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AN IN-DEPTH EVALUATION OF URBAN SOUNDSCAPE PERCEPTION: IZMIR KONAK SQUARE[1]

KENTSEL İŞİTSEL PEYZAJ ALGISININ DERİNLEMESİNE DEĞERLENDİRİLMESİ: İZMİR KONAK MEYDANI

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Abstract: In urban design, another concept that gains importance as visual perception is auditory perception. To provide acoustic comfort in cities, these subjective perceptions should be investigated and known in depth. Soundscape has been used as a key method to improve sound quality in urban open spaces in recent years.

Aim: The aim of the study is to show the importance of soundscape design in public spaces by investigating the perceptions of the soundscape and sound preferences of Konak Square users and the effects of demographic factors.

Method: Within the scope of the study, the sounds in the field were examined by literature review and on-site observation, and survey scales were prepared accordingly. After the survey data were collected, frequency analyses and pairwise comparison tests were conducted. In addition, the equivalent continuous sound level (Leq) measurement was made in the field by using the smart mobile phone application together with the questionnaire.

Results: It has been determined that all of the sound levels measured in the square are considerably higher than the sound limit values determined for a healthy environment.

Conclusion: The results of this research confirm that the most preferred sounds in the square are natural sounds. Otherwise, the most disturbing sounds are the sounds originating from the traffic.

Keywords: Acoustic Environment, Acoustic Perception, Urban Squares

Öz: Kentsel tasarımda görsel algı kadar önem kazanan bir diğer kavram da işitsel algı olmaktadır. Kentlerdeki akustik konforun sağlanabilmesi için bu öznel algıların derinlemesine araştırılıp bilinmesi gereklidir. İşitsel peyzaj, son yıllarda kentsel açık alanlarda ses kalitesini artırmak için kilit bir yöntem olarak kullanılmıştır.

Amaç: Çalışmanın amacı, Konak Meydanı kullanıcılarının işitsel peyzaj ve ses tercihleri algılarını ve demografik faktörlerin etkilerini araştırarak işitsel peyzaj tasarımının kamusal alanlardaki önemini göstermektir.

Yöntem: Çalışma kapsamında, alandaki sesler literatür taraması ve yerinde gözlem yapılarak incelenmiş ve buna göre anket ölçekleri hazırlanmıştır. Anket verileri toplandıktan sonra frekans analizleri ve ikili karşılaştırma testleri yapılmıştır. Ayrıca anket ile beraber akıllı cep telefonu uygulaması kullanılarak alanda eşdeğer sürekli ses düzeyi (Leq) ölçümü yapılmıştır.

Bulgular: Meydanda ölçülen ses düzeylerinin tamamının sağlıklı bir ortam için belirlenen ses sınır değerlerinin oldukça üzerinde olduğu tespit edilmiştir.

Sonuç: Bu araştırmanın sonuçları meydanda en çok tercih edilen seslerin doğal sesler olduğunu teyit etmektedir. Bunun dışında en rahatsız edici sesler trafikten kaynaklanan seslerdir.

Anahtar Kelimeler: Akustik Çevre, Akustik Algı, Kent Meydanları

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INTRODUCTION

The relationship of the individual with the society is reflected in the urban spaces (Altuğ Turan & Malkoç True, 2020). Public spaces are important spaces that enable people to have 'social interaction' with others for their mental and psychological well-being (Carr et al., 1992). The gathering of many people at different cultural, social and economic levels in a common center, that is, in public city squares, has a social communication purpose. Public spaces that are accessible to everyone are seen as places that make it possible to meet and hear from those with different social perspectives, experiences and belongings (Mitchell, 1995). This social interaction allows people to explore themselves, the environment, and others, thus helping to create a sense of personal continuity in a fast-evolving world (Francis & Hester, 1990 cited in Carr et al., 1992). Moreover, these areas function as places of relaxation that can take people away from the stress of daily life (Carr et al., 1992). Urban squares, one of the important open public spaces, reflect the identity and past of societies and cities by carrying the traces of the society's culture, economy, beliefs, values and social changes (Sağlık et al., 2016). Since ancient times, these places have provided an environment for gathering people and creating urban life. These void spaces, surrounded by buildings and other structures, play a major role in the mass void composition of the city. Therefore, urban public squares have a balancing power function in today's congested and crowded urban fabric (Memluk, 2013). In their original essence, these urban voids literally function as transport nodes, a junction that connects spaces and routes (Maslovskaya, 2019). An ideal square should provide the functions of people to relax, see others, be seen and communicate with others. Therefore, it is important to consider the environmental conditions of the squares and their effects on attracting users. Today, these void spaces between the buildings of the city are filled by grey ambient noises, thus giving rise to the brownfield of the urban soundscape. However, one of the main ways of perceiving and communicating with the environment is sound. It provides a sense of reality and dynamism, thus helping to perceive the scale of space and the progression of time. Compared to visual perception, auditory perception has poor information but is richer in emotion. Evaluation of urban soundscapes, which is a part of sensory aesthetic research, improves the enjoyment of the sensations one receives from the environment (Yang & Kang, 2005). Another perspective that is gaining increasing attention is the sensory dimension of the landscape. The soundscape that can be directly perceived by people basically consists of sound and sound-related environmental components, and this is a determining factor in how people perceive a place (He et al., 2019). Soundscape is considered as an element of sensation of place (Dumyahn & Pijanowski, 2011). Individuals can perceive a landscape, form attitudes, evaluate their experiences, reinforce the soundscape they experience, and create values from it. These values can affect the pattern of human behavior in relation to a soundscape. Soundscape

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research is therefore vital and can potentially undermine the "the visual tyranny" in the field of landscape architecture research (Li et al., 2022).

