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Memory Interfaces in Urban Soundscapes: Downtown Trabzon

Kentsel Ses Peyzajında Bellek Arayüzleri: Trabzon Kent Merkezi

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ABSTRACT

Public spaces that reflect the collective consciousness of societies in establishing a bond between the past and the future are among the key determinant factors of urban identity. The soundscape approach can be used as a tool to define the sonic environment as a part of urban identity. This study aimed to reveal the sonic identity of downtown Trabzon by determining the elements of soundscape, namely keynotes, signals, and soundmarks, along with lost/disappearing sounds considering their association with collective memory, and continuous sounds that have remained unchanged from past to present. The methodology of this study consisted of soundwalks and surveys. Sonic regions belonging to Atatürk Square, Kunduracılar Street, Kemeraltı Street, and Mumhaneönü Boulevard were identified based on soundwalks and sonic environment assessments in line with the predetermined routes. The findings obtained from soundwalks showed that sonic identities differed by region, suggesting the presence of sui generis sound environments that define the sonic image of each region. The limitations of this study were the soundwalks performed in the regions that were considered to be representative of downtown Trabzon and the users' sonic environment assessments.

Keywords: Urban space, collective memory, soundscape, Trabzon.

ÖZ

Geçmiş ile gelecek arasında bağ kurma noktasında, toplumun kolektif bilincini yansıtan kamusal mekânlar, kent kimliğini oluşturan unsurlar arasındadır. Kent kimliğinin bir parçası olarak sonik çevrenin tanımlanmasında ses peyzajı yaklaşımından yararlanılabilmektedir. Bu araştırmanın amacı, ses peyzajını tanımlayan "arka-plan sesler", "ön-plan sesler", "sembol sesler" ve kolektif bellek ile ilişkili olması yönüyle "kaybolan/yitikleşen sesler" ile geçmişten günümüze kadar "devamlılığı/sürekliliği olan seslerin" tespiti yoluyla Trabzon kent merkezinin sonik kimliğini ortaya çıkarmaktır. Araştırmanın metodolojisini, ses yürüyüşleri ve anket uygulamaları oluşturmaktadır. Atatürk Alanı, Kunduracılar Caddesi, Kemeraltı Sokağı ve Mumhaneönü Meydanı'na ait sonik bölgeler; ses yürüyüşleri ve belirlenen güzergâhlar doğrultusunda sonik çevre değerlendirmeleri yoluyla belirlenmiştir. Ses yürüyüşlerinden elde edilen bulgular, bölgelere ait sonik kimliklerin farklılaştığını göstermektedir. Bu sonuç, bölgelerin sonik imgelerini tanımlayan ve kendilerine özgü olan ses çevrelerinin varlığını ortaya koymaktadır. Araştırmanın sınırlılığını, Trabzon kent merkezini temsil ettiği düşünülen bölgelerde gerçekleştirilen ses yürüyüşleri ve kullanıcıların sonik çevre değerlendirmeleri oluşturmaktadır.

Anahtar Kelimeler: Kentsel mekân, kolektif bellek, ses peyzajı, Trabzon.

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Introduction

Cities are the place where the concept of public space is born and developed throughout history. As a combination of several components, cities are defined as public spaces with a heterogeneous and complex structure, while urban life is defined as public life (Arendt, 1998). Cities possess unique physical features, and these features define the character of the city and distinguish it from other urban settlements. These differentiating, exceptional physical attributes are crucial for establishing a connection that generates identity and for creating the links that form the city's identity (Manahasa & Manahasa, 2020). The formation and reformation of an identity is a spatial process. Understanding the processes of how identity is constructed, created, sustained, and remembered necessitates acknowledging the significance of place and space (Volcic, 2005).

Urban space has a direct impact on individuals. People perceive and make sense of space through specific objects in functional and communicative ways (Amen & Nia, 2021). In this process, activities and events taking place in the environment also influence an individual's behavior and attitudes (Carmona & Tiesdell, 2007). Urban spaces that involve interaction and communication enable individuals to perceive and comprehend spatial scale through their bodies and all senses (Akbarishahabi, 2022; Ching, 2007; Rapoport, 1984). Interactions like seeing and hearing are indicated as crucial features that make urban spaces appealing (Askarizad & Safari, 2020; Gehl, 1987). Events in a space create memories, and memories, in turn, shape lives. In the context of urban space connected to memory, individuals exist both individually and collectively (Mianroodi et al., 2020). Being an urban dweller can be explained in association with the sense of collective movement and having common values and spaces. An individual's life starts at home, gradually expands and grows, and helps the creation of collective living spaces (Vardar, 1990). Public squares and streets have the potential to improve the sense of loyalty to collective living spaces that allow for public use and spaces. Scannell and Gifford (2010) noted that the sense of loyalty to a space can be both in individual and social manners. From an individual perspective, one's memories and experiences regarding a specific space allow one to establish strong bonds with that space. This bond gives meaning to the space and creates the place. From a social perspective, loyalty is created through collective memory and symbolic meanings that more than one individual has about a particular place. It also allows history, social value judgements and cultural memory to be represented within a particular space. These facts are reflected holistically to future generations, and each generation shapes the space and the context in which it lives.

Pallasmaa (2018) indicated that interactions and experiences related to a space or place influence an individual's agreement between themselves and the world. Studies of the relationships between people and space highlighted the emotional bond that individuals establish with spaces (Hay, 1998; Hummon, 1992; Jorgensen & Stedman, 2001). From a cultural perspective, the sense of loyalty refers to the connection between the tendencies shared by people and an individual's affection towards a space (Göregenli, 2018). Being an organic form, a social space can be identified as a common ground of society throughout the historical process. A social space that can be defined as a space shared by more than one individual consists of various places suitable for social reproduction relations, gender, age, family structures, and production relations (Lefebvre, 2009). Boulevards and streets are also in connection with several concepts such as social images, economy, culture, and political power that form a city. The memory of society creates an identity regarding the physical and nonphysical formation of social spaces. According to Wright (1999), these physical spaces are key components in the creation of the identity rather than its production and determination. Additionally, Özdoğan (2019) defined the true owners of a city as individuals who live in, commune with, feel that they belong in, and concern themselves over a city and stated that an urban space should provide confidence and peace to individuals.

However, the fact that cities are affected by the political, economic, and cultural structure of the period they are in causes their meaning and functions to continuously change (Karakurt, 2006). Cities constantly grow and change through the concept of rapid urbanization whereas urban spaces remain under the pressure of economic rationality of design; therefore, similar spaces without identity or characteristics occur because the city image (boulevard, street, yard, human scale) and city culture (urbanity, consciousness of being an urban-dweller, values shared within a city, traditions, customs) of the past are being forgotten (Özer & Ayten, 2005). The fact that cities are constantly changing and transforming has a negative impact on the relationship between the city and memory, causing the images in society's memory to diminish. There is no doubt that such changes affect the use, capacity and identity of urban spaces.

