considered and Cronbach's alpha was used to assess the reliability of the questionnaire. Cronbach's alpha in this study was 0.818, which indicates the reliability of the questionnaire. A total of 80 questionnaires were distributed among green space users in region 2 and 80 questionnaires in region 17 of Tehran. After collecting and deleting unusable questionnaires, 66 questionnaires from District 2 and 66 questionnaires from District 17 were analyzed. To analyze the data, two sections of descriptive statistics and inferential statistics have been used. Descriptive statistics have been used to display demographic information using frequency tables and graphs. Inferential statistics have been used to analyze data and test hypotheses. First, the normality of the collected data was investigated through the Kolmogorov-Smirnov test, then, to test the research hypotheses, a one-sample t-test (comparing the mean of the population with a fixed value) and a comparison test of mean or dependent T were used. It should be noted that for data analysis, SPSS software version 24 was used.

## 7. Data Analysis

The frequency of descriptive statistics analysis showed that most of the respondents to the questionnaire in the 17th district of Tehran were men with a bachelor's degree and the age younger than 30 years and most of the respondents to the questionnaire in the 2nd district of Tehran were men with master's degree and age less than 30 years. Additional information is provided in Table 3.

## 8. Testing Research Hypotheses

In this section, the research hypotheses are examined using a one-sample t-test. In the t-test, we have compared the practical and theoretical means. Theoretical average means the average of the codes assigned to the options of each question, which is equal to 3, and the practical or observed average is the average obtained from the questionnaires for each hypothesis. If the mean of observation is significantly higher than the theoretical mean, it can be concluded that the frequency of many and very many options is higher than other options, and this means that the hypothesis is fulfilled.

*a. Comparison of the current situation with the desired situation (Region 17):*

To compare the average effect of the extracted indicators on the quality of urban green space in both the current situation and the optimal situation, the pairwise average comparison test or the dependent T-test was used. The results of this test are as follows:

Hypothesis 0: The average effect of the extracted indicators on the quality of urban green space is the same in both existing and desired conditions.

Hypothesis one: The average effect of the extracted indicators on the quality of urban green space is not the same in the existing and desirable conditions. Table 4

$\begin{cases} H_0: \mu_1 = \mu_2 & \text{(The means of the two samples are equal)} \\ H_1: \mu_1 \neq \mu_2 & \text{(The means of the two samples are not equal )} \end{cases}$

μ_1 Mean in the current situation:
μ_2 Mean in the desired situation:

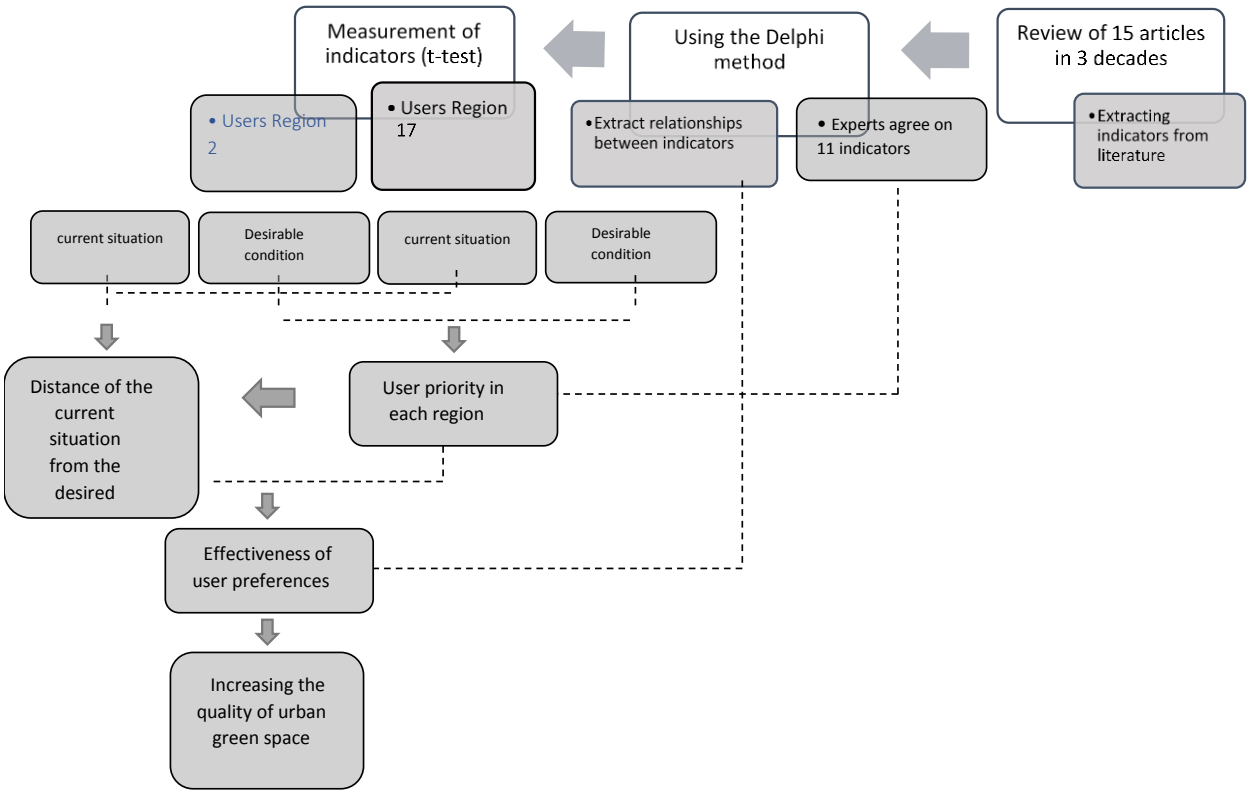


Fig. 4. Research process

Table 3
Descriptive information of the respondents

| **Gender of respondents** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Region 17 | | | | Region 2 | | | |
| Man | | woman | | Man | | woman | |
| 42 | | 24 | | 36 | | 30 | |
| **Age of respondents** | | | | | | | |
| Region 17 | | | | Region 2 | | | |
| Less than 30 years | 30 to 40 years | 40 to 50 years | 50 years and up | Less than 30 years | 30 to 40 years | 40 to 50 years | 50 years and up |
| 42 | 6 | 12 | 6 | 26 | 15 | 11 | 14 |
| **education** | | | | | | | |
| Region 17 | | | | | Region 2 | | | | |
| Diploma and sub-diploma | Associate Degree | Bachelor | Masters | P.H. D | Diploma and sub-diploma | Associate Degree | Bachelor | Masters | P.H. D |
| 12 | 12 | 24 | 6 | 12 | 0 | 10 | 20 | 27 | 9 |

Table 4
Results of the comparison test of the current and favorable situation in Region 17

| region | group | number | average | Test statistics T | Degrees of freedom d. f | Sig | Low limit | Upper limit | Test result At an error level of 5% |
|---|---|---|---|---|---|---|---|---|---|
| 17 | current / desired | 66 | 1.801 / 4.049 | 44.970 | 65 | 0.000 | -2.34 | -2.14 | The difference is significant |

b. *Comparison of the current situation with the desired situation (Region 2*)

To compare the average effect of the extracted indicators on the quality of urban green space in both the current situation and the desired situation, the pairwise average test or the dependent T-test was used. The results of this test are as follows: Table 5

$\begin{cases} H_0: \mu_1 = \mu_2 & \text{(The means of the two samples are equal)} \\ H_1: \mu_1 \neq \mu_2 & \text{(The means of the two samples are not equal )} \end{cases}$

μ_1 Mean in the current situation:
μ_2 Mean in the desired situation:

Table 5
Results of the comparison test of the current and favorable situation in Region 2

| region | group | number | average | Test statistics T | Degrees of freedom d. f | Sig | Low limit | Upper limit | Test result At an error level of 5% |
|---|---|---|---|---|---|---|---|---|---|
| 2 | current / desired | 66 | 2.743 / 4.00 | 21.204 | 65 | 0.000 | -1.37 | -1.13 | The difference is significant |