OBJECTIVE

In soundscape assessments, both the physical environment and psychological, social and cultural factors create the context. In order to provide acoustic comfort in cities, these subjective perceptions should be investigated and known in depth. The aim of this study is to determine the perception of the soundscape of the square by the users of Izmir Konak Square, and to identify the spatial deficiencies in order to increase the satisfaction level of the users from the experience they have in this area, and to produce solutions.

Scope

In recent years, soundscape has been used as a key method to improve sound quality of urban open spaces (Meng & Kang, 2016). Although there are studies for different cultures and provinces, there is no detailed study for the province of Izmir. For this reason, it is of great importance to investigate the soundscape perceptions of Izmir Konak Square users. Considering the cultural factor, it is desired to measure the relationship between the amount of time spent in Izmir, demographic data and soundscape comfort. In addition, the sounds in the area have been observed and it is aimed to determine which sounds are comfortable and which are disturbing. Thus, in order to increase the quality of life, it is aimed to be included in the planning by knowing the things to be considered while providing acoustic comfort in public spaces in Izmir.

MATERIAL AND RESEARCH METHOD

Material

The main material of the study is Izmir Konak Square, which was chosen as the study area. As seen in Figure 1, the square is located in the west of Turkey, within the provincial borders of Izmir. Located in Konak district of Izmir and by the sea, the square is one of the most important historical squares of Izmir with its 200-year history. Konak Square, the first public space of Izmir, has been used as a square since the 19th century. The construction of the Sarıkışla, located next to the Government House, was completed in 1829 and thus the first step was taken towards making the area the public center of Izmir (Alpaslan & Gülenç, 2019). Satellite images obtained from Google Earth for the years 2000, 2004, 2010, 2015, 2020 and 2022 showing the changes in Konak Square and its surroundings are shown in Figure 2. In 2003, a renovation project was made for Konak Square and its surroundings, which had undergone many transformations before. The project aimed to be pedestrian-oriented, wide green areas, to ensure the interaction of the city and the sea, to strengthen the historical identity of the square and Izmir, and its final form is preserved today (Güneş Gölbey, 2022). When the images are examined, it can be observed that in addition to the changes made within the framework of the project after 2003, the Konak tram stop was added in 2018 and the Izmir Metropolitan Municipality Building was demolished in 2022.

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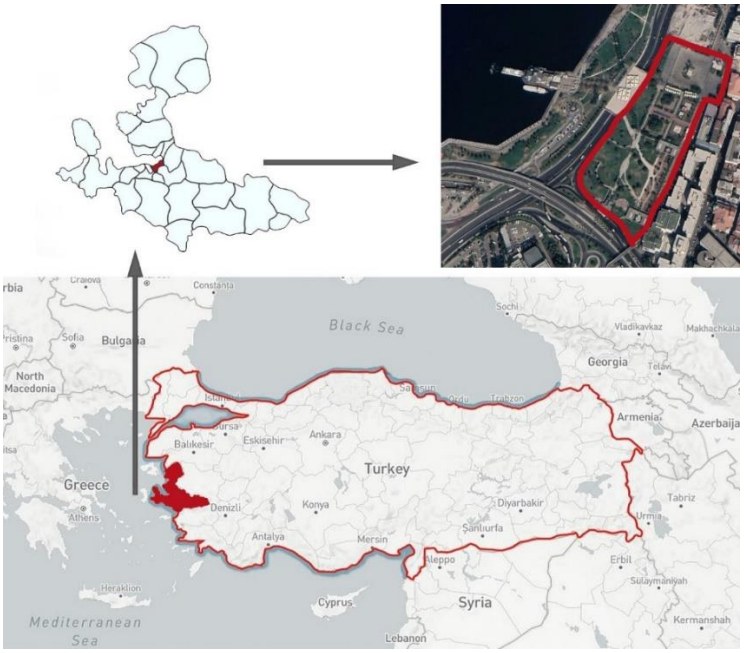

Figure 1. Location of the Study Area

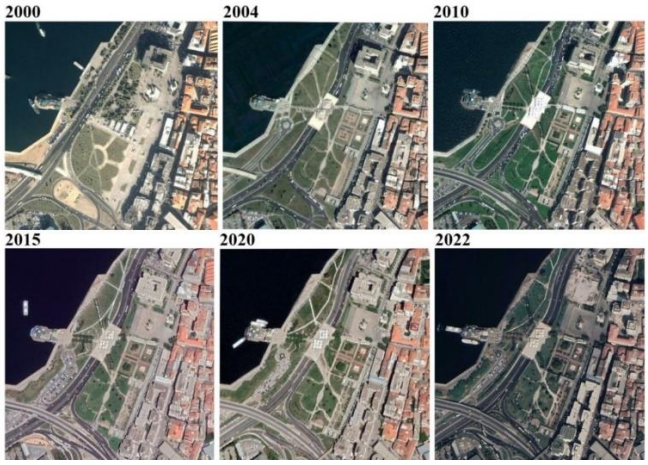

Figure 2. Google Earth Satellite View of Izmir Konak Square Between 2000 and 2022

The square can be expressed as a closed and defined square defined by the historical, administrative, commercial, religious, cultural and political structures around it. As shown in Figure 3, today, there is the Izmir Clock Tower, an Ottoman architectural work, at its center, and the Izmir Metropolitan Municipality Building, which is being rebuilt, to its north. To the east of the square, there is the Kemeraltı historical shopping axis, the Government House and the Yalı Mosque. In addition, the square has important points of Izmir transportation axis in the south (Izmir Konak metro, Konak bus transfer center) and west (Konak pier, Konak tram stop). Thus, the square has maintained its feature of being the "center of Izmir" for years, thanks to its intense use and being the first and last point to be reached (Güneş Gölbey, 2022; Altuğ Turan & Aslan Gülgün, 2018). Due to these