Spatial Perception and Memory

Human beings constantly interact with their environment. Within the course of this interaction, they should understand and interpret the environment they live in. This entire process creates the concept of perception (Argan, 2019). Piaget and Inhelder (2005) stated that one's interactions with their environment and motions considerably affect their perceptual activities. Cüceloğlu (2019) defines perception as meanings and responses that an individual gives to their environment through identifying and interpreting sensory data, and he defines the entire process as perceiving. Factors that affect the way of perceiving a space include a society's lifestyle, psychological impacts, experiences, biological impacts, and physical factors (Çiçek, 2019). Individuals need to perceive every image they see, every object they touch, and every sound they hear (Argan, 2019).

The relationships individuals establish through mutual interactions reveal the semantic aspect of the concept of space. In its basic form, space is defined as a place in which we assign meaning to ourselves. The first thing we need to have a perception of within a space is motion. Individuals experience a space with their motions. Through the effects of these motions, numerous images are generated in the mind and these images help to establish a connection between them and the space (Asar, 2013). Not only visual perceptions but also auditory, olfactory, gustatory, and tactile perceptions have an impact on perceiving a space. Visual perception is effective in perceiving at a rate of 60% while auditory perception is at a rate of 30% and tactile perception is at a rate of 10%. In the process of perception, a space is perceived and evaluated as a whole, together with the area within sight. Spatial perception is shaped by the results obtained through the senses as well as experiences and images in the mind (Yılmaz, 2008).

The relationship that an individual establishes with their environment and other people is stored in different forms of memory such as short term, long term, individual and cognitive as a reflection of their experiences. The concept of memory has been addressed by various disciplines. As this concept is associated with a wide and diverse range of fields of study, it brings along numerous definitions. According to the Turkish Language Association (2023), memory is the ability to consciously keep in mind the connection between experienced events and encountered situations and the past.

The structure of memory consists of three stages regarding the processing and encoding of information. These stages are short-term memory, long-term memory and sensory memory. Sensory memory is the retention of sounds or images for a very short period of time. When we hear a sound or see a picture, the information we receive is stored in our sensory memory. The information stored in our sensory memory is retained for a short time and then transferred to our short-term memory (Atkinson & Shittrin, 1971; Özak, 2008). The information transferred to short-term memory divides into two sections i.e. auditory encoding and visual encoding. Encoding in long-term memory is explained by the cause-and-effect relation, and it is associated with auditory

and visual encoding as well as the meanings of objects (Hilgard et al., 1990; Özak, 2008). It is not important whether the information is received auditorily or visually during the encoding process. What is important is that this information is transferred and encoded by associating it with experienced, learned and existing information (Sachs, 1967).

Memory is formed individually through the process of socialisation, but it is identified collectively (Assmann, 2015). Objective elements of memory emerge when the concepts of individual and collective memory are analysed in the context of a city. Similarly, Bergson (2015) pointed out that remembering through individual memory is possible when a place and its context are associated with that particular moment. Halbwachs (2018) pointed out that individual memory is supported by collective memory, in order to recall and crystallise memories.

According to Rossi, "The city is the locus of the collective memory. The city itself is the collective memory of its people, and like memory it is associated with objects and places. The collective memory participates in the actual transformation of space in the works of the collective, a transformation that is always conditioned by whatever material realities oppose it." (Rossi, 1984, p. 130). Public spaces, which reflect the collective consciousness of societies, are used to define society and its environment in terms of establishing a bond between the past and the future. This defining process occurs when information learned through hearing or seeing is recalled. Visual and auditory memories are developed according to society's perceptions and shape the identity of cities. This is why the "soundscape" approach was introduced, which defines the auditory identity of a city.

Soundscape

Through hearing, an individual perceives their environment, establishes relationships with the objects around them, and assigns meaning to their environment using their overconscious and subconscious experiences. The concepts of listening and hearing are related to the perception of sound. Sounds are interpreted with different associations created in the mind through listening and hearing. This emphasises the nature and importance of soundscapes (Akkaya, 2014). The concept of soundscape is related not only to the source of the sound but also to the information perceived in the sound environment (Jeon et al., 2010). Being addressed with the soundscape approach, auditory perception has added another dimension to the concept of noise which is an effective factor in the assessment of acoustic comfort. Recent studies have noted that according to the subjective data obtained from users, there is no direct relationship between perceived noise effects and sonic environment assessments. Therefore, the soundscape approach allows for the classification of sounds into soundmarks and annoying/unwanted sounds, independent of the noise measurement of the sounds. This approach provides the opportunity to quantitatively measure the sound environment of urban spaces, define soundmarks, and determine users' subjective data related to the environment they are in (Aydın et al., 2017).

The concept of soundscape was first seen in the book with the title "Tuning of the World" published by Murray Schafer in 1977. According to the ISO standard, a soundscape is an acoustic environment as perceived or experienced and/or understood by a person or people, in context (ISO 12913-1, 2014). Cain et al. (2013) addressed this environment experienced by the sound with the concept of a sonic environment which is a part of the space. A sonic environment represents the region in an environment in which a sound occurs whereas sonic images are related to restrictive sound barriers, directive axes, and sound focuses defining a city (Akkaya, 2014). Moreover, Schafer defined the concept of soundscape, a significant component of the sonic environment, as all sounds reaching the ear from a specific spot (Kaymaz et al., 2013).

Schafer (1994) classified the concept of soundscape into three categories: keynotes, signals, and soundmarks. Keynotes are climate- and geography-related sounds associated with the common sounds in an environment that we unconsciously perceive. Signals are short-lasting and meaningful sounds that are heard mandatorily through their stimulus effect. Soundmarks are sounds unique to a society and a region that define the identity of an environment (Tokgöz & Bilen, 2019). Soundmarks should be protected and remembered for cities that are exposed to auditory deformations. In this regard, it is possible to discuss the lost/disappearing sounds of changing cities and social habits. A lost/disappearing sound is one that gives its place to another sound within the course of life and does not exist anymore but has gained a place in society's cognitive memory (Wallace, 2012). In terms of reflecting the urban identity and social memory, continuous sounds that have been ongoing from past to present can also be discussed along with the lost/disappearing sounds.

Sonic environments, a key component in the formation of a city's identity, highlight the importance and necessity of soundscape studies. The concept of soundscape has been linked to a wide range of other concepts such as urban identity, perception, dominant sound and memory in urban, rural and historic spaces (Akkaya, 2014; Brambilla et al., 2007; Dubois et al., 2006; Jo & Jeon, 2020; Kang et al., 2019; Lavandier & Defreville, 2006; Liu et al., 2013; Özçevik, 2012; Pérez-Martínez et al., 2018; Raimbault & Duboisrossi, 2005; Semidor & Venot-Gbedji, 2007). As indicated in Table 1, there are numerous national and international studies in recent years that address soundscapes in various contexts.

