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How Can Natural Environment Scoring Tool (Nest) be Adapted for Urban Parks?

Dilara Yilmaz*, [a], Oznur Isinkaralar[b]

[a] *Department of Landscape Architecture, Faculty of Engineering and Architecture, Kastamonu University, Kastamonu, Turkey*
e-mail: dlara.ylmaz94@gmail.com
ORCID ID: 0000-0002-9151-0529
[b] *Department of Landscape Architecture, Faculty of Engineering and Architecture, Kastamonu University, Kastamonu, Turkey*
e-mail: obulan@kastamonu.edu.tr
ORCID ID: 0000-0001-9774-5137

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Corresponding Author:
E-mail: dlara.ylmaz94@gmail.com

ABSTRACT

Urban Parks, which are important elements of the urban environment, have many beneficial effects on people. They also increase the quality of life. The features, facilities, and possibilities of the parks are determined and evaluated by the users to increase qualityof these areas. This study aimed to develop a tool for evaluating the natural environments in different cities, supporting various uses, and determining the relationship between natural environment quality and user satisfaction levels. In the study conducted in the park areas selected from Jakarta and Ankara cities, the users of the area were scored according to the natural environment typologies of the areas with the Natural Environment Scoring Tool (NEST). The data obtained as a result of scoring were evaluated by correlation analysis. Within the scope of the analysis, it was an important result that access, facilities, aesthetics, safety, threats and usability typologies strongly affect the users' satisfaction levels. In addition, the study laid the groundwork for the development of a more comprehensive scoring system in terms of demonstrating the applicability of NEST for urban parks and ensuring the participation of users.

Anahtar Kelimeler:
Kent parkı,
NEST,
Kullanılabilirlik,
Ankara,
Jakarta.

ÖZ

Park alanlarının insanlar üzerinde birçok yararlı etkisi bulunmaktadır. Kentsel çevrenin önemli unsurları olan park alanları yaşam kalitesinin arttırılmasını da sağlamaktadır. Park alanlarının özelliklerinin, tesislerinin ve olanaklarının tespit edilerek kullanıcılar tarafından değerlendirilmesi bu alanların kalitelerini arttırmak için gereklidir. Çalışmada, çeşitli kullanımları da destekleyen, farklı kentlerde olan doğal ortamların değerlendirilmesinde bir araç geliştirmek ve doğal çevre kalitesi ile kullanıcıların memnuniyet düzeyleri arasındaki ilişkinin belirlenmesi amaçlanmıştır. Jakarta ve Ankara kentlerinden seçilen park alanlarında yapılan çalışmada, alan kullanıcıları tarafından Doğal Çevre Değerlendirme Aracı (NEST) ile alanların doğal çevre tipolojilerine göre puan verilmiştir. Puanlama sonucunda elde edilen veriler korelasyon analizi ile değerlendirilmiştir. Analiz kapsamında erişim, olanaklar, estetik, güvenlik, tehditler ve potansiyel kullanım tipolojilerinin kullanıcıların memnuniyet düzeylerini güçlü düzeyde etkilemesi ulaşılan önemli bir sonuç olmuştur. Ayrıca çalışma NEST'in park alanlarında uygulanabilirliğini ortaya koyması ve kullanıcıların da katılımını sağlaması açısından daha kapsamlı bir puanlama sistemi geliştirilmesine zemin hazırlamıştır.

1. Introduction

With rapid population growth and urbanization, the pressure on urban areas is also increasing. As a result of these pressures, various problems arise in urban areas [1, 2]. Parks, one of the most important urban areas are common use areas that enable people to perform various recreational activities such as walking, strolling, resting, and being in touch with nature. Urban parks, one of the most important resources for recreation, are also the most important elements of the urban environment [3, 4]. They increase the quality of life by affecting people both physically and mentally and also enable physical activities, reduce stress, and encourage social interaction [5, 6]. At the same time, they provides the opportunity for children and young people to perform sports activities [7, 8]. In this context, park quality plays an important role in determining the purpose of park usage. The number of various usage areas they contain, the features that encourage physical activity such as playgrounds, basketball courts, water elements, shelter, picnic areas, and asphalt tracks make these areas more attractive by increasing the use of parks. However, negative situations such as environmental pollution and vandalism block the use of parks [9, 10].

The recreational use of urban parks has recently increased significantly. With this increase, various problems such as environmental pollution and air pollution have emerged in cities. There are various studies in the literature to solve these problems [11-17]. Recreational activities play an essential role in people's healthy lifestyles [18-19-20-21]. Therefore, solving environmental problems is of great importance in terms of increasing the quality of park areas. Visiting urban parks is the most important activity for people to spend their free time. In parks, they can perform various activities such as walking and jogging. Urban parks are basic public service facilities that are considered important areas for city dwellers to engage in daily leisure activities. Therefore, focusing on leisure activities in urban parks is an important task for park management [21-24].

During rapid urbanization and the COVID-19 pandemic, determining people's attitudes towards urban parks will make an important contribution to determine how they perceive urban parks and their level of participation [21]. In addition, determining the attitudes of people in urban parks towards these areas helps to structure various interventions for positive attitudes because the attitude towards these areas has an important role in increasing the frequency of visiting park areas and increasing satisfaction [25-30].