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features, the area is one of the important nodes of the city and is rich in sound diversity. This area has many important sounds that reflect the identity of Izmir, such as the sounds of the sellers heard like "gevrek" (Turkish bagel), "çiğdem" (sunflower seeds), “boyoz” (pastry) and “kumru” (sandwich). Because these sounds are completely unique to Izmir. When these sounds, which carry identity or symbol qualities, are listened to, it can be determined to which city or area the sounds belong, and since such a square is not elsewhere in Izmir, these sounds can identify Konak Square. In addition to these symbolic sounds, the sounds of heavy traffic, ferryboats, crowds, birds and the sea are the sounds of Izmir. Thus, it can be said that Konak Square represents the city of Izmir. Moreover, in the studies carried out, it was concluded that the sounds reflecting the Izmir identity mainly emerged from the sounds of the Konak Square. Therefore, it was chosen as the study area because it can reflect the sounds of the city in a comprehensive way (Işıkhan, 2022, Işıkhan et al., 2020).

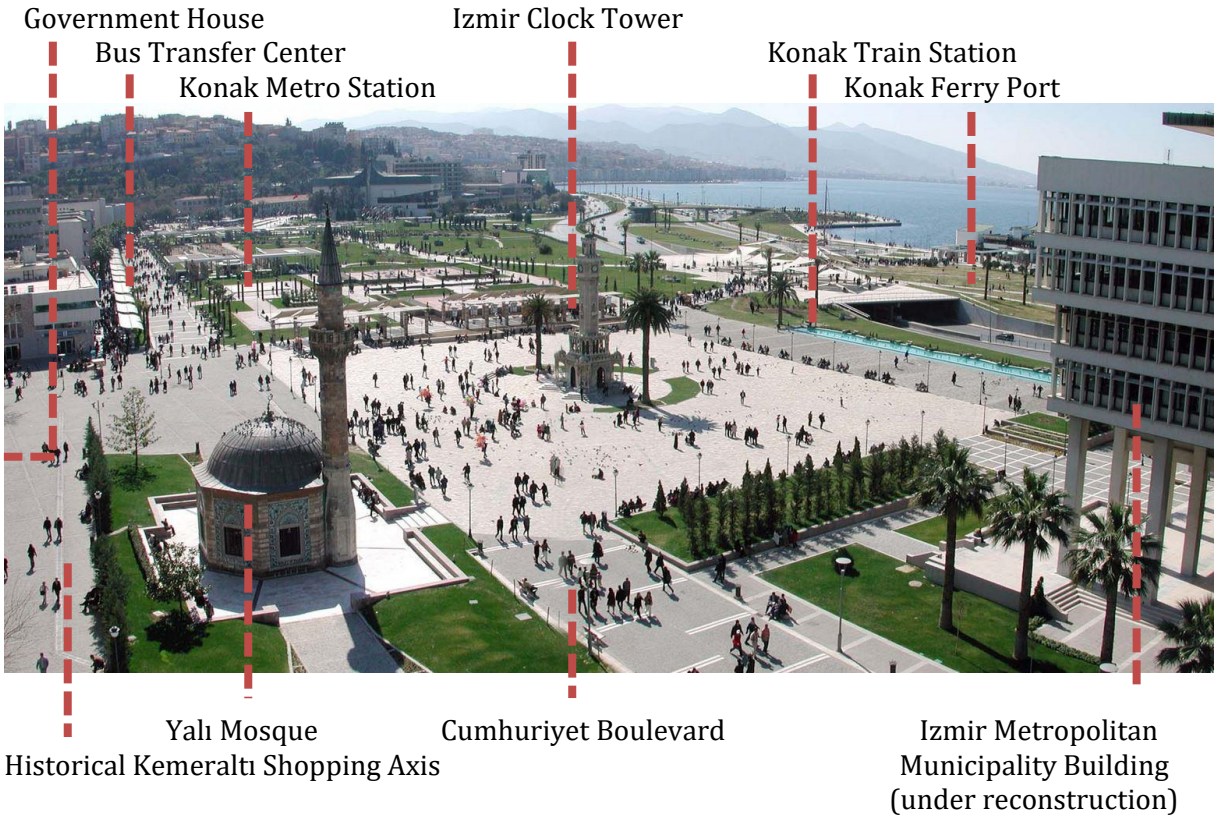

Figure 3. Izmir Konak Square (Arkiv, n.d.)

RESEARCH METHOD

In this study, a three-stage method consisting of data collection, analysis and evaluation was used. In the data collection phase, a literature review on the soundscape, space perception and auditory perception was made and the hypothesis and research questions were formed. The project tools were determined as Izmir Konak Square, sound sensory examination in the field, sound level measurement of the field and survey with field users. In the second stage, the analysis

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stage, the number of users of the area where the survey was planned to be applied was determined. The universe of the research consists of Konak Square users and it is planned to apply a face-to-face survey. The sample size was determined as 385 at the 95% confidence interval. The sounds in the field were examined by literature review and on-site observation, and survey scales were prepared accordingly. After the survey data were collected, frequency analyses and pairwise comparison tests were made. The results obtained in the evaluation stage, which is the last stage of the study, were evaluated and interpreted. Suggestions were presented for the improvement of the soundscape of Konak Square, which is an important public space of Izmir.