Table 1. Examples of past studies in the field of soundscape

Studies	The main topic/theme
Bruce et al. (2009); Özçevik (2012); Pérez-Martínez et al. (2018)	Soundmarks
Berglund & Nilsson (2006); Boivin et al. (2007); Guo et al. (2022); Hong et al. (2019a); Jeon & Jo (2020); Kaya (2018); Liu et al. (2019)	Urban spaces (squares, parks, historical sites, streets, residential areas)
Tokgöz & Bilen (2019)	Lost/disappearing sounds
Cliffe et al. (2019); Hong et al. (2019b); Krijnders & Andringa (2010)	Virtual sounds
Brambilla et al. (2007); Lam et al. (2009); Sherpherd & Grimwood (2009);	Quiet soundscape
Brown (2010); Gozalo et al. (2015); Jeon et al. (2010)	Noise
Deng et al. (2020); Hong et al. (2022a); Hong et al. (2022b); Lee et al. (2014)	Rural soundscape
Farina et al. (2011); Pijanowski et al. (2011)	Soundscape ecology

It can be observed that soundscapes are particularly the subject of numerous studies related to urban spaces (squares, parks, historical sites, streets, residential areas), as indicated in Table 1. No studies were found in the literature that examines the sonic characteristics of Trabzon, its soundscape, or its sound maps. In this regard, this study analysed the keynotes, signals and soundmarks, which are three main elements that define the soundscape, lost/disappearing sounds in terms of their association with collective memory, and continuous sounds that

have continued from the past to the present over downtown Trabzon. This study aimed to determine the sonic identity of the area and to identify the users' perception of the sonic environment.

Material and Methods

This study aimed to define the soundscape of downtown Trabzon and its methodology consisted of soundwalks and surveys. The selection of Trabzon province for this study was influenced by the absence of any existing soundscape study related to the city of Trabzon. Fieldwork was conducted in two stages to document the sounds defining the soundscape and to determine the sonic environment assessments. For both stages, weekdays with clear, sunny, and calm weather conditions were chosen. It is assumed that the familiar daily activities in the four included regions continue in their usual manner on weekdays. Therefore, fieldwork was conducted on weekdays, considering that it would better reflect the typical urban center mobility and the resulting sounds.

The first stage of this fieldwork covered a soundwalk that was performed through a route over a transport axis of four regions in which the soundscape was conducted. Özçevik (2012) indicated that R. M. Schafer (1977) supported the soundwalk method to assess the compounds and formation of the soundscape belonging to an environment, to listen and record the existing sounds, and to discover the soundscape of that environment. A soundwalk is a method designed to record the important soundscape within a specific area by following the predetermined routes in a way to record all sounds being heard within given geographical borders. Within the scope of this method, recorded sounds are used to detect which sounds are in the foreground/background and to identify the types of sound sources. In the first stage of the fieldwork, the soundwalk was performed in areas with an intense sound source from 10:00 to 14:00. For each region, stops were made at predetermined points that could represent the sound characteristics. Sounds were recorded using a sound recording device at these points. A 15-minute audio recording was taken at each point. Without any breaks between the points, a new recording was started when a new point was reached.

The second stage consists of survey applications conducted with a total of 120 participants who volunteered to participate in the study, selected through random sampling method, with 30 participants from each region where sound recordings were taken. The researchers prepared the aforementioned survey form to reveal the users' sonic environment assessments. The first section of this form asks for the participants' demographic information, while the second section asks for their assessment of the sound environment.

The section on sonic environment assessments consists of questions that define the sound environment, identify sounds heard in the environment, determine noise sources in the surroundings, assess how noisy the sound environment is perceived to be, inquire about preferred sounds to be added or eliminated from the environment, and identify lost/disappearing sounds and continuous sounds in the environment. Perceptual assessments of users regarding the surrounding sound environment involve marking a statement indicating 7 emotions: "free," "calm and relaxed," "happy and peaceful," "safe," "active and vigorous," "optimistic," and "vivacious and nice," on a scale ranging from 1 (never) to 5 (always) in response to the question, "How do you feel about the sound environment you hear around you?"

Analysis and Findings

First Stage: Urban Sonic Images

The fieldwork was conducted in Atatürk Square, Kunduracılar Street, Kemeraltı Street, and Mumhaneönü Boulevard consecutive locations in downtown Trabzon. It is believed that these consecutive areas, in terms of location, intensive usage, and sound diversity, can reflect the sonic environment of the city center. Accordingly, this study established the route of the soundwalk through the four aforementioned regions (Figure 1).

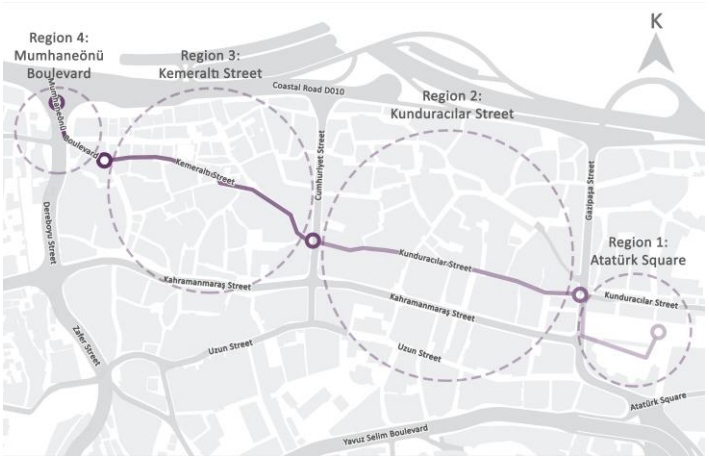

Figure 1. Study field and the route of soundwalk (Reference: Authors)

The followings were effective factors in the selection of the regions in Figure 1 that were determined to be study fields:

- Their characteristics were identified with the urban identity of Trabzon,
- They had distinct characteristics in social, cultural, and historical terms regarding their location and functions,
- They had an auditory richness,
- They were extensively preferred by the users.

The data that were obtained through the soundwalk performed in the first stage of the fieldwork were used to determine the urban sonic images of these regions. The sounds heard were grouped through the detection of the characteristics of the sonic regions. Sound focuses and specific sound barriers were also identified. In this regard, sonic regions, focuses, and axes were considered to be sonic as a result of recording and analyzing these regions' soundscapes by using soundwalks. The urban sonic images of the aforementioned regions were detailed below.

Urban Sonic Images of Atatürk Square

Atatürk Square was addressed as "Region 1" in this study. Known as 'Boulevard Park' within the course of its use, Atatürk Square is present in an important location defined as the downtown Trabzon (Sancar & Acar, 2016). Atatürk Square is surrounded by historical buildings used for trading purposes and roads with intense public transportation use/heavy traffic. This makes it easy to access the park so that it hosts numerous users from different regions of the city within different periods. Atatürk Square has been used as a gathering place in the region with the most critical trading axes of the city in order to organize various activities and celebrations from the past to the present. It is also preferred for its recreation function due to the sitting areas in

the tea garden and greensward. Sancar and Acar (2016) stated that this park constitutes a historical and social focus with all its features and is the best place that reflects the identity of the city.