This study aims to create a scale to measure people's attitudes towards urban parks. In this context, Monas and Menteng parks in Jakarta, Harikalar Diyari, and Altinpark areas in Ankara were evaluated using the Natural Environment Scoring Tool (NEST), and people's satisfaction with these urban parks was investigated.

2. Material and Method

The research was carried out in urban parks in 2 different cities. The first of these cities is Ankara, the capital city of Turkey. The province is located between latitude 39° 57 'N and longitude 32° 53' E. The surface area of the city is 25,632 km², and its height above sea level is 894 m. Approximately 50% of the province's surface area established in a plain area consists of agricultural lands, 28% forest and scrub lands, 12% meadows and pastures, and 10% non-agricultural lands. There are 16 urban parks in the province, where the green land per person is 19.79 m². The total surface area of these urban parks is 3,675,069 m² [31]. Altinpark and Harikalar Diyari were selected as the study area (Figure 1).

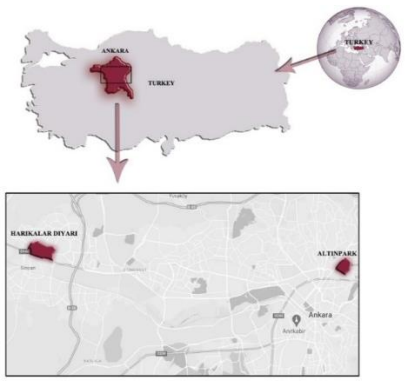

Figure 1. Location map of selected parks in Ankara (Original, 2021)

The second field of study is in Jakarta, the capital city of Indonesia. Jakarta is located between latitude 6° 10 ' S, and longitude 106° 49' E. Jakarta's surface area is 7,659,020 km², and its altitude is 7 m. approximately 26% of the city area is agricultural lands, and 69% is forest lands. There are 12 urban parks in the city with a green land of 2.3 m² per person [32]. Menteng Park and National Monument Park (Monas) were chosen as the study area (Figure 2).

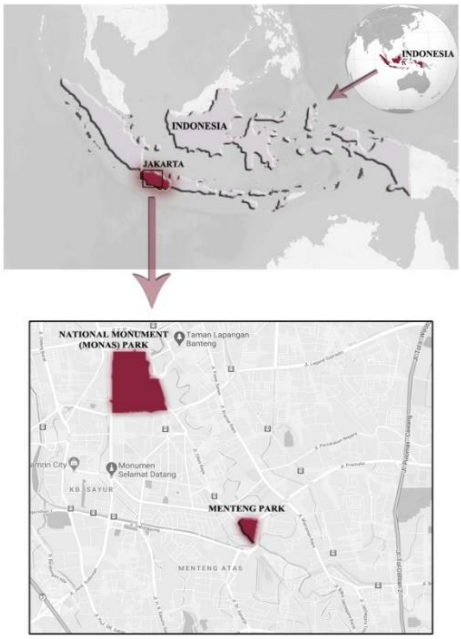

Figure 2. Location map of selected parks in Jakarta (Original, 2021)

The characteristics of these parks are given in Table 1. The diversity of activities in the park areas is important in terms of evaluation.

Table 1. Characteristics of the study area

PARK NAME	COVERED AREA (m²)	ACTIVITIES
ALTINPARK	640,000	32.000 m² artificial lake Amp Water items Water games with music Fishing Boat ride
HARIKALAR DIYARI	1,300,000	Wedding hall Fitness center Cultural center 28 km hiking trail 25.000 m² dream island 91.510 m² artificial lake Cruise by kayak and water bikes Restaurant Amp Car racing tracks Car park

MENTENG PARK	300,000	Children's playgrounds sports fields Running tracks Car park Restaurant Exhibition and greenhouse areas
NATIONAL MONUMENT (MONAS) PARK	1,000,000	National monument Sculptures Sports fields Green lands Water items Flower garden Walking path

In the research, urban parks were evaluated by a total of 260 volunteers from Ankara and Jakarta with the survey technique. A 5-point Likert scale was used in the research questions (1: Strongly Disagree, 5: Strongly Agree). In the first part of the questionnaire, questions were asked to determine the demographic characteristics of the participants. In the second part, the general evaluations of the participants about the urban parks were questioned. In the third part, points were given to the characteristics of the urban parks determined by the participants using the Natural Environment Scoring Tool (NEST).