Research Limitations

The scarcity of studies on the contribution of the use of soundscape design in urban design to architecture and sustainability is striking. In the survey method, which is the method of the study, there is a possibility that people do not give correct answers to the questions. Another limitation of the study is that the sound types and measured sound pressure heights in the area vary according to seasons, days and hours. This possibility can provide a motivation for comparing the findings of similar studies to be conducted in different seasonal and temporal periods.

Research Problems

Konak Square is accepted as the center of Aegean Region Izmir and is accepted as the largest square in terms of surface area. Konak Square, as a “transformed public space” in the reflection of this synthesis and the unity of different cultures that has been going on for centuries in Izmir, both as a Western and an Islamic city, is an important public space that continues to exist from the past to the present, as the most important witness of both political and social transformations. In urban public spaces, the soundscape is a factor that affects the quality of the experience gained from the space. In this study, it is aimed to examine the soundscape perception of Konak Square users and to develop design suggestions with the obtained data. In this way, it is aimed to increase the quality of the experiences in the square by answering the following question: -What is the perception of soundscape in the square by Konak Square users?

Sub Problems of the Research

The answers to the following questions constitute the sub-problems of the study: 1. What is the relationship between demographic factors and acoustic comfort? 2. What is the relationship between the time spent in Izmir and acoustic comfort? 3. What is the relationship between perceived sound level and acoustic comfort? 4. What are the soundscape sounds of Konak Square? 5. How does the soundscape of Konak Square make the users feel?

Research Hypotheses

The auditory perception, which can affect the satisfaction of use of the space, has the potential to meet the needs of public spaces by using it in the design of urban areas. As a result of the literature review, it is seen that the perception of the urban soundscape

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changes according to demographic factors, and the responses to the sounds change, especially with the cultural difference (Erfanian et al., 2021). The hypothesis of the study is that the soundscape experience, which occurs due to the auditory sensation, is not outside the urban public space issues and is a concept that will enrich the spatial experience by affecting the satisfaction level obtained from the area.

CONSEPTUAL FRAMEWORK

Soundscape and Environmental Noise Management

The concept of soundscape basically refers to the whole of the sounds that reach the human ear in a certain area. The World Soundscape Project initiated by R. M. Schafer and his colleagues at the end of the 1960s, created the concept of soundscape, which was developed to study the acoustic dimensions of an area/environment (Truax, 2021). A large number of sound sources have been proposed in order to enable the auditory environment, which is formed as a result of the interaction between the people who perceive the sounds and the environment, to be defined without making positive or negative assumptions, and to enable a combined evaluation of how the sound is perceived and environmental, psycho-social and socio-economic data (Schafer, 1997). Unlike the concept of noise, soundscape is not considered as a negative feature, but as an element of the physical environment. Masking or eliminating the sounds in a space is a negative approach, and instead, it will be better understood which sounds are protected, strengthened or eliminated by first defining the soundscape of the space (Shafer, 1997). Sound has often been examined as an undesirable element in studies of the physical environment. However, sound is a design element that plays a role in the perception and description of the space, such as visual landscape features. Therefore, sound should be considered as one of the features that reveal the character of a landscape. In this context, different methods than sound measurements are needed in physical planning and design studies (Hellström et al., 2014).

RESULTS

Auditory Analysis of Izmir Konak Square

Just as sound types affect the soundscape perception of the environment, the sound level is considered as one of the important acoustic parameters that can affect this perception. Therefore, sound measurements were made while examining the sound types in the field. In this section, after the sound types are presented, sound measurements are given. The auditory sensation in the area at various times of the day was examined and 18 sound types in the area were determined. These 18 sound types were divided into 4 categories as human sounds, natural sounds, mechanical sounds and instrumental sounds. Among the sounds evaluated in the category of human sounds, 3 sound types were heard as speech, child and seller sounds. Moreover, bird, dog, cat, wind and water sounds were detected in the area and included in the category of natural sounds. In the group of mechanical sounds, which was more crowded than the others, car, motorcycle, tram, horn, ferry and bicycle bells were heard. Finally, street artist, car music, azan and bell sounds

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are listed in the instrumental sounds category. While examining the sound types in the field, sound level measurements were also made during the weekdays (Tuesday-Thursday) and weekend (Saturday). These 5-minute measurements were repeated during the midday and evening hours of the day. Equivalent continuous sound level (Leq) measurements were made using the free sound level meter app from Splend Apps. As a result of the 5-minute measurements made with the application, the minimum sound levels, maximum sound levels and average sound levels determined over time as the outputs of the application were determined in dB. It has been determined that all of the sound levels measured in the square are higher than the sound limit value of 65 dBA (Regulation on the Evaluation and Management of Environmental Noise) and 55 dBA (World Health Organization) (Dal, 2012). It is seen that the measurements made on Saturday are above the average. In addition, while the measurements were made, it was observed that the number of people using the area on Saturday was higher than on other days. The fact that Saturday is a holiday may be one of the important reasons affecting this situation.

Data Obtained by Questionnaire Analysis

The data collected by the questionnaire method and transferred to the Microsoft Excel program were organized, cleaned and made suitable for analysis. Explanatory Factor Analysis, Confirmatory Factor Analysis, Reliability Analysis, Mann Whitney U Test, Kruskal Wallis Test and Spearman Correlation Tests were used in the analyses. Data analyzes were tested using the IBM SPSS Statistics 26.0 (Statistical Package for Social Science) package program. The total number of valid questionnaires (385) was taken into account for each question. In each table, answers not given by the participants for each question are indicated as 'not given'.