Its keynotes were determined to be trade- and nature-related sounds. Trade-related sounds were coming from the selling spaces (e.g., waiting for staff to call the customers). Nature-related sounds came from the wind and different types of birds. Their signals were identified as traffic and human-related sounds. Traffic-related sounds came from minibuses stopping and starting, brakes, horns and whistles. Human-related sounds came from people having dialogues and conversations, laughing and singing, children's cries, footsteps and mobile phone ringing. The azan was the most prominent sound. Figure 2 shows the sonic images associated with Atatürk Square.

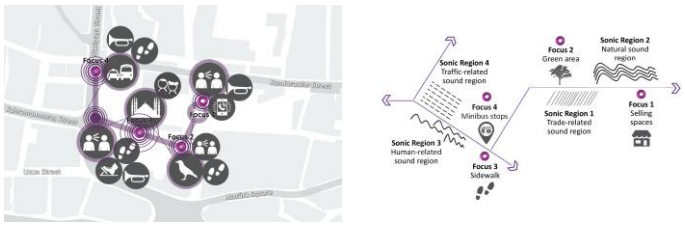

Figure 2. Graphic of the sonic images related to Atatürk Square (Reference: Authors)

Urban Sonic Images of Kunduracılar Street

Representing "Region 2", Kunduracılar Street is connected to Mumhaneönü over Semerciler Street in the west, to the harbor over İskele Street in the east. This street increases the importance of the trade centers as it is located in downtown Trabzon, and it has an intense trading axis. There are pedestrian-shopping areas and spots in which cultural activities are organized along the street. As being closed to vehicles, this street has intense human and social activities, and it is present in an important location to perceive the historical texture reflecting the characteristics of the region (Özkan, 2017).

Its keynotes were determined to be traffic-related sounds such as motor vehicle and horn sounds. Its signals were determined to be trade- and human-related sounds. Trade-related sounds were coming from tradesman-customer dialogs, coins, and music. Human-related sounds were coming from people having dialogs and conversations, fights/arguments and offensive words, children, babies crying, footsteps, key holders, and ringing mobile phones. Its soundmark was determined to be sounds coming from selling spaces. Figure 3 shows the sonic images related to Kunduracılar Street.

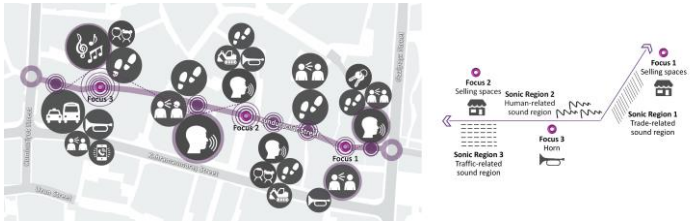

Figure 3. Graphic of the sonic images related to Kunduracılar Street (Reference: Authors)

Urban Sonic Images of Kemeraltı Street

Defined as "Region 3", Kemeraltı Street is within walking distance of Kunduracılar Street, Uzun Street and Atatürk Square. It is one of the protected areas in Trabzon and is located in the Grade 3 protected area. Kemeraltı Street is located between Pazarkapı and Kemerkaya Neighborhoods and serves as the historic downtown within the borders of Devlet Sahil Yolu and Kahramanmaraş Streets. This region has many intense trade areas allowing for shopping as well as numerous civil architecture samples. The fact that the region has historic settlement areas and trade centers presents the city's identity distinctly (Özkan et al., 2017).

Its keynotes were determined to be traffic-, construction- and nature-related sounds. Traffic-related sounds were coming from motor vehicles, police radios, and horns. Construction-related sounds were coming from construction equipment. Nature-related sounds were coming from the wind and birds. Its signals were determined to be trade- and human-related sounds. Trade-related sounds were coming from sellers, coins, and music. Human-related sounds were coming from people having dialogs and conversations, children, whistles, laughter, footsteps, and ringing mobile phones. Its soundmark was determined to be forging sounds related to copperworking. Figure 4 shows the sonic images related to Kemeraltı Street.

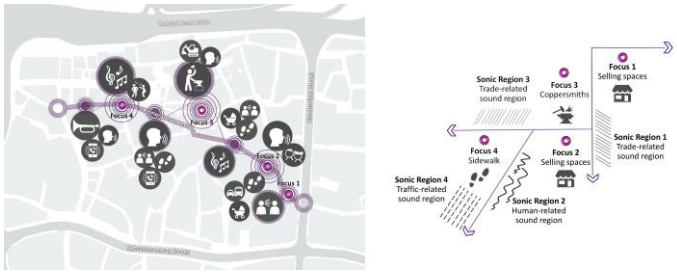

Figure 4. Graphic of the sonic images related to Kemeraltı Street (Reference: Authors)

Urban Sonic Images of Mumhaneönü Boulevard

Being addressed as "Region 4", Mumhaneönü Boulevard is located in Pazarkapı Neighborhood, Ortahisar District, Trabzon. This boulevard has a developed physical structure as it is close to the downtown and is associated with Ganita and Faroz regions in the east and west. Being identified with trading activities, Mumhaneönü Boulevard is a prominent place in which historical texture is quite effective due to having the oldest known architectural remains of the city (Turkish Design Council, 2019).

Figure 5. Graphic of the sonic images related to Mumhaneönü Boulevard (Reference: Authors)

Its keynotes were determined to be nature-related sounds coming from the wind. Its signals were determined to be traffic-, trade- and human-related sounds. Traffic-related sounds were coming from motor vehicles (e.g., minibusses, motorcycles), brakes, police sirens, and horns. Trade-related sounds were coming from sellers, tradesman-customer dialogs, and tradesmen talking among themselves. Human-related sounds were coming from people having dialogs and conversations, fights/arguments and offensive words, singing, whistles, footsteps, key holders, and ringing mobile phones. Its soundmark was determined to be fishery-related sounds coming from fishers calling the customers,

water, and ice. Figure 5 shows the sonic images related to Mumhaneönü Boulevard.

Second Stage: Sonic Environment Assessments

The second stage of the fieldwork obtained data about the assessments of the sound environment from a total of 120 participants (48 females and 72 males) through surveys. Table 2 shows the distribution of the participants by their demographic characteristics.

Table 2. Demographic characteristics of the participants

Gender	Number (N)	Percentage (%)
Female	48	40
Male	72	60
Age		
17-25	26	21.7
26-35	22	18.3
36-45	25	20.8
45 and more	47	39.2
Reason for being in the downtown		
Shopping	36	30
Having leisure time	9	7.5
Resting	7	5.8
Meeting with friends	12	10
The downtown being in the route to the destination	6	5
Wandering	3	2.5
Working/workplace	47	39.2
Time spent in the downtown		
0-1 hour	16	13.3
1-3 hours	35	29.2
4-10 hours	34	28.3
All day	35	29.2
Total	120	100

Of the people participating in the surveys, 48 were female (40%) and 72 were male (60%). Looking at the distribution of the participants by their age, it was observed that 26 were between the ages of 17 and 25 (21.7%), 22 were between the ages of 26 and 35 (18.3%), 25 were between the ages of 36 and 45 (20.8%), and 47 were between the ages of 45 and older (39.2%). Of the participants, 47 were in downtown for working purposes (39.2%), 36 for shopping (30%), 12 for meeting with their friends (10%), 9 for having leisure time (7.5%), 7 for resting (5.8%), 6 for the downtown being in the route to the destination (5%), and 3 for wandering (2.5%). The mean time spent by the participants in downtown was analyzed and it was noted that 16 spent 0-1 hour (13.3%), 35 spent 1-3 hours (29.2%), 34 spent 4-10 hours (28.3%), and 35 spent all day (29.2%). The participants' assessments of the sonic environment in relation to the above regions are detailed below.