NEST is a comprehensive quality assessment tool developed for in situ evaluations of the various natural environments in different European cities. In their study [33], developed a scoring system consisting of 8 sections and 47 criteria through existing studies, expert opinions, and field studies in order to evaluate urban parks and neighborhood parks in 4 European cities. Within the scope of the study, NEST criteria were adapted as 53 criteria under seven headings to determine the factors that will affect the use of urban parks (Table 2)

Table 2. NEST criterias

Main Topics	Criterias	Referance
Environment	The appearance of the buildings Building maintenance The connection between the park and the environment	
Access	Entry points (quantity) Walking paths (amount) Walkways (quality) Bicycle paths (amount) Bicycle paths (quality) Parking (amount) Parking (quality) Disability arrangements (amount) Disability regulations (quality)	[10] [33] [34] [35]
Facility	Children's playgrounds (amount) Children's playgrounds (quality) Water facilities (quantity) Water facilities (quality) Skateboard ramps (amount) Skateboard ramps (quality) Courtyards (amount) Courtyards (quality) Green area (amount) Garbage cans (quantity) Picnic tables (quantity) Picnic tables (quality) Fountain (amount) WC (amount) Cafe / restaurant (quantity) Cafe / restaurant (quality) Sports fields (amount) Sports fields (quality) Outdoor furniture (quantity)	[10] [33] [35] [36]

	Outdoor furniture (quality)	
Aesthetics	Surface materials (quantity) Surface materials (quality) Plant amount Plant diversity (proficiency) Plant arrangements (quality) Decorative water items (quality)	
Safety	Lighting (amount) Lighting (quality) Safety regulations for vehicles (qualification) Safety arrangements for pedestrians (qualification)	[35] [37]
Threats	Alcohol use Drug Annoying noise / noise Smell Damage to public property	[10] [33] [35] [36]
Usability	Sport Walk Landscape viewing Children's playgrounds Social activity Soothing, relaxing effect	[10] [33] [35] [38]

The data obtained as a result of scoring were evaluated by creating a database in the SPSS 22.0 software. First, the reliability of the data was tested, and the data were used in the study as "highly reliable" (Table 3). Then the data were evaluated by correlation analysis.

Table 3. Reliability analysis

Criterias	**Cronbach'sAlpha**	**N of Items**
Environment	**,821**	**7**
Access		
Facility		
Aesthetics		
Safety		
Threats		
Usability		
0.00 <0.40 is not reliable *0.40 <0.60 is low reliability* *0.60 <0.80 is very reliable and* *0.80 <1.00 is highly reliable*		

3. Results

The demographic profiles of the participants in the survey conducted in Ankara and Jakarta are given in Table 4. 52% of the participants in Ankara were man and 48% were women. It is observed that these participants are predominantly in the age range of 38% (26-35 age) and 32% (36-45 age). When the educational status of the participants was evaluated, it was seen that 42% of them had a university education. 56% of the participants in Jakarta were women, and 44% were man. 55% of the participants, who are predominantly in the age range of 66% (18-25 age), stated that they had a university education.

Table 4. Demographic profile of the participants

	Attributes	**Attribute Groups**	**n**	**%**
ANKARA	Gender	Women	62	48
		Men	68	**52**
	Age	18-25	29	22
		26-35	49	**38**
		36-45	42	32
		46-55	10	8
		56+	0	0
	Education	Primary school	0	0
		Middle School	0	0
		High school	47	36
		University	55	**42**

		Postgraduate	28	22
JAKARTA	Gender	Women	73	**56**
		Men	57	44
	Age	18-25	9	7
		26-35	86	**66**
		36-45	18	14
		46-55	17	13
		56+	0	0
	Education	Primary school	18	14
		Middle School	17	13
		High school	11	8
		University	72	**55**
		Postgraduate	12	10

In the second part of the survey, the general evaluations of the participants about the urban parks were questioned. The general evaluations of the participants are given in Figure 3. According to these data;

53% of the participants in Ankara stated that they came to Altinpark and Harikalar Diyari with their families. In Jakarta, 65% of the participants stated that they came to Monas Park with their families, while 49% stated that they came to Menteng Park with their friends.

37% of the participants in Ankara stated that they came to Altinpark and Harikalar Diyari for nature excursions. While 33% of the participants in Jakarta stated that they came to Monas Park for hiking, 58% stated that they came to Menteng Park for physical activity.

While 58% of the participants in Ankara stated that they spent 1-2 hours in Altınpark, 62% stated that they spent 2-4 hours in Harikalar Diyari. Equally, 44% of the participants in Jakarta stated that they spent between 1-2 and 2-4 hours in Monas Park. 39% of them stated that they spent 1-2 hours in Menteng Park.

While 61% of the participants in Ankara stated that they came to Altinpark and 73% to Harikalar Diyari with their private vehicles; In Jakarta, 60% of the participants stated that they came to Monas Park, 48% to Menteng Park with their private vehicles, and 43% of them stated that they came to Menteng Park by using public transportation.