Demographic Characteristics

The demographic data of the participants included in the study, such as gender, place of birth, age, education level and residence length in Izmir, were examined. According to the data obtained via the questionnaires, 51.4% of the respondents were women, 44.7% of the respondents were born in Izmir, 57.6% of the respondents were under the age of 35, 37.2% of the respondents had undergraduate and higher education, 25.5% of the respondents have been living in Izmir for more than 25 years and 10.6% of the respondents are in Izmir for visiting purposes.

Sounds Heard in the Square

According to the data obtained from the responses of the participants to the sounds in the categories of human sounds, natural sounds, mechanical sounds and instrumental sounds, the distribution of the sounds heard in Konak Square was examined. In this part, the participants were allowed to choose more than one option while they were asked to mark which of the sounds they perceived under the categories. It was observed that the most perceived sounds in Konak Square were "speech sound" (96.1%), "automobile sound" (84.2%) and "wind sound" (80.0%). As the rates decreased, it was concluded that "water

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sound" (29.1%) and "tram sound" (17.7%) were perceived at a level that could not be ignored.

Dominance Order

In order to determine the dominance level of the sounds perceived in the square, the participants were asked to rank the first 5 sounds they heard from the most dominant to the least dominant. Street artists (35.8%), automobile sounds (18.4%) and speech sounds (17.9%) were the most perceived sounds as the first dominant sounds. The second dominant sound is the car sound (24.7%), the third dominant sound is the speaking sound (17.4%), and the fourth dominant sound is the speech sound (16.1%) and wind noise (16.1%). Finally, as the fifth dominant sound, wind noise (19.2%) is the most perceived sound. When the general dominance percentages are examined, it is seen that the most dominant sound is the street artist sound (35.8%).

Level Perception and Satisfaction Level

In order to measure sound level perception and satisfaction level of the participants, 4 sound categories of human, natural, mechanical and instrumental sounds were presented to them. According to the survey data, it has been determined that the most disturbing sound category is mechanical sounds (52.2%), and the sound category that does not disturb the users at all is natural sounds (59.5%). Similarly, when the perceived sound levels were examined, it was seen that the category of sound perceived as the noisiest was mechanical sounds (60.5%), and the category of sound perceived as the quietest was natural sounds (27%).

Propositions Regarding Perceived Sound Levels

In this part of the survey study, there are 36-proposal scale questions presented to the participants. The expressions are formed by combining certain sounds with the adjectives "disturbing" and "too dominant". The participants were asked about their level of agreement with various proposals. According to the proposition data, the proposal that was answered as "Strongly agree" at the highest rate is "Automobile sounds are disturbing" (65.2%), the second highest rate is "Automobile sounds are too dominant" (60.8%), and the third is "Horn sounds are disturbing" (54.3%). On the other hand, the proposal that was answered as "Strongly disagree" at the highest percentage is "Cat sounds are disturbing" (69.6%), the expression with the second highest percentage is "Cat sounds are too dominant" (67%), third percentage is "Bird sounds are disturbing" (64.4%) and the fourth rate is "Water sounds are disturbing" (60.3%).

Findings on Statistical Tests of the Scales

When the 36 propositional scale questions asked to the participants were analyzed by explanatory factor analysis, it was determined that there were questions that should be grouped and excluded. After the remaining propositions were tested in confirmatory factor analysis in SPSS AMOS program, they were modeled according to the modification indices as in Figure 4.

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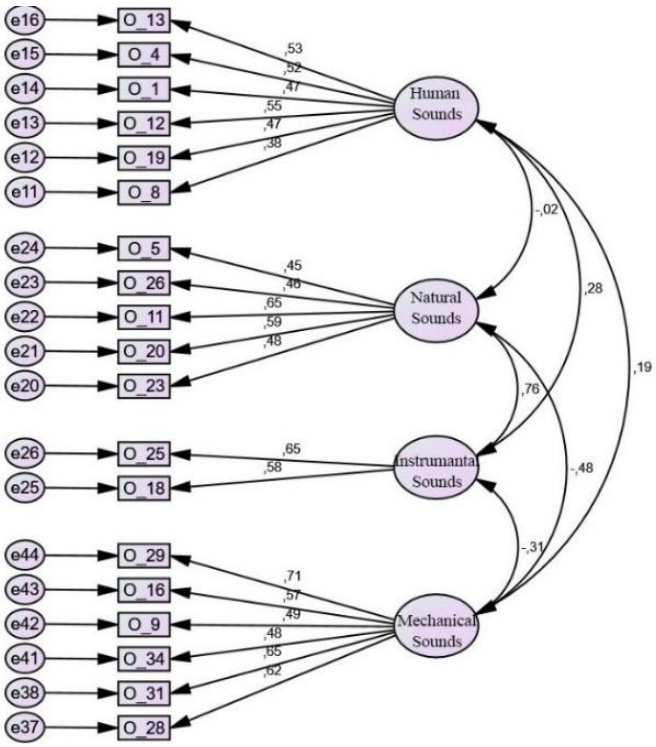

Figure 4. Confirmatory Factor Analysis AMOS Model

According to the model, the questions with very low factor correlations were removed from the model and the final model above was reached. Here, the covariance coefficients between the factors vary between -2% and 76% within the tolerance limits. As a result of the Confirmatory Factor Analysis, when the model fit indexes were examined, as seen in Table 1, it was found that GFI, AGFI and CFI values vary between 0.88-0.92, while RMR and RMSEA values are within normal limits.