Sonic Environment Assessments Related to Atatürk Square

The most heard sound in this region was human sound with a rate of 16.02%, while the least heard sound was the sounds of street vendors with a rate of 5.52%. The data obtained revealed that human and traffic related sounds were the most heard sounds in the region. According to the participants' answers to the question "How do you define the sound environment in Atatürk Square?" the sound environment of the region was determined to be "moderate" at a rate of 53.33%. The participants' answers presented that the region's biggest source of noise was motor vehicle sounds with a rate of 55.56%. The perceived noise effect of Atatürk Square was determined to be "very noisy" with a rate of 43.33%. The answers to the question "Do you do anything to cope with the noise?" indicated that 56.67% of the participants did nothing, 30% changed their location, and 13.33% used earphones or earplugs (Figure 6).

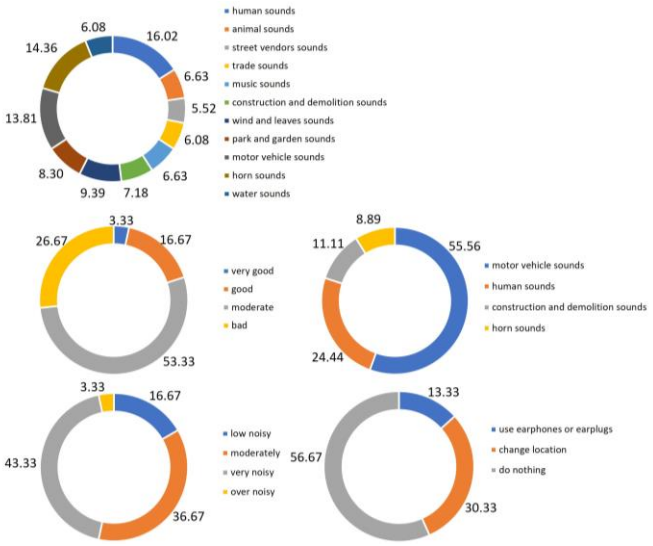

Figure 6. Users' assessments of the sound environment and perceived noise effect in Atatürk Square

The sounds that were preferred to be added to Atatürk Square were music sound (33.33%), water and bird sounds (20%), tree sound (16.67%), and kemenche sound (a musical instrument) (10%). On the other hand, the sounds that were preferred to be eliminated from the region were traffic sounds (45.45%), construction and demolition sounds (18.18%), sounds of horns and the crowd (13.64%), and sounds of fights/arguments (9.09%). The lost/disappearing sounds in Atatürk Square were water sounds (42.86%), bird and music sounds (23.81%), and the sound of horse-drawn vehicles (9.52%). The continuous sounds in the region, on the other hand, were traffic sounds (50.9%), human sounds (37%), construction and demolition sounds (8.1%), and water sounds (4%) (Figure 7).

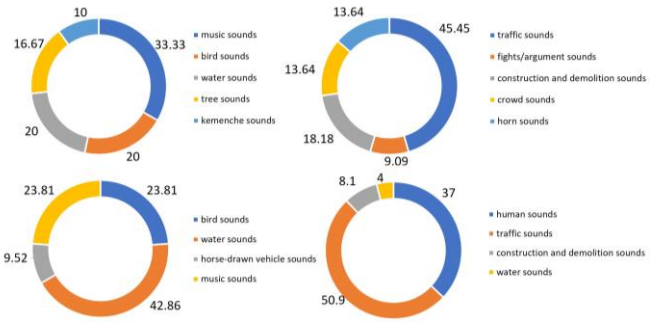

Figure 7. Users' assessments about the sounds that were preferred to be added to and eliminated from Atatürk Square in addition to their other assessments about the lost/disappearing and continuous sounds at Atatürk Square

Sonic Environment Assessments Related to Kunduracılar Street

The most heard sound in this region was human sound at a rate of 18.07% whereas the least heard sound was water sound at a rate of 1.2%. The data obtained revealed that the human- and trade-related sounds were the most heard sounds in the region.

According to the participants' answers to the question "How do you define the sound environment in Kunduracılar Street?" the sound environment of the region was determined to be "bad" at a rate of 46.66%. The participants stated that the biggest source of noise in Kunduracılar Street was human sound with a rate of 48.08%. The perceived noise effect of Kunduracılar Street was determined to be "moderately noisy" with a rate of 46.67%. The answers to the question "Do you do anything to cope with the noise?" indicated that 60% of the participants did nothing, 26.67% changed their location, and 13.33% used earphones or earplugs (Figure 8).

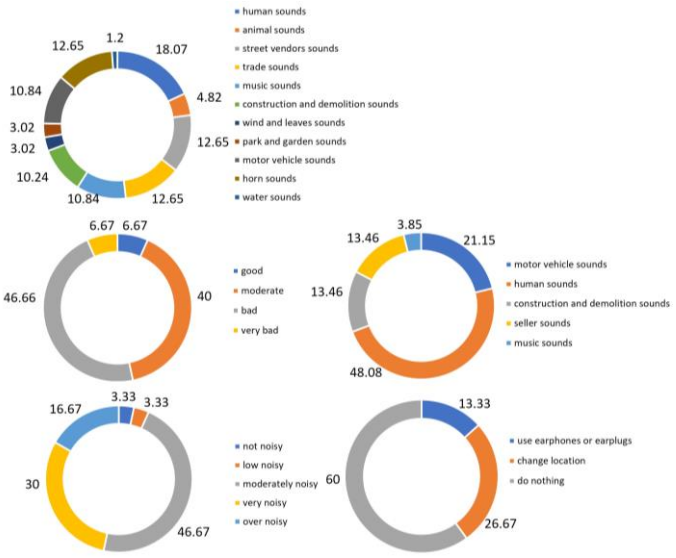

Figure 8. Users' assessments of the sound environment and perceived noise effect in Kunduracılar Street

The sounds that were preferred to be added to Kunduracılar Street were water sounds (32.26%), tree sounds (22.58%), music and bird sounds (19.35%), and trolley sounds (6.46%). On the other hand, the sounds that were preferred to be eliminated from the region were traffic sounds (25.81%), construction and demolition sounds (19.35%), horn sounds (16.13%), sounds of fights/arguments and street vendors (9.68%), and loud music (6.45%). The lost/disappearing sounds in Kunduracılar Street were sounds of birds and boza sellers (25%), sounds of street vendors and sea (18.75%), and cheer sounds (12.5%). The continuous sounds in the region, on the other hand, were human sounds (45%), traffic sounds (28.9%), sounds of street vendors (21.5%), and construction and demolition sounds (4.6%) (Figure 9).