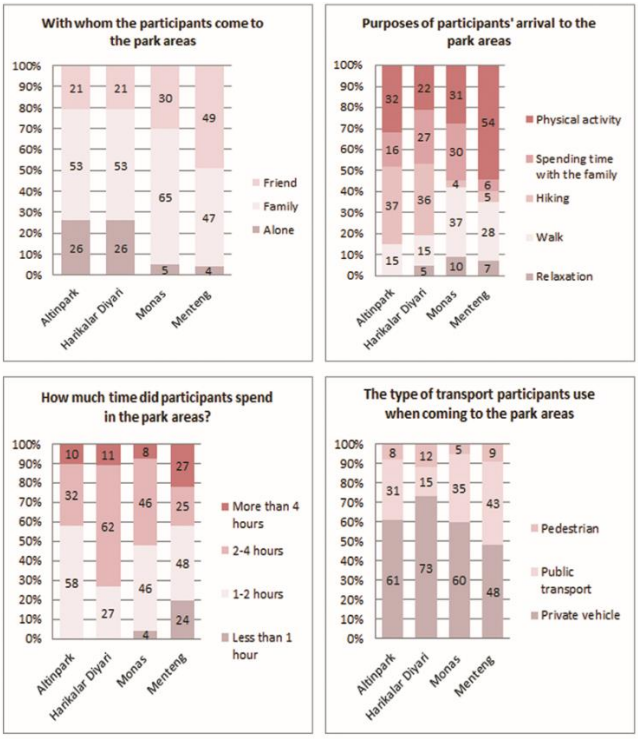

Figure 3. The general evaluations of the participants about the parks.

Then the obtained NEST scores were compared according to the urban parks. The average NEST scores of the parks are given in Figure 4. According to these scores:

The highest average overall scores belong to Menteng and Monas parks in Jakarta. The prominent criteria in these parks were Environment, access, aesthetics, safety and usability.

In the "Environment and Access" criterion, the highest average NEST scores were in Menteng Park and the lowest NEST scores were in Altinpark,

In the "Facility" criterion, the highest NEST scores were in Altinpark and Harikalar Diyari and the lowest NEST score was in Monas Park,

In the "Aesthetics and Safety" criterion, the highest NEST score was in Monas Park and the lowest NEST scores were in Altinpark and Menteng Park,

In the "Threats" criterion, which shows no existence of threat in the field, the highest NEST score was in Altinpark, the lowest NEST score was in Menteng Park,

In the "Usability" criterion, the highest NEST score was seen in Menteng Park and the lowest NEST score was seen in Harikalar Diyari.

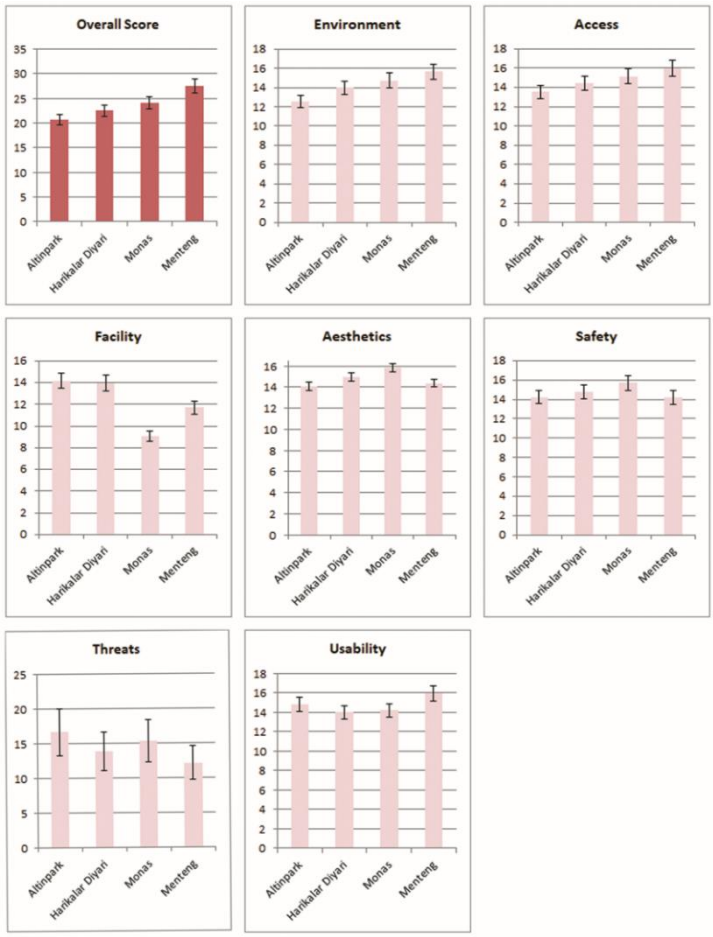

Figure 4. Average NEST scores according to natural environment criteria (With 95% CI error bars)

As a result of the analysis, the average score for the field typology for each criterion was calculated and a general score was obtained. In Figure 5, the effect values for the general scores of the parks as percentage for each natural environment criterion are given. According to these values:

- "Usability features" in Ankara Altinpark, having activity areas such as sports, walking, children's playgrounds in the park constitutes a large part of the overall scoring (16.62%), while "Environment" constitutes the smallest part (12.56%).
- In Harikalar Diyari, on the other hand, "Aesthetics" constitutes the majority of the overall scores (14.94%) and "Threats" constitute a small part (13.85%).
- A large part of the overall scores (15.81%) in Jakarta Monas Park is "Aesthetics" and a small part (9.8%) of the scoring is "Facilities".
- In Menteng Park, a large part of the overall scores (16%) constitutes the "Access" criterion, while the small part (11.71%) of the scores were "Facilities".