Table 1. Confirmatory Factor Analysis Model Fit Index

Goodness of Fit Indexes	Value
CMIN/DF	2.01
RMR	0.07
RMSEA	0.05
GFI	0.92
AGFI	0.90
CFI	0.88

The results of the reliability analysis applied for all 4 factors are presented in Table 2. Values vary between 0.54 and 0.75. Thus, the reliability of the scales is medium-high. As seen in Table 2, according to the results of Kolmogorov Smirnov distribution for normality tests, it is seen that all 4 factors do not exhibit normal distribution (H0 rejection: $p<0.05$), therefore non-parametric tests are used preferred in the analysis of the data.

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Table 2. Reliability Analysis and Normal Distribution Tests of Scales

Normality Distribution of the scales				Reliability Analysis
Factor	Statistics	sd	p	Cronbach's Alpha
Human sounds	0,072	385	0.000*	0,649
Natural sounds	0,171	385	0.000*	0,652
Instrumental sounds	0,217	385	0.000*	0,544
Mechanical sounds	0,137	385	0.000*	0,753

*Statistically significant at the 0.05 level.

In Table 3, the results of the Mann-Whitney U test applied according to gender are presented. The rate of only mechanical sounds differ statistically at a meaningful rate ($p<0.05$). That is, female participants are more disturbed by mechanical sounds than male participants. Mann Whitney U results applied according to place of birth are presented in Table 3. The results show that only the rate of mechanical sounds differ statistically at a meaningful rate ($p<0.05$). That is, participants born outside of Izmir are more disturbed by mechanical sounds than those born in Izmir. According to the results of Kruskal-Wallis test depending on age, as seen in Table 3, human sounds and mechanical sounds rates differ statistically at a meaningful rate ($p<0,05$).

Table 3. Statistical Analysis by Gender, Place of Birth and Age (Mean ± Std. Deviation)

Statistical Analysis by Gender				
	Human sounds	Natural sounds	Instrumental s.	Mechanical sounds
Woman	17.68 ± 4.79	7.54 ± 2.43	3.37 ± 1.52	25.31 ± 3.99
Man	17.15 ± 4.86	8.19 ± 3.22	3.62 ± 1.67	24.04 ± 4.86
p	0,281	0,146	0,155	**0.006***
Statistical Analysis by Place of Birth				
	Human sounds	Natural sounds	Instrumental s.	Mechanical sounds
Izmir	16.84 ± 4.95	8.06 ± 3.32	3.64 ± 1.75	24.02 ± 4.75
Other	17.90 ± 4.68	7.69 ± 2.41	3.37 ± 1.45	25.24 ± 4.17
p	0,064	0,73	0,262	**0.006***
Statistical Analysis by Age				
	Human sounds	Natural sounds	Instrumental s.	Mechanical sounds
18	17.21 ± 4.84	8.44 ± 3.83	3.66 ± 1.8	23.17 ± 4.89
18-24	18.63 ± 4.67	8.31 ± 2.99	3.69 ± 1.63	24.86 ± 4.81
25-34	17.93 ± 4.96	7.84 ± 2.57	3.36 ± 1.61	24.91 ± 4.34
35-44	17.25 ± 5.04	7.97 ± 2.90	3.52 ± 1.52	24.68 ± 4.40
45-54	17.31 ± 4.95	7.00 ± 1.78	3.16 ± 1.28	26.45 ± 3.18
55-64	15.36 ± 3.81	6.92 ± 1.51	3.44 ± 1.62	24.64 ± 4.25
>64	14.17 ± 1.94	6.83 ± 1.72	3.00 ± 1.55	24.00 ± 3.10

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p	0.014*	0,099	0,581	**0.003***

*Statistically significant at the 0.05 level.

When the results are examined, depending on the human sounds, >64-25-34 (p=0.047), >64-18-24 (p=0.020), 55-64-<18 (p=0.047), 55-64-35-44 (p=0.041), 55-64-25-34 (p=0.008) and 55-64-18-24 (p=0.001) age groups differ statistically at a meaningful rate. (p<0.05). As a result, the discomfort of the over 55 age group from human sounds is significantly lower than the other groups. Thus, young people are more disturbed by human voices than the elderly (Figure 5). According to the results depending on mechanical sounds, <18-35-44 (p=0.043), <18-25-34 (p=0.02), <18-18-24 (p=0.005), <18-45-54 (p=0), 55-64-45-54 (p=0.034), 35-44-45-54 (p=0.02) and 25-34-45-54 (p=0.039) age groups differ statistically at a meaningful rate (p<0.05). Therefore, while the discomfort of the age group under 18 from mechanical sounds is lower than the other groups, the discomfort of the age group "45-54" from mechanical sounds is significantly higher than the other groups (Figure 5).