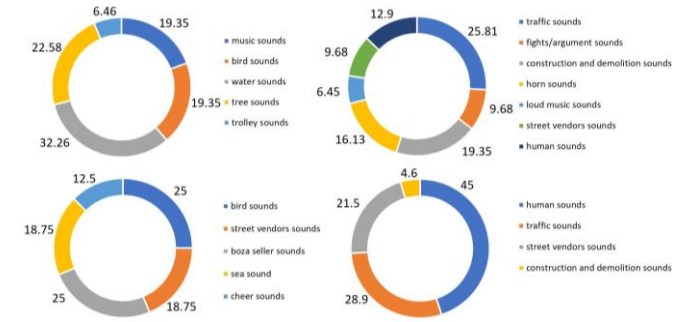

Figure 9. Users' assessments about the sounds that were preferred to be added to and eliminated from Kunduracılar Street in addition to their other assessments about the lost/disappearing and continuous sounds at Kunduracılar Street

Sonic Environment Assessments Related to Kemeraltı Street

The most heard sound in this region was human sound at a rate of 20.15% whereas the least heard sound was the sound of wind and leaves at a rate of 5.37%. The data obtained revealed that the human-, trade-, and traffic-related sounds were the most heard sounds in the region. According to the participants' answers to the question "How do you define the sound environment in Kemeraltı Street?" the sound environment of the region was determined to be "moderate" at a rate of 53.33%. The participants stated that the biggest source of noise in Kemeraltı Street was human sound with a rate of 50%. The perceived noise effect of Kemeraltı Street was determined to be "moderately noisy" with a rate of 53.33%. The answers to the question "Do you do anything to cope with the noise?" indicated that 83.33% of the participants did nothing, 10% used earphones or earplugs, and 6.67% changed their location (Figure 10).

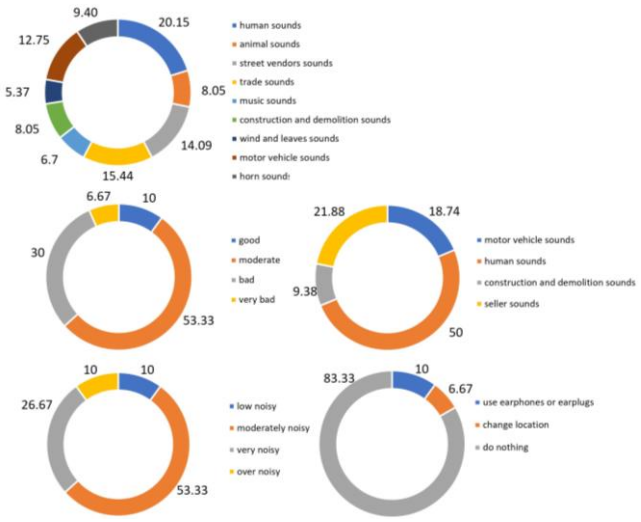

Figure 10. Users' assessments of the sound environment and perceived noise effect in Kemeraltı Street

The sounds that were preferred to be added to Kemeraltı Street were music sound (50%), bird sound (35.71%), and natural sounds (14.29%). On the other hand, the sounds that were preferred to be eliminated from the region were traffic sounds (29.41%), construction and demolition sounds (23.53%), sounds of street vendors and humans (17.65%), and sounds of fights/arguments (11.76%). The lost/disappearing sounds in Kemeraltı Street were the sounds of birds (50%) and horse-drawn vehicles (50%). The continuous sounds in the region, on the other hand, were human sounds (40%), the sound of azan (28%), copperworking-related sounds (19.5%), and sounds of street vendors (12.5%) (Figure 11).

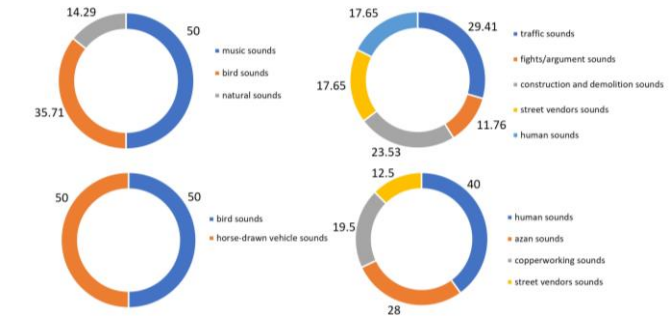

Figure 11. Users' assessments about the sounds that were preferred to be added to and eliminated from Kemeraltı Street in addition to their other assessments about the lost/disappearing and continuous sounds at Kemeraltı Street

Sonic Environment Assessments Related to Mumhaneönü Boulevard

The most heard sound in this region was human and motor vehicle sounds at a rate of 14.95% whereas the least heard sound was the sounds coming from parks and gardens at a rate of 2.06%. The data obtained revealed that human-, traffic-, and trade-related sounds were the most heard sounds in the region. According to the participants' answers to the question "How do you define the sound environment in Mumhaneönü Boulevard?" the sound environment of the region was determined to be "moderate" at a rate of 50%. The participants stated that the biggest source of noise in Mumhaneönü Boulevard was motor vehicles with a rate of 38.6%. The perceived noise effect of Mumhaneönü Boulevard was determined to be "moderately noisy" with a rate of 46.67%. The answers to the question "Do you do anything to cope with the noise?" indicated that 66.67% of the participants did nothing, 30% changed their location, and 3.33% used earphones or earplugs (Figure 12).

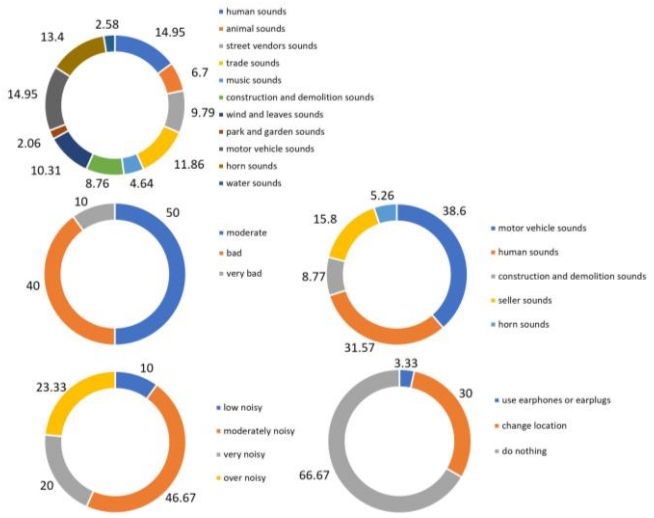

Figure 12. Users' assessments of the sound environment and perceived noise effect in Mumhaneönü Boulevard