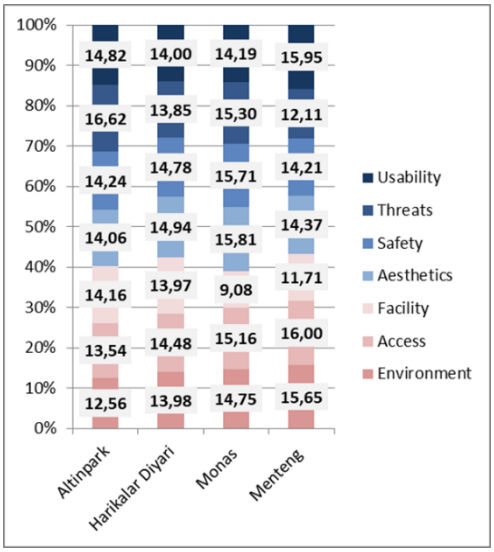

Figure 5. Distribution (%) of NEST scores by urban parks

The correlation analysis results to determine to what extent the gender, age, and educational status of the participants affect their evaluation are given in Table 5. There appears to be a negative correlation between the gender and satisfaction levels of the participants. This situation shows that the satisfaction level of women from the urban parks in Ankara and Jakarta is higher than that of man. It is observed that there is no statistically significant difference between the ages of the participants and their level of satisfaction, and the age factor does not affect satisfaction. It is seen that there is a strong correlation between the education levels of the participants and the satisfaction levels of the urban parks in Ankara. As the education level of the participants increased, their satisfaction level increased. There is no statistically significant difference between the education levels of the participants and the satisfaction of the urban parks in Jakarta.

Table 5. Correlation analysis between the demographic profile of the participants and their satisfaction levels

DEMOGRAPHIC INFORMATION OF PARTICIPANTS			SATISFACTION
Gender	Ankara	Pearson Correlation (r)	-,174*
		Sig. (2-tailed)	,048
	Jakarta	Pearson Correlation (r)	-,275**
		Sig. (2-tailed)	,002
Age	Ankara	Pearson Correlation (r)	,034
		Sig. (2-tailed)	,703
	Jakarta	Pearson Correlation (r)	,062
		Sig. (2-tailed)	,487

Education	Ankara	Pearson Correlation (r)	,293**
		Sig. (2-tailed)	,001
	Jakarta	Pearson Correlation (r)	,095
		Sig. (2-tailed)	,282

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*
r = 0.10-0.29(weak)
r = 0.30-0.49(medium)
r = > 0.50(strong)

The correlation analysis results to determine to what extent the average scores of the NEST criteria affect the satisfaction levels of the participants are given in Table 6. It seems that the "environment" criterion is not a quality that affects the satisfaction levels of the parks in Ankara and Jakarta. There appears to be a strong correlation between the "access" criterion and the satisfaction of urban parks in Ankara and Jakarta. As the scores given to the access criteria increased, the satisfaction scores of the urban parks increased at the same level. While there is a strong correlation between the "facility" criterion and the satisfaction of the parks in Ankara, it is seen that the parks in Jakarta do not affect the satisfaction scores at a statistically significant level. There is a strong correlation between the "safety" criterion and the satisfaction scores of the parks in both cities. The fact that there were no problems in the parks in terms of security positively affected the satisfaction levels. Likewise, there is a strong correlation between the "usability" criterion and satisfaction scores of the parks in Ankara and Jakarta. Having potential areas of use in parks has been an important factor that ensures high levels of satisfaction. While the "threats" criterion strongly affected the satisfaction scores of the parks in Ankara, it did not affect the satisfaction scores of the parks in Jakarta statistically. The parks in Ankara did not pose any threat, which enabled their satisfaction ratings to increase.

Table 6. Correlation analysis between NEST criteria and satisfaction levels

NEST CRITERIAS			SATISFACTION
Environment	Ankara	Pearson Correlation	-,168
		Sig. (2-tailed)	,057
	Jakarta	Pearson Correlation	,078
		Sig. (2-tailed)	,379
Access	Ankara	Pearson Correlation	**,727****
		Sig. (2-tailed)	**,000**
	Jakarta	Pearson Correlation	**,306***
		Sig. (2-tailed)	**,003**
Facility	Ankara	Pearson Correlation	**,631****
		Sig. (2-tailed)	**,008**
	Jakarta	Pearson Correlation	-,156
		Sig. (2-tailed)	,077
Aesthetics	Ankara	Pearson Correlation	**,357***
		Sig. (2-tailed)	**,027**
	Jakarta	Pearson Correlation	**,439****
		Sig. (2-tailed)	**,006**
Safety	Ankara	Pearson Correlation	**,422****
		Sig. (2-tailed)	**,000**
	Jakarta	Pearson Correlation	**,277****
		Sig. (2-tailed)	**,001**
Threats	Ankara	Pearson Correlation	**,284****
		Sig. (2-tailed)	**,001**
	Jakarta	Pearson Correlation	-,013
		Sig. (2-tailed)	,879
Usability	Ankara	Pearson Correlation	**,545****
		Sig. (2-tailed)	**,000**
	Jakarta	Pearson Correlation	-,013
		Sig. (2-tailed)	,879

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*
r = 0.10-0.29(weak)
r = 0.30-0.49(medium)
r = > 0.50(strong)

4. Result and Discussion

Urban parks play a key role in ensuring sustainable urban development. The use of parks by users is also important for urban planning and the development of green space infrastructure. In this context, the high satisfaction level of the users with the park spaces is important not only for the design and planning of the urban parks, but also for the parks to continue their functions in a healthy way. As a result of the determination of user satisfaction, it will be possible to make parks more attractive for city residents and to develop new strategies by identifying their deficiencies and insufficient situations.

