

Evaluation of the Soundscape in the Territory of Sacred Places; Case Study: the Peripheral Territory of the Shrine of Hazrat Masoumeh *

Shirin Eslami^{a**} - Bahador Zamani^b - Homayoon Nooraei^c

^a Ph.D. Candidate of Urban Planning, Faculty of Architecture and Urban Design, Art University of Isfahan, Isfahan, Iran (Corresponding Author).

^b Associate Professor of Urban Planning and Design, Faculty of Architecture and Urban Design, Art University of Isfahan, Isfahan, Iran.

^c Assistant Professor of Urban Planning and Design, Faculty of Architecture and Urban Design, Art University of Isfahan, Isfahan, Iran.

Received 16 February 2022; Revised 26 August 2022; Accepted 12 September 2022; Available Online 10 August 2023

ABSTRACT

Soundscapes, as one of the qualities constituting the territory of sacred places, with distinct perceptual, behavioral, social, and symbolic features, play a key role in mentally preparing pilgrims in the hierarchy of pilgrimage to these places. Therefore, urban designers and planners can contribute to the environmental richness of these sacred and spiritual territories by properly managing the soundscape according to contextual values. Today, the decline of pleasant sounds and the dominance of unpleasant sounds in the peripheral territory of the Shrine of Hazrat Masoumeh cause its cultural soundscape to require more attention. So, the present study aims to evaluate the soundscape in the peripheral territory of this holy shrine. The present study is descriptive-analytical mixed-method research. The soundscape in this territory is evaluated qualitatively using the soundwalking technique and quantitatively by measuring the Equivalent Continuous Sound Pressure Level (Leq) using a TES-1358 Sound Level Meter (SLM) in two periods of day and night. Quantitative findings indicate that the day-night equivalent sound pressure level is higher than the standards approved by the Iranian Supreme Commission for Environment, and the values obtained during the day were higher than those obtained at night. In the pedestrianized areas specified for pilgrimage to the Shrine of Hazrat Masoumeh, such as the Bahar walkway, Eram walkway, Enghelab walkway, and the area surrounding the holy Shrine in Astaneh Square and Imam Khomeini Square, the average day-night sound levels were within a more favorable range compared to other areas, with Imam Musa Sadr, and Taleghani axes and especially, Motahhari Square with the highest average sound level. Moreover, considering the spiritual and religious role of this territory, qualitative findings indicate the presence of numerous religious and cultural sound marks, among which the holy shrine is considered the most significant sound mark in this territory. However, the dominance of noise and anthroponic sounds influence the identity of religious and cultural sound marks in this territory. Moreover, geophonic and biophonic sounds appropriate to the context of this territory, account for a small part of pleasant sounds.

Keywords: Soundscape, Equivalent Sound Pressure Level, Soundwalking, the Territory of Sacred Places, the Shrine of Hazrat Masoumeh.

* The present article is derived from the first author's master's thesis entitled "Privacy of the Shrine: A Case Study of the Surrounding Fabric of Hazrat Masoumeh's Holy Shrine in order to Improve the Quality of the Sacred Privacy with a Comprehensive Territoriality Approach", defended under the supervision of the second author and the advice of the third author at Art University of Isfahan in 2020.