Table 6
Ranking of extracted indicators in the 17th district of Tehran

| Dimensions | Indicators | Average rating | N | Chi-square | Degrees of freedom | Significance level |
|---|---|---|---|---|---|---|
| Visual | Cleanliness and maintenance | 9,23 | 66 | 221.193 | 10 | 0.000 |
| Mental | safety and security | 8.77 | | | | |
| | Equality for different groups pf people | 6.45 | | | | |
| | Silence and calm | 6.36 | | | | |
| Visual | access | 6.36 | | | | |
| | Respond to user needs | 6 | | | | |
| Mental | Sense of belonging | 5.45 | | | | |
| | Vitality | 5 | | | | |
| | Sensory richness | 4.50 | | | | |
| Visual | Spatial diversity | 4.27 | | | | |
| | Being natural and diverse | 3.59 | | | | |

Table 7
Ranking of extracted indicators in the 2th district of Tehran

| Dimensions | Indicators | Average rating | N | Chi-square | Degrees of freedom | Significance level |
|---|---|---|---|---|---|---|
| mental | safety and security | 9.14 | 66 | 264.157 | 10 | 0.000 |
| visual | Cleanliness and maintenance | 8.50 | | | | |
| | access | 8.05 | | | | |
| | Respond to user needs | 6.77 | | | | |
| Visual | Equality for different groups pf people | 6.18 | | | | |
| Visual | Being natural and diverse | 5.23 | | | | |
| Mental | Sensory richness | 4.82 | | | | |
| | Sense of belonging | 4.73 | | | | |
| | Vitality | 4.55 | | | | |
| | Silence and calm | 4.41 | | | | |

*a. Ranking of extracted indicators in green space quality (region 17&2):*

Friedman test was used to rank the extracted indices.
H0: Prioritization of extracted indicators is the same.
H1: At least two priorities are different.
The results of the Friedman test are presented in the following tables. Table 6 is a descriptive statistic that shows the average rankings of each index. Considering that the higher the average rankings, the more important that index is, so in the 17th district of Tehran, cleanliness, and maintenance are the first and natural priority, and diversity is the last priority in the ranking. Also, in Region 2 of Tehran, safety and security are the priority, and spatial diversity is the last priority in the ranking Error! Reference source not found.. Also, considering that the significance level in both regions is less than 0.05 (zero), hypothesis H0 is rejected, and the claim that the rank of these indicators is the same is not accepted.

## 9. Results and Discussion

In examining the hypothesis of the difference between the current and desirable situation in the two regions, the results of which are given in Tables 5 and 6, the significant discrepancy of this difference in the two regions can be examined. The average of the current situation is 1.801 and the average of the favorable situation is 4.049. It can be said that the difference between the current situation of green space in area 17 should still be 2.248 and it can be concluded that there is still a gap to achieve the ideal quality. Therefore, considering the significance level of 0.000 and the feeling of both boundaries of distance (ie distance to ideal) and the value of the t-statistic which is greater than 1.96, it can be concluded that the null hypothesis was rejected. In other words, the average effect of the extracted indicators on the quality of urban green space is not the same in the existing and desirable conditions. Also, in the study of Region 2, the results of Table 6 show the difference between the average of the current and the desired situation. The average current situation is 2.743 and the average favorable situation is 4, if the current situation is, the quality of green space currently in Zone 2 should still be 1.257. So, there is still a distance to the ideal. Considering the significance level of 0.000 and the existence of both distances (ie the distance to the ideal is not) and the value of the t-statistic which is greater than 1.96, it can be concluded that the null hypothesis is rejected. The extracted indicators in the quality of urban green space are not the same in the two existing and favorable conditions in Region 2.
Considering the distance from the optimal situation in Region 17, which is 2.248, and in Region 2, which is 1.257, it seems that the quality of urban green space in Region 17 is far from the desired conditions according to the indicators obtained, and the taste of the citizens in this region.
Also, in examining the quality priorities of urban green space in the two regions, we observe differences in the citizens' tastes. According to the evaluation in Table 5, which examined the primary users of District 17, the cleanliness and maintenance index has the highest importance among users in this area. The index of safety and security, equality, silence and tranquility, access, response to the needs of users, sense of belonging and vitality, sensory richness, and spatial diversity have respectively less important than Cleanliness and maintenance. Also, being natural and diverse is at the lowest level of importance among the users of this region.
In the study of the priority of the residents of District 2 of Tehran, the safety and security indexes are among the most important indicators of the quality of urban green space and have a high position. Also, indicators of cleanliness and maintenance, accessibility, responding to the needs of users, Equality for different groups of people, naturalness, and diversity, sensory richness, sense of belonging, vitality, and presence, decrease their importance in order. And finally, the index of spatial diversity among the users of this region has the lowest level of importance.
According to the statistics in Tables 6 and 7, the mental characteristics of vitality and sense of belonging have less importance and the users of both regions have given them fewer points. It seems that the difference between the expectations of quality users and experts is related to the way they look at green space and the type of activities envisaged. Users of urban green spaces consider it a place for fun, sports and games and pay less attention to the subject of social interactions. However, experts have emphasized social interactions, and the mental characteristics of vitality and embedded sense of belonging are in the same direction. Therefore, it seems that paying attention to indicators such as Sociability, invitational, permeable and social monitoring as mediating indicators can lead to the emergence of mental and visual indicators jointly (users and experts).