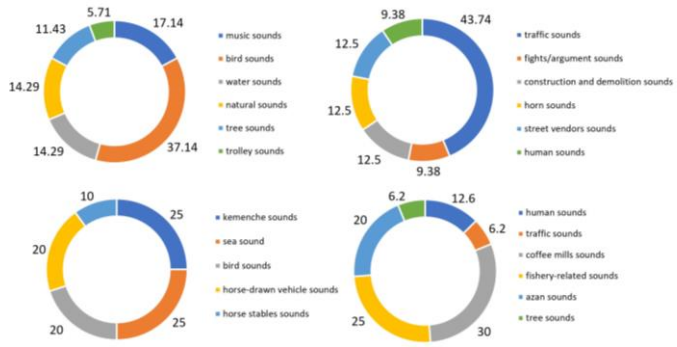

Figure 13. Users' assessments about the sounds that were preferred to be added to and eliminated from Mumhaneönü Boulevard in addition to their other assessments about the lost/disappearing and continuous sounds at Mumhaneönü Boulevard

The sounds that were preferred to be added to Mumhaneönü Boulevard were bird sounds (37.14%), music sounds (17.14%), natural sounds and water sounds (14.29%), tree sounds (11.43%), and trolley sounds (5.71%). On the other hand, the sounds that were preferred to be eliminated from the region were traffic sounds (43.74%), construction/demolition sounds, sounds of horns and street vendors (12.5%), and sounds of humans and fights/arguments (9.38%). The lost/disappearing sounds in Mumhaneönü Boulevard were the sounds of kemenche and sea (25%), sounds of birds and horse-drawn vehicles (20%), and the sounds of horse stables (10%). The continuous sounds in the region, on the other hand, were the sound of coffee mills (30%), fishery-related sounds (25%), the sound of azan (20%), human sounds (12.6%), and traffic and tree sounds (6.2%) (Figure 13).

In the second stage of the fieldwork, perceptual assessments of the users about the sound environment were analyzed through the scores given to the statements "free," "calm and relaxed," "happy and peaceful", "safe", "active and vigorous", "optimistic", and "vivacious and nice". Figure 14 shows the perception map regarding the users' assessments of the sonic environment of the regions. The users' assessments of the sonic environments were analyzed with a 5-point Likert scale and it was found that

- In the Atatürk Square sonic environment, the statement "calm and relaxed" had the highest value with a mean score of 3 whereas the statement "free" had the lowest value with a mean score of 1.8,
- In the Kunduracılar Street sonic environment, the statement "calm and relaxed" had the highest value with a mean score of 3.2 whereas the statement "safe" had the lowest value with a mean score of 2,
- In the Kemeraltı Street sonic environment, the statement "calm and relaxed" had the highest value with a mean score of 3.1 whereas the statement "safe" had the lowest value with a mean score of 2.1,
- In the Mumhaneönü Boulevard sonic environment, the statement "calm and relaxed" had the highest value with a mean score of 3 whereas the statement "free" had the lowest value with a mean score of 1.6.

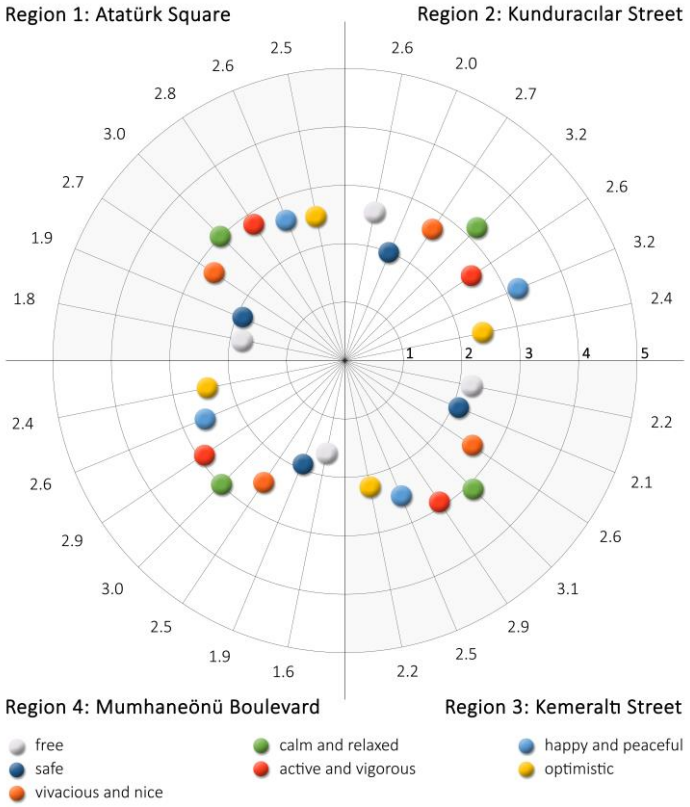

Figure 14. Sonic environment perceptual assessments (Reference: Authors)

The perceptual map illustrates the distribution formed based on mean scores of regionally different evaluations. The fact that all four regions have the highest mean score for the statement "calm and relaxed" suggests that the sonic environment in the city center of Trabzon generally creates positive feelings. Looking at the statements with the lowest mean scores in the regions, it can be observed that the sense of freedom is weaker in Atatürk Square and Mumhaneönü Boulevard compared to other areas. This finding might be attributed to the prominence of traffic-related sounds in these two regions. Additionally, Kunduracılar Street and Kemeraltı Street have a weaker sense of safety compared to the other two regions. This situation implies that in these two regions, the physical constraints are more pronounced, leading to a higher density of overlapping sounds in the perceived environment.

Discussion

This study analyzed the sonic environment assessments of the routes in downtown Trabzon and identified the sounds that create the sonic identity of the Atatürk Square, Kunduracılar Street, Kemeraltı Street, and Mumhaneönü Boulevard regions. The results obtained from the keynotes, signals and soundmarks highlighted the difference between the sonic identities of the regions. This result revealed the existence of sound environments that define the sound images of the regions and are sui generis. Considering the overall circumstances, it is assumed that all the sound images of these regions reflect the sound identity of downtown Trabzon. Figure 15 visualizes the sound maps related to the regions by determining the keynotes, signals and soundmarks. The sound maps were generated based on the diversity and frequency of the sound images detected throughout the route.