** E_mail: eslami_109@yahoo.com

1. INTRODUCTION

Nowadays, the quality of the soundscape of cities is globally seen as an increasing concern. Inattention to it is considered a significant element effective in reducing the quality of life, well-being, peace, etc., due to the dominance of unpleasant sounds and resultant noise pollution (Aletta and Kang 2018). Among various soundscapes, it is greatly important to identify and pay attention to the soundscape of the religious territories in cities, which have been formed according to their cultural, social, and historical background (Jeon, Hwang, and Hong 2014), because religious concepts can be meaningfully expanded beyond the metaphysical framework of the mind and in a widespread scope in terms of experiential, mental, emotional, and moral dimensions in the lived experiences of pilgrims (Geertz 1993, 123). Since sacred places can be considered the semantic and sensory poles of the city, attention to their soundscapes provides new methods for generating or eliminating a sense of place (Kato 2009) in such a way that the memory of a pilgrimage city can be sometimes defined with the identity of its soundscape, religious sound marks, and values. The proper management of the soundscapes of these territories can improve pilgrims' mental and spiritual moods and behavioral patterns, and it, besides attention to other qualities, is considered one of the underlying factors of mental preparation, peace, and satisfaction of pilgrims in the hierarchy of pilgrimage to sacred places. However, nowadays, the change in the soundscape of these territories, inattention to the hearing ability, and the quality of audible sounds have negatively influenced pilgrims' mental image of sacred places, their sense of belonging to these places, and sense-making in the pilgrimage to these places. In Iran, among various pilgrimage territories requiring such considerations, one can refer to the peripheral territory of the Shrine of Hazrat Masoumeh, which still faces various problems despite the efforts of city managers in recent years to implement the policy of pedestrianization of some areas specified for pilgrimaging the Holy Shrine and eliminate vehicular traffic and its resultant noise pollution. The soundscape perceived by the pilgrims in the territory of the Holy Shrine seems mostly unpleasant, and this will adversely affect the legibility of religious sound marks in this area if no effective action is taken. Also, the faded role of pleasant sounds such as the sounds of birds, flowing water, religious tunes, etc., influences the quality of the areas specified for the pedestrianized pilgrimage, the duration of stay in the space, pilgrims' presence of heart (mindfulness) at the time of pilgrimage, and the continued use of these areas by users. Considering the explained necessity, the present research seeks to answer the following question: How is the quality of the soundscape in the peripheral territory of the Shrine of Hazrat Masoumeh? So, it aims to quantitatively and

qualitatively evaluate the soundscape of the peripheral territory of the Shrine of Hazrat Masoumeh. For this purpose, after reviewing the theoretical framework, the approaches to soundscape evaluation are discussed and the findings are presented based on the selected evaluation framework. Next, the findings are compared with the standards to conclude and present strategies to improve the quality of the soundscape in the territory of the Shrine of Hazrat Masoumeh.

2. THEORETICAL FOUNDATIONS

The term soundscape was coined by Schafer to give an auditory equivalent to a landscape, defined as an environment created by sound (Dubois, Guastavino, and Raimbault 2006), and encompasses all elements of the sonic environment, including natural, mechanical, human, industrial, musical, and cultural sounds (Yelmi 2016). Also, in 2014, ISO 12913-1 defines the term soundscape as an acoustic environment as experienced or perceived by a person or people in a specific context (International Organization for Standardization 2014 cited by Aletta and Astolfi 2018). In other words, the concept of soundscape includes a subjective component, namely the way in which the environment is perceived and understood by an individual or a community (Dubois, Guastavino, and Raimbault 2006). So far, different categorizations of the elements, features, and potentials of the soundscape have been presented by experts in this field. The World Soundscape Project (WSP) classifies the features of the sonic environment into three main themes: keynote sounds, signals, and sound marks. The keynote sounds refer to background sounds related to the geographical location, weather, and daily routines of a community or a region (such as water, wind, market noise, etc.). For example, traffic noise and chirps may be among the keynote sounds because they are heard every day, anytime, and almost everywhere. Signals are foreground sounds to which we consciously listen, such as ambulance sirens, calls to prayer, and church bells that may be considered examples of signals. Sound marks are specific to a place or a community and are different depending on the context. For example, one can refer to the nostalgic tramway's bells in Taksim and the creaking of the horse-drawn carriages in Büyükada near Istanbul (Yelmi 2016). Also, there is another categorization widely used by soundscape experts. It is almost a full categorization and contains all auditory potentials. This categorization was presented by Krause (2012) and includes the following categories: 1. Biophony: it includes the sounds of living organisms such as birds and animals, 2. Geophony: it includes sounds caused by the geophysical events such as thunder, water, and wind, and 3. Anthrophony: it includes man-made sounds such as the sound of machines and sirens, etc. (Lotfi and Zamani 2015). In soundscape ecology, biophones, geophones, and anthrophones

are distinguished and the temporal dynamics of soundscapes are analyzed (Bernat 2013). Figure 1

shows the soundscape system with an emphasis on the main sources of sound.