## 10. Conclusion

In urban settings, natural spaces like parks serve as essential retreats for both permanent and temporary users, offering respite from the daily stresses of city life. The design and management of these urban environments must prioritize meeting user needs and providing solace. Thus, understanding user preferences in urban green spaces is of paramount importance. Such preferences serve as a framework for assessing the landscape, shedding light on how individuals perceive their environment and what elements they value. However, relying solely on user preferences may not suffice to determine urban space quality; expert opinions also play a crucial role in this evaluation.
The research findings indicate a substantial disparity between the current state and the desired conditions of urban green spaces in the two examined areas, with Region 17 showing a more significant gap. This suggests an uneven distribution of green space quality across various parts of Tehran, with some areas facing more

pronounced challenges. Additionally, user feedback reveals specific areas of concern, such as the emphasis on cleanliness and maintenance in region 17 and the priority of safety and security in region 2. Furthermore, it is evident that user preferences vary between the two regions, with mental indicators taking precedence in region 17 and visual indicators being more crucial in region 2. Notably, some indicators considered vital by experts, like vitality and a sense of belonging, do not hold the same significance for users. Thus, a balanced approach that integrates user input and prioritizes their preferences, along with mediating indicators such as sociability, attendance, invitation, permeability, and social control, can provide a solid foundation for shaping essential expert-driven indicators. This collaborative approach can effectively enhance the overall quality of urban green spaces. The innovation in this research lies in considering user preferences alongside expert opinions and identifying the differences between these two perspectives as a potential factor contributing to a decrease in the quality of green spaces in Tehran. Future studies on this topic may include extensive examinations and obtaining the mental pattern of users in different areas of Tehran. This approach aims to achieve desirable quality, extending beyond mere greenery to address the diverse needs and preferences of urban dwellers in the city's green spaces. The focus on the opinions of experts and the disregard for the urban users' preferences are limitations of the current research.

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**Appendix:**

In the initial phase of employing the Delphi method, 11 experts specializing in landscape matters were consulted. They were queried regarding the identified indicators and their relationship derived from the various resources. This approach aimed to gather comprehensive insights and expert opinions, enriching the research process with a diverse range of perspectives from acknowledged professionals in the field. The degree of agreement was determined using Kendall's concordance coefficient. Kendall's concordance coefficient is a measure for assessing the degree of agreement and concordance among the ranks of n phenomena. This coefficient represents the rank correlation between sets of ranks K. The Kendall coefficient ranges from zero to one, where zero indicates no concordance, and one represents complete concordance. A value of 0.7 or higher for the Kendall coefficient indicates satisfactory agreement. If the coefficient falls between 0.5 and 0.7, there is a moderate level of agreement, while a range of 0.3 to 0.5 suggests weak agreement, requiring a reevaluation by specialists (Ezadi, 2016). The Kendall concordance coefficient (W) is calculated using the formula:

$$W = \frac{12\,S}{K^2\,(N^3 - N)}$$

- $S$ is the sum of the squares of deviations of $Rj$ from the mean $Rj$,
- $Rj$ is the sum of ranks related to a factor,
- $K$ is the number of sets (number of experts),
- $N$ is the number of ranked factors or phenomena.
- In this study, the Kendall coefficient was determined to be 0.768, indicating approximately 70% agreement among the perspectives.