In the study, the parks selected as study areas from Ankara and Jakarta by using NEST were compared and evaluated. In the results of the study, the users stated that they came with their families while coming to Altinpark, Harikalar Diyari in Ankara and Monas Park in Jakarta, while they stated that they came to Jakarta Menteng Park with their friends. There was no significant difference between the park areas of both cities considering with whom the users came. It has been determined that there are differences between cities in the purpose of the users to come to the park. It has been concluded that the purpose of coming to Ankara Altinpark and Harikalar Diyari is a nature excursion, while the purpose of coming to Monas Park is walking, and the purpose of coming to Menteng Park is physical activity. The different purposes of coming to the park areas are closely related to the features and opportunities they have. This result revealed that the users come to the park areas to relax, socialize and satisfy their longing for nature.

This study aimed to determine the relationship between park characteristics and satisfaction levels using the Natural Environment Scoring Tool (NEST) in the study conducted in Ankara and Jakarta sampling areas. In this context, users were asked to rate park areas within the framework of NEST criteria and indicate their level of satisfaction. As a result of the scoring, the satisfaction level of female users was higher than that of men. Likewise, the level of satisfaction of users with a higher level of education was also higher. The high level of satisfaction with the park areas, which are mainly selected from both cities, has been an important result. Within the scope of the study, it was concluded that access, facilities, aesthetics, safety, threats and usability criteria affect the satisfaction of park areas. Adequate entry points, walking, cycling, pedestrian paths and parking areas in the park areas; The availability of facilities such as children's playgrounds, picnic areas in the park areas, the aesthetic plant designs and the usability features areas such as sports, walking and social activities in the park areas have greatly affected the satisfaction levels of the users. At the same time, the fact that these park areas do not contain any threats (alcohol use, drugs, disturbing noise / noise, odor, etc.) and do not pose a problem in terms of security are among the criteria that ensure high satisfaction levels of the users. These results are equivalent to the results of the studies conducted by [39-43]. In addition, [10, 44-46] reached similar results in their studies.

This article, in which the Natural Environment Scoring Tool (NEST) is used, has added a new dimension to the evaluation of park areas. This study emphasized NEST's applicability and set the ground for developing a more comprehensive scoring system by providing its users' participation.

Competing Interest / Conflict of Interest

The authors declare that they have no competing interests.

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We declare that all Authors equally contribute.

4. References

[1] Ozturk S., Ayan E., Isinkaralar, O. (2018a). Visual Landscape Evaluation of Kastamonu Clock Tower Environment as a Historical Urban Area. Fresenius Environmental Bulletin 27(12B), 9617-9625.