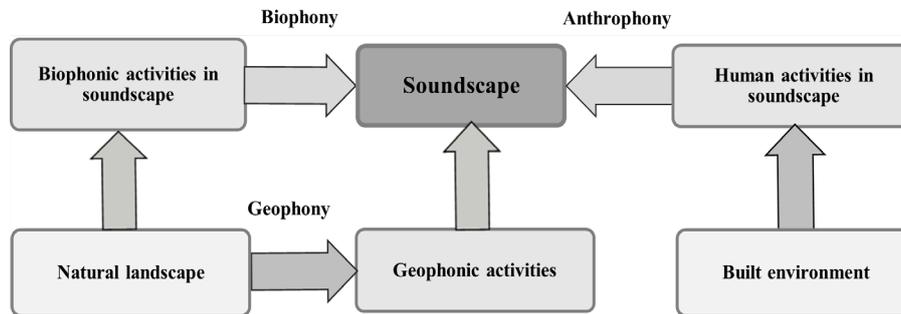


Fig. 1. Soundscape System with an Emphasis on the Main Sources of Sound
(Dumyahn and Pijanowski 2011)

2.1. The Position of the Soundscape in Urban Contexts

Soundscapes are very important for experiencing spaces and interacting with them in urban life because they cause a short-term and transient experience in users (Arkette 2004). Sound waves easily overpass spatial boundaries and mediate between public and private spaces, presence and absence, visibility and invisibility. Most sound studies analyze sound as a symbol and indicator of identity and the acoustic environment as a "semiotic system" (Garrioch 2003). Kato summarizes the significance of sound in the four main points. Firstly, sound is a means of making a connection to and knowing a place. Being in a place mentally, spiritually, and with a whole body is considered an experience through which the sense of place overlaps with the physical senses by Feld. Secondly, sounds can be a means to creating a community. Listening to a place actively to identify unique sounds is a situation where a community is introduced and recognized (Kato 2009) and it provides grounds for establishing social interactions. According to Gehl, the conversation is possible if the background sound intensity is below 60 decibels, and this level should be reduced to 45-50 decibels so that people can better hear the sounds of people, footsteps, songs, etc. (Gehl 2017). Thirdly, sound can carry ethics and spirituality. Sounds can carry traditional and historical knowledge of living in a place and establish the complexity of knowledge, ethics, and connectivity to the outside world. Fourthly, sounds have social memories of places and people and can enhance users' creative expression, innovation, and imagination. Also, the ephemeral quality of sound enables a person to imagine and give meaning to space through it. Therefore, sound is part of the process in which our positive connection with place can be better formed and influential (Kato 2009). Despite the importance of the role of sound in

urban spaces, today, noise pollution is one of the problems with adverse physical, mental, and social effects on humans that urban management faces in the environmental protection sector (Golmohamadi 2010). Studies show that in the human environment, noise pollution can cause physical diseases such as tinnitus, hearing loss, speech interference, weakened immune system, elevated blood pressure, skeletal-muscle disorders, and cardiovascular diseases. For example, if a person is continuously exposed to higher than 70 dBA intensity noise for 8 hours, his blood pressure will increase by 5 to 10 mmHg. Also, these factors have adverse effects on the human psyche, the most important of which are increased stress, fatigue, irritability, weakened morale and decreased motivation, increased anger, restlessness, etc. (Bandarabad and Shahcheraghi 2017).

2.2. The Cultural Soundscape of Religious Territories and Its Importance

In the classification of soundscapes, religious territories are placed in the class of cultural soundscapes. Cultural soundscape refers to a socially defined landscape connecting to cultural, historical, spiritual, and aesthetic values and a sense of place. Cultural soundscapes connect people to places with their unique sound marks. Sound marks can help to create and preserve natural and cultural heritage making places outstanding and memorable (Schafer 1994; Torigoe 2003 cited by Dumyahn and Pijanowski 2011). That is why it is necessary to pay special attention to the preservation of sound marks, as sonic representatives of cultural identity because preserving them renews individuals' memories, and enhances the sense of belonging between people, culture, and their living environment. Cultural sounds can express social, spiritual, historical, national, and cultural memories related to place and community (Yelmi 2016).