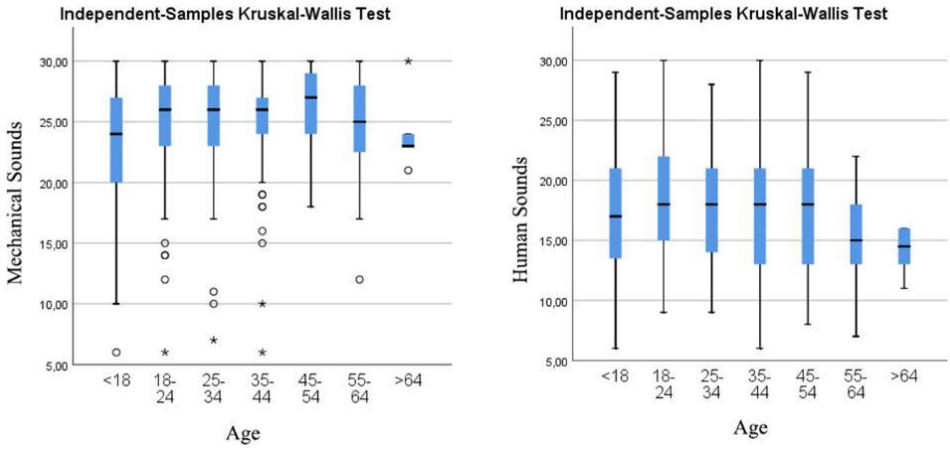

Figure 5. Mechanical Sounds and Human Sounds by Age

According to the results of Kruskal Wallis test depending on residence length in Izmir, as seen in Figure 6, the rates of human sounds and mechanical sounds rates differ statistically at a meaningful rate (p<0,05). When the results are examined, depending on the human sounds, >25-6-15 (p=0.046), >25-16-25 (p=0.016), >25-Visit (p=0.026) and >25-0-5 (p=0.002) groups differ statistically at a meaningful rate (p<0.05). As a result, the discomfort of people living in Izmir over 25 years from human sounds is lower than the others (Figure 6). According to the results depending on mechanical sounds, 16-25-0-5 (p=0.008), 16-25->25 (p=0.004) and Visit->25 (p=0.05) groups differ statistically at a meaningful rate (p<0.05). As a result, while the discomfort of mechanical sounds in the group who living in Izmir for 16-25 years is lower than the groups living in Izmir for 0-5 and >25, the discomfort of mechanical sounds in the visiting Izmir group is significantly lower than the group living in Izmir for more than 25 years (Figure 6). As seen in Figure 7,

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according to Kruskal Wallis results applied to education level, only mechanical sounds rates differ statistically at a meaningful rate (p<0,05). According to the results depending on mechanical sounds, the rates of Primary-Postgraduate (p=0.001), Undergraduate-Postgraduate (p=0.009) and High School-Postgraduate (p=0.012) groups differ statistically at a meaningful rate (p<0.05). As a result, the rate of being disturbed by mechanical sounds of postgraduates group is significantly higher than primary school, high school and undergraduate groups (Figure 7).

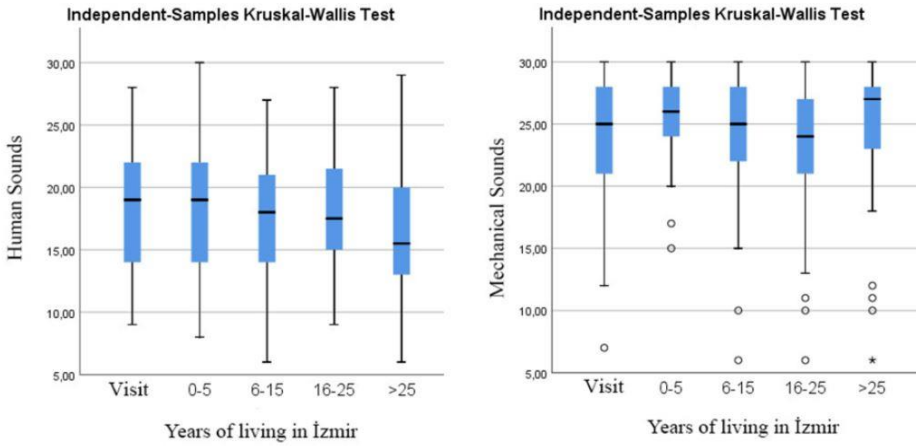

Figure 6. Human Sounds and Mechanical Sounds by Residence Length in Izmir

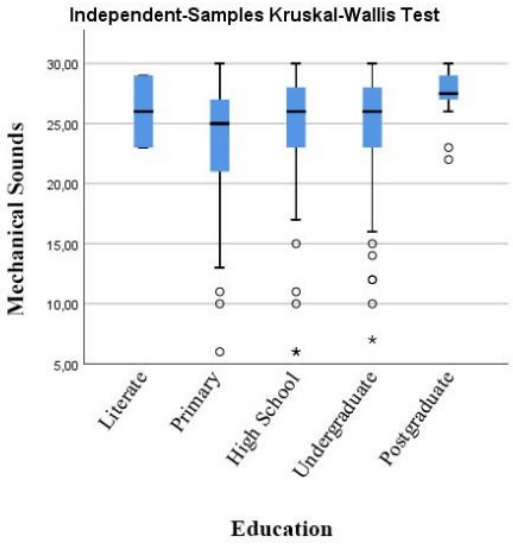

Figure 7. Mechanical Sounds by Education

Finally, Spearman Correlation Test was applied to the factor rates data in order to examine the relationship between sounds types. According to Table 4, it has been determined that there is a relationship between all variables except the nature sounds and human voices (p <0.05). When the relationships between them are examined in

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detail, it was seen that there was a weak positive relationship (r=0.17) between human sounds and instrumental sounds, and a weak positive relationship (r=0.10) between human sounds and mechanical sounds (p<0.17). 0.05). Moreover, it was determined that there was a weak positive relationship (r=0.36) between natural sounds and instrumental sounds, and a weak negative relationship (r=-0.16) between natural sounds and mechanical sounds (p<0.05). In addition, there was a weak negative relationship (r=-0.13) between instrumental sounds and mechanical sounds (p<0.05).

Table 4. Relationship Between Sounds Types (Spearman Correlation Test) r(p)

	Natural sounds	Instrumental sounds	Mechanical so.
Human sounds	0.02 (p=0.627)	0.17 (p=0.001*)	0.10 (p=0.040*)
Natural sounds		0.36 (p=0.000*)	-0.16 (p=0.002*)
Instrumental so.			-0.13 (p=0.009*)

*Statistically significant at the 0.05 level.