[2] Ozturk, S., Isinkaralar, O., Ayan, E. (2018b). Visibility Analysis in Historical Environments: The case of Kastamonu Castle and its Surrounding. Journal of Current Researches on Social Sciences, 8 (4), 405-412.
[3] Isinkaralar, K. & Ramazan, E. (2021). Landscape Plants as Biomonitors for Magnesium Concentration in Some Species. International Journal of Progressive Sciences and Technologies, 29(2), 468-473.
[4] Ozturk, S., Isinkaralar, O. (2018). New Trends in Tourism: A Research on Farm Tourism. Journal of Current Researches on Social Sciences, 8 (4), 537-546.
[5] Bowler, D. E., Buyung-Ali, L. M., Knight, T. M., & Pullin, A. S. (2010). A systematic review of evidence for the added benefits to health of exposure to natural environments. BMC Public Health, 10(456), 1-10.
[6] Hartig, T., Mitchell, R., de Vries, S., & Frumkin, H. (2014). Nature and Health. Annual Review of Public Health, 35(1), 207–228.
[7] Dunnett, N., Swanwick, C., ve Woolley, H., (2002). *Improving urban parks, play areas and green spaces*. London: Department for transport, local government and the regions.
[8] Walker, C., (2004). The public value of urban parks, Urban Institute.
[9] Kaczynski, A. T., Potwarka, L. R., & Saelens, B. E. (2008). Association of Park Size, Distance, and Features with Physical Activity in Neighborhood Parks. American Journal of Public HealthAm Journal Public Health, 9898(810), 1451–1456.
[10] Roberts H, Kellar I, Conner M, Gidlow C, Kelly B, Nieuwenhuijsen M, McEachan R. (2019).Associations between park features, park satisfaction and park use in a multi-ethnic deprived urban area.Urban Forestry & Urban Greening, 46, 1-9, https://doi.org/10.1016/j.ufug.2019.126485
[11] Isinkaralar O., Isinkaralar K., Ekizler A., Ilkdogan C. (2017). Changes in the Amounts of CO2 and Particulate Matter in Kastamonu Province Depending on Weather Conditions and Locations, Journal of Chemical, Biological and Physical Sciences, 7(3), 643.
[12] Cetin, M., Sevik, H., Isinkaralar, K. (2017). Changes In The Partıculate Matter And Co2 Concentratıons Based On The Tıme And Weather Condıtıons: The Case of Kastamonu. Oxidation Communications 40, No 1-II, 477–485
[13] Sevik, H., Isinkaralar, K., Isinkaralar, O. (2018). Journal of Chemical, Biological and Physical Sciences an International Peer Review E-3 Journal of Sciences Section D: Environmental Sciences Indoor Air Quality in Hospitals: The Case of Kastamonu- Turkey. Journal of Chemical, Biological and Physical Sciences 9(1):67-73.
[14] Ozturk, S., Isinkaralar, O. (2019). Parkıng Problematıque in Kastamonu Cıty Center: A Crıtıcal Evaluatıon. The Journal of International Social Research, 12(67), 506-511.
[15] Turkyilmaz, A. and Isinkaralar, K. (2020). Removal of Antibiotics (Tetracycline and Penicillin G) From Water Solutions by Adsorption on Activated Carbon. Journal of Engineering Sciences and Design, 8(3), 943-951. https://doi.org/10.21923/jesd.762953
[16] Cetin, M., Sevik, H., Turkyilmaz, A. & Isinkaralar, K. (2021). Using Abies's Needles as Biomonitors of Recent Heavy Metal Accumulation. Kastamonu University Journal of Engineering and Sciences, 7 (1), 1-6. Retrieved from https://dergipark.org.tr/en/pub/kastamonujes/issue/63105/892118
[17] Savas, D. S., Sevik, H., Isinkaralar, K., Turkyilmaz, A., & Cetin, M. (2021). The potential of using Cedrus atlantica as a biomonitor in the concentrations of Cr and Mn. Environmental Science and Pollution Research, 1-8. https://doi.org/10.1007/s11356-021-14826-1
[18] Brown, G., Schebella, M.F., Weber, D. (2014). Using participatory GIS to measure physical activity and urban park benefits. Landscape and Urban Planning, 121, 34-44
[19] Henderson, K.A. (2006). Urban parks and trails and physical activity. Annals of Leisure Research, 9(3–4) (2006), 201-213
[20] Işınkaralar, Ö. & Varol, Ç. (2021). Kent Merkezlerinde Ticaret Birimlerin Mekansal Örüntüsü Üzerine Bir Değerlendirme: Kastamonu Örneği. Journal of Architectural Sciences and Applications, 6(2), 396-403.https://doi.org/10.30785/mbud.927529
[21] Fan, Y. and Luo, J.M. (2021). Development of a measurement scale for residents' attitudes toward leisure activities in urban parks. Journal of Outdoor Recreation and Tourism 33, 1- 13, https://doi.org/10.1016/j.jort.2020.100360
[22] Wong, K.K. (2009). Urban park visiting habits and leisure activities of residents in Hong Kong, China. Managing Leisure, 14(2), 125-140
[23] Fang, Y., Bi, D., Gan, Q. (2012). Analysis on the urban residents' perception of the park free opening-up policy in the context of socioeconomic transformation: A case of Guangzhou. Tourism Tribune, 27(8), 78-87
[24] Sahin, F., Ozturk S., Isinkaralar, O., (2019). An Assessment about Barrier Free Design in Urban Green Areas, Academic Stuedies in Engineering Arctitecture, Planning and Design 2019/2, IVPE, 289.

[25] Öztürk, S., Işınkaralar, Ö., Yılmaz, D., Şimşek, M., Almansourı, H. M. S. & Elahsadı, A. H. M. (2021). Covıd-19'un tüketici alışkanlıklarına etkisi üzerine bir araştırma: Türkiye-Libya karşılaştırması. Doğu Coğrafya Dergisi, 26 (46), 97-108 . DOI: 10.17295/ataunidcd.958864

[26] Öztürk S., Işınkaralar, Ö., Yılmaz, D. (2019). Cittaslow Hareketi ve Toplumsal Farkındalık: Gerze Sinop Örneği, Academic Sciences on Social and Education Sciences, Kitap Bölümü, Gece Akademi, Chapter 1, 1-14.

[27] Ozturk, A., Isinkaralar, O., Yilmaz, D., Cılginoglu, H. (2021a). Visitor Satisfaction In The Case Of Hasankeyf as A Cultural Tourism Destination. Journal of Bartin Faculty of Forestry, 23(2), 359-369.

[28] Ozturk, A., Isinkaralar, O., Yilmaz, D. (2021b). Perception and Attitude of Local People after Restoration (Example of Kayseri). Journal of Eastern Geographical Rewiew, 26(45), 183-194.

[29] Ozturk, S., Isinkaralar, O., Yilmaz, D. and Cicek, E. (2021c). Tourists' Perspective of Cultural Heritage Areas: Importance-Performance Analysis of Safranbolu. Research&Reviews in Architecture, Planning and Design, Gece Akademi, Chapter 7, 133-155.