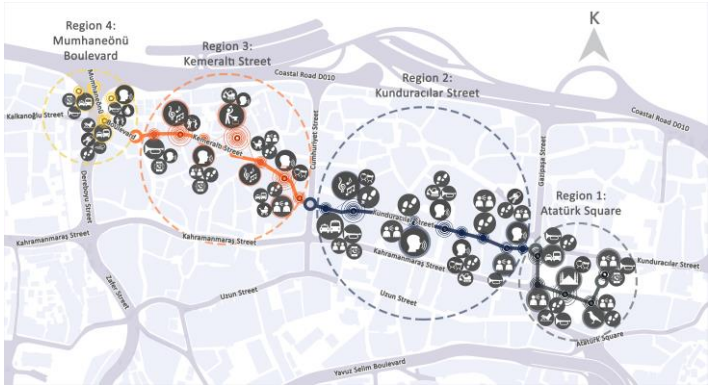

Figure 15. Sound maps related to the regions (Reference: Authors)

The study results presented the differences between sound environment assessments, perceived noise effects, the most heard sounds, the sounds to be added/eliminated, lost/disappearing sounds, and continuous sounds for each region. In Atatürk Square, keynotes are influenced by both trade and natural sources, whereas on Kunduracılar Street, keynotes are primarily traffic-related. Kemeraltı Street experiences a combination of traffic, human, and natural sounds, while Mumhaneönü Boulevard is characterized solely by natural sounds. As a result, it can be observed that the keynotes in these four regions exhibit distinct differences from one another. In terms of signals, Atatürk Square contains traffic and human-related sounds, Kunduracılar Street and Kemeraltı Street exhibit trade and human-related sounds, while Mumhaneönü Square encompasses traffic, trade, and human-related sounds. Among signals, only Kunduracılar Street and Kemeraltı Street exhibit similarities. Soundmarks, which are believed to reflect the identity of each region, also differ among the four areas. For Atatürk Square, the soundmark is the azan, while for Kunduracılar Street, it's the sounds related to selling spaces. In Kemeraltı Street, the soundmark is the sound of hammering from coppersmithing, and for Mumhaneönü Boulevard, it's the sounds related to the fishery. The variability of soundmarks plays a significant role in reflecting the urban identity through the sonic environment. Many researchers have examined the effects of human, traffic, trade, and nature-related sounds on individuals while defining keynotes, signals, and soundmarks. For instance, in one study, it was found that individuals consider nature-related sounds as desired sounds in their soundscape preferences, while traffic and human-related sounds are considered undesired sounds (Yang & Kang, 2005). Nature-related sounds generally serve as a means to improve the soundscape quality of urban environments. Pijanowski et al. (2011) state that trees and other plant species reflect and absorb sound energy, suggesting that nature-related sounds serve as a tool to reduce or minimize undesired sounds in urban spaces.

There are also differences in the evaluation of the sound environment and the perceived noise effect. In Atatürk Square, Kemeraltı Street, and Mumhaneönü Boulevard, the sound environment is assessed as "moderate," while on Kunduracılar Street, the sound environment is rated as "bad." The perceived noise impact is considered "moderately noisy" in Kunduracılar Avenue, Kemeraltı Street, and Mumhaneönü Square, whereas in Atatürk Square, this effect is perceived as "very noisy." Although the perceived noise effects vary across the regions, the presence of noise in the center of Trabzon is noteworthy. To reduce or absorb noise, Yu and Kang (2008) emphasize that in order to achieve a more sustainable and livable spatial quality in urban areas, sound should be seen as a resource rather than a waste. Considering the effects of hard surfaces on sound distribution, they suggest that more holistic, efficient, and beneficial urban space designs can be achieved.

The assessments of the sound environments and perceived noise effects of the regions were directly proportionate to each other. Accordingly, it is possible to say that the assessments of the sound environments of the regions were shaped depending on the perceived noise effects. The most distinct sources of noise in the regions were among the sounds that were preferred to be eliminated from these regions. This result indicated that the regions were considered to be noisy when their sound environment was negatively assessed and that the sounds constituting a source of noise were among those preferred to be eliminated from the region.

Table 3 shows the urban sonic images of the regions in accordance with the data obtained by the soundwalk method and the user ratings within the fieldwork addressed by the soundscape approach.

The perceptual assessments about sonic environments indicated that the sound environment aroused a feeling of "calm and relaxed" for all regions. However, users did not feel "free" enough in the Atatürk Square and Mumhaneönü Boulevard sound environment. Similarly, the users assessed the sound environments of Kunduracılar Street and Kemeraltı Street negatively in terms of arousing a feeling of "safe".

Table 3. Sonic images of the downtown Trabzon

	Keynotes	Signals	Soundmarks	Lost/Disappearing Sounds	Continuous Sounds
Region 1: Atatürk Square	• Trade-related sounds • Nature-related sounds	• Traffic-related sounds • Human-related sounds	• Azan sounds	• Water sounds • Bird sounds • Music sounds • Horse-drawn vehicle sounds	• Human-related sounds • Traffic-related sounds • Construction and demolition-related sounds • Water sounds
Region 2: Kunduracılar Street	• Traffic-related sounds	• Trade-related sounds • Human-related sounds	• Selling spaces-related sounds	• Bird sounds • Street vendors sounds • Boza seller sounds • Sea sound • Cheer sounds	• Human-related sounds • Traffic-related sounds • Construction and demolition-related sounds • Street vendors sounds
Region 3: Kemeraltı Street	• Traffic-related sounds • Construction and demolition-related sounds • Nature-related sounds	• Trade-related sounds • Human-related sounds	• Copperworking-related sounds	• Bird sounds • Horse-drawn vehicle sounds	• Human-related sounds • Azan sounds • Copperworking-related sounds • Street vendors sounds
Region 4: Mumhaneönü Boulevard	• Nature-related sounds	• Traffic-related sounds • Trade-related sounds • Human-related sounds	• Fishery-related sounds	• Sea sound • Bird sounds • Kemenche sounds • Horse-drawn vehicle sounds • Horse stables sounds	• Human-related sounds • Traffic-related sounds • Coffee mills sounds • Fishery-related sounds • Azan sounds • Tree sounds

Conclusion and Recommendations

The data collected during the fieldwork revealed that the sounds that were most desired to be eliminated from the regions were horns, street vendors, fights/arguments, loud music, and most importantly, traffic and construction/demolition activities. On the other hand, the sounds that were preferred to be added to the regions were mostly natural sounds from sea/water, trees and birds, and musical sounds. These sounds that were preferred to be added to the regions were parallel to the lost/disappearing sounds. Physical changes in the downtown caused natural sounds coming from the sea/water and birds to remain in the background over time. The fact that some of the participants remembered sounds related to the horse stables indicated that there was a horse stable on Mumhaneönü Boulevard. Horse-drawn vehicles, not being used anymore, have given their place to motor vehicles, which is one of the results of the changing urban life. Adding the sound of boza sellers that reflects the collective memory of the participants and the sound of kemenche which is one of the symbols of Trabzon to the downtown is believed to increase satisfaction regarding the sound environment.

The continuity of the items, actions, and/or spaces that constitute the sound environment unique to the downtown ensures the integrity of the relationship between the urban and urban dwellers. Common images that are generated in a society's mind through cognitive, perceptual, and experiential processes are effective in maintaining the relationship established with the past and in improving the sense of loyalty in cultural terms. To ensure the continuity of the sonic identity, it is critical to keep the sonic value that comes from the past and belongs to the rapidly changing city in memory as much as possible, and to pass it on to future generations. Therefore, it is believed that in the studies of identifying the urban identity, the measures that set the framework of this urban identity do not depend solely on visual perception. In addition, other senses play an important role in reflecting the urban identity. This study argues that the auditory dimension can be incorporated into current visual identity studies by identifying the sound elements that set the framework of a city's sonic identity.

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Participant Consent: The author declared that written consent was obtained from all participants in this study.

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