DISCUSSION

It is important to determine how any space is perceived by users, and it is even more important for public spaces, because public spaces must provide sustainable usage and adapt to user diversity. Therefore, soundscape is an important concept that affects perception and usage preferences of users depending on the space, and should be used in the design phase. In this study, which aims to examine the perceptions of Soundscape, it has been observed that the perceptions of users can change in the context of demographic characteristics. Data from 385 participants in Konak Square were included in the analysis. The results show that perception of human sounds and mechanical sounds show significant differences in terms of demographic factors. When the differences by gender were examined, it was concluded that women were more disturbed by mechanical sounds than men. A study measuring overall perception of loudness found that women showed higher sensitivity and lower tolerance than men (Fang et al., 2021). Therefore, it makes sense that women are more sensitive to mechanical noises than men and feel more discomfort. Another study found that compared to men, women are more favorable to sounds such as water, church bells, street music, clock chimes and children's shouts. It seems that the emotional impact is a common feature of these sounds (Yang & Kang, 2005). However, in a study conducted to determine the soundscape satisfaction of users in the Suriçi region of Diyarbakır province, it was concluded that men feel more unpleasant than women (Aydın & Yılmaz, 2016). Considering the perception of soundscape in terms of age, it is seen that young people are less tolerant of human sounds than the elderly. In addition, while the discomfort of the group under the age of 18 from mechanical sounds is lower than the other groups, the discomfort of the age group "45-54" from mechanical sounds is higher than the other groups. As the age increases, the discomfort caused by

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mechanical sounds increases and the tolerance to human sounds also increases. It is supported by many studies that there is a positive increase in general soundscape enjoyment with the increase in age (Erfanian et al., 2021; Aydın & Yılmaz, 2016). Yang and Zhang (2010) concluded in their study that with increasing age, people are more positive or tolerant of sounds related to nature, culture or human activities, on the other hand, young people are more positive or tolerant towards street music and mechanical sounds. Another issue that affects the perception of soundscape is whether the users are local or not and how long they have lived in the city. Visitors in Izmir feel less discomfort from mechanical sounds than people who have been in Izmir for more than 25 years. However, the mechanical sounds in the square bother non-local users more. Moreover, as residence length increases in Izmir, the discomfort from human sounds decreases. Likewise, Yang and Kang (2005) concluded that non-local users are more disturbed by human sounds. When the education level is evaluated in the context of mechanical sounds, it is seen that the graduate group is more disturbed by mechanical sounds than the other groups. Likewise, Kang and Zhang (2010) concluded in their study that as the level of education increases, the discomfort with mechanical sounds increases, while the tendency to prefer natural sounds also increases.

CONCLUSION

Within the scope of this study, the results of the study carried out in Konak Square, which is located in the city center of Izmir and has different usage patterns, are presented. The results of the survey data made with 385 people in the field and the results of loudness measurements made at different days and times of the week were examined. It has been concluded that all of the sound levels measured in the square are considerably higher than the sound limit values determined for a healthy environment. On Saturday, the use of the area increases and the sound level reaches the maximum level as 88dB. According to the survey results, the most dominant sounds in the square are street artist, car sound, speech sound and wind sound respectively. Among these sounds, the discomfort rate of the automobile sound is very high, while those of the other sounds are low. In addition, according to the propositions, mechanical sounds such as horn sounds, motorcycle sounds and automobile music sounds are perceived as sounds that cause a lot of discomfort. On the other hand, it has been concluded that natural sounds such as cat, dog, bird and water sounds are perceived as not disturbing to a large extent. The results of this research confirm that the most preferred sounds in the square are natural sounds. Otherwise, the most disturbing sounds are the sounds originating from the traffic. In terms of the effects of demographic factors, differences between age groups are quite important in the perception of sound satisfaction. Older people and young people may have some fundamental differences in evaluating soundscape. In general, young people are more tolerant of mechanical sounds. But with an increase in age, people become more

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favorable or tolerant of sounds related to nature and human activities.

SUGGESTIONS

Soundscape is important for an identified space, as the preferences of soundscape elements influence people's choice to use an urban square. A more aesthetically appealing soundscape will draw more users into a frame. Knowing the soundscape satisfaction levels of citizens with different demographic characteristics before the urban planning process will make a great contribution to creating sustainable cities. In the context of Konak Square, the traffic axis to the east of the area negatively affects the soundscape of the square. Therefore, a sound barrier should be created between this traffic axis and the square. The barrier created by the existing water pool is insufficient and a new sound barrier should be designed with strong water sounds that will not block the sea view. Since the elderly are less tolerant of traffic noises, it is recommended that the western side of the square should be designed for the elderly and the eastern side should be designed to encourage the use of children and young people. For this design, children's playgrounds with special sound insulation can be designed. Considering that there are too many street artists in the area and that the users of the square are generally not disturbed by this dominant instrumental sound, special areas for street artists should be designed. Thanks to this design proposal, it will allow street artists to be protected from external factors such as rain and wind and to exhibit their art more comfortably. With the comfort offered by this design, it will be possible to increase the sounds of street artists, which is a popular and desired sound in the square. The fact that the data obtained from the users is so extensive reveals that the sound is actually a more complex spatial element than it is thought. Therefore, the element of sound should be evaluated more effectively in the physical planning and design process of public spaces. In this context, there is a need for more studies based on both subjective and objective parameters on how to integrate acoustic character studies in planning-design processes.

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