[30] Öztürk, S., Işınkaralar, Ö., Yılmaz, D., İhtiyar, M., (2020). Koruma Yaklaşımı Olarak Tarihi Bir Güzergâhın Kültür Rotasına Dönüştürülmesi: Kastamonu Örneği Turizm ve Arastırma Dergisi Journal of Tourism and Research, 9(2), 144-159.

[31] Zaloglu, A. (2006). The Study of Water as a Demonstrator in Ankara City Parks. Master Thesis, Ankara University Institute of Science, Landscape Architecture Department.

[32] Setiowati, R., Hasibuan, H.S. and Koestoer, R.H. (2018). Green open space masterplan at Jakarta Capital City, Indonesia for climate change mitigation. International Conference on Climate Change IOP Publishing IOP Conf. Series: Earth and Environmental Science 200, 1-8, doi:10.1088/1755-1315/200/1/01204.

[33] Gidlow, C., Kempen, E. Van, Smith, G. Triguero-Mas, M. Kruize, H. Gražulevičiené, R. Ellis, N. Hurst, G. Masterson, D. Cirach, M. et al. (2018). Development of the natural environment scoring tool (NEST). Urban For. Urban Green., 29 , 322-333. https://doi.org/10.1016/j.ufug.2017.12.007

[34] Mowafi, M., Khadr, Z., Bennett, G., Hill, A., Kawachi, I., & Subramanian, S. V. (2012). Is access to neighborhood green space associated with BMI among Egyptians? A multilevel study of Cairo neighborhoods. Health & place, 18(2), 385-390.

[35] Knobel, P., Radvand, P., Alonso, L., Costa, L., Espanol, M., Maneja, R. (2020). Development of the Urban Gren Space Quality Assessment Tool (RECITAL). Urban Forestry & Urban Greening, 57, 1-8. https://doi.org/10.1016/j.ufug.2020.126895.

[36] Richardson, A. S., Ghosh-Dastidar, M., Collins, R. L., Hunter, G. P., Troxel, W. M., Colabianchi, N., & Dubowitz, T. (2020). Improved street walkability, incivilities, and esthetics are associated with greater park use in two low-income neighborhoods. Journal of Urban Health, 97(2), 204-212, https://doi.org/10.1007/s11524-019-00416-7

[37] Groshong, L., Wilhelm Stanis, S. A., Kaczynski, A. T., & Hipp, J. A. (2020). Attitudes about perceived park safety among residents in low-income and high minority Kansas City, Missouri, neighborhoods. Environment and Behavior, 52(6), 639-665.

[38] Peschardt, K. K., Schipperijn, J., & Stigsdotter, U. K. (2012). Use of small public urban green spaces (SPUGS). Urban forestry & Urban greening, 11(3), 235-244.

[39] Ghoma WEO, Sevik H and Isinkaralar K (2021) Using indoor plants as biomonitors for detection of toxic metals by tobacco smoke. Air Quality, Atmosphere & Health, https://doi.org/10.1007/s11869-021-01146-z (In press)

[40] McCormack, G. R., Rock, M., Toohey, A. M., & Hignell, D. (2010). Characteristics of urban parks associated with park use and physical activity: A review of qualitative research. Health and Place, 16(4), 712–726.

[41] Baran, P. K., Smith, W. R., Moore, R. C., Floyd, M. F., Bocarro, J. N., Cosco, N. G., & Danninger, T. M. (2014). Park Use among Youth and Adults: Examination of Individual, Social, and Urban Form Factors. Environment and Behavior, 46(6), 768–800.

[42] Edwards, N., Hooper, P., Knuiman, M., Foster, S., Giles-Corti, B. (2015). Associations between park features and adolescent park use for physical activity. International Journal of Behavioral Nutrition and Physical Activity, 12(1), 1-10, DOI 10.1186/s12966-015-0178-4.

[43] Veitch, J., Salmon, J., Parker, K., Bangay, S., Deforche, B., & Timperio, A. (2016). Adolescents' ratings of features of parks that encourage park visitation and physical activity. International Journal of Behavioral Nutrition and Physical Activity, 13(1), 1–10.

[44] Douglas, J. A., Briones, M. D., Bauer, E. Z., Trujillo, M., Lopez, M., & Subica, A. M. (2018). Social and environmental determinants of physical activity in urban parks: Testing a neighborhood disorder model. Preventive Medicine, 109 (December 2017), 119–124.

[45] Knapp, M., Gustat, J., Darensbourg, R., Myers, L., & Johnson, C. (2019). The relationships between park quality, park usage, and levels of physical activity in low-income, African American neighborhoods. International Journal of Environmental Research and Public Health, 16(1), 1-9, http://dx.doi.org/10.3390/ijerph16010085

[46] Xu, Z., Gao, X., Wang, Z., Fan, J. (2019). Big Data-Based Evaluation of Urban Parks: A Chinese Case Study. Sustainability, 11 (7), 1-16, http://dx.doi.org/10.3390/su11072125