2.3. The Role of Sound in Religious Territories

Zumthor (2003) identifies nine experiential qualities that help to create an environmental mood and improve the quality of the territory of sacred places, one of which is the sound of the environment, which is required to be considered an important principle for urban planners and designers (Gregory 2009). In religious contexts, sounds are a powerful means of connection and reaching spirituality. Stoller (1998) maintains that religious sounds such as religious speeches, religious hymns, songs, and sounds need to be analyzed in terms of symbolic meaning in cultural and religious life because spiritual or spiritual effects may be obtained not only with physical touch but also with sounds or by seeing images (Stoller 1989, cited by De Witte 2008). The soundscape of a religious space can include sonic activities such as prayer, religious chants, dhikr, playing religious musical instruments, discussions, conversations, etc., and pilgrims connect to it through the space (Park 2012). The sound of the call to prayer in Islamic cities, as the most important sound mark, like church bells in other cultures, calls Muslims to worship (Kiser and Lubman 2008) and plays a significant role in the users' mental image of these territories and connect tangible sonic features to spiritual-devotional meanings (Park 2012). The biggest threat to the cultural soundscapes of these territories is their uniformity and homogenization due to the dominance of anthroponic sounds and the loss of their unique sound marks (Schafer 1994; Wrightson 2000 cited by Dumyahm and Pijanowski 2011). This threat is greatly induced by street networks, vehicles, and the resultant sound traffic surrounding these territories. The predominance of anthroponic sounds in the territory of sacred places influences the inner peace of pilgrims generated by spiritual sights in the pilgrimage hierarchy. Attention to geophonic and biophonic sounds in the connection of sacred places to the principle of naturalism is another index influencing the inner peace of pilgrims and worshipers when pilgrimaging sacred places. This is realized by locating (in remote areas close to nature, such as mountains, lakes, and rivers), planting trees, flowers, and shrubs, using water (springs, ponds), and designing soft spaces in the territory of these places (Mazumdar and Mazumdar 2004). Among the abovementioned items, the sound of water has played an important role in obtaining this inner peace since ancient times, and in addition to its symbolic and metaphorical aspect, it has been considered the container of life, power, immortality, as well as the container of refinement and purification before pilgrimaging sacred places (Rana 1994).

3. RESEARCH BACKGROUND

Soundscape evaluation is a part of sensory aesthetics research, which addresses one's feelings about the environment (Lang 1988, cited by Yang and Kang

2005). The history of soundscape studies dates back to the late 1960s when authors such as Southworth and Schafer began to raise questions about the soundscape of built environments (Truax 1978; Schafer 1977; Southworth 1969 cited by Aletta and Astolfi 2018). In the late 1960s, Schafer started the WSP at Simon Fraser University. To explore soundscape at the global level, Schafer and his colleagues carried out studies through sound recordings and soundwalks in different places in Canada and Europe (Yelmi 2016). Since then, numerous studies have examined soundscapes on a relatively large scale of urban spaces (Schulte-Fortkamp and Dubois 2006; Schulte-Fortkamp and Kang 2013; Kang et al. 2016; Davies, 2013, cited by Aletta and Astolfi 2018). The research background reviewed in the present study includes three categories. The first category includes those studies that have descriptively addressed the soundscape of a religious place. For example, one can refer to the study entitled "The Soundscape of Church Bells" by Kiser and Lubman (2008). The results of this study indicated that part of the historical landscape of London is defined by its soundscape, and church bells and the voices of worshipers are considered a set of religious sound marks and a landmark in historical and cultural contexts (Kiser and Lubman 2008). In her study entitled "Accra's Sounds and Sacred Spaces", DeWitt (2008) investigated the sonic sacralization of urban space in the multicultural city of Accra, Ghana. Sacred sonic space is created by churches and religious followers through the loud voices of worship, prayer, the preaching of local groups, and the open architecture of devotional buildings (De Witte 2008).

The second category includes studies that have evaluated the soundscape in religious territories using different evaluation approaches. For example, one can refer to the study entitled "Soundscape Evaluation in a Catholic Cathedral and Buddhist temple precincts through social surveys and soundwalks" by Jeon, Hwang, and Hong (2014). They carried out their study using a mixed method (a combination of a questionnaire and the soundwalking technique) in the territories of a Catholic cathedral and a Buddhist temple in Seoul. The results revealed that religious and natural sounds, as the basic components in the territory of the temple, outperform those in the territory of the Catholic cathedral, and the subjective response from the soundwalking of the users indicated that the pleasantness of the sounds and the attractiveness of the visual environment are closely related to peace received from a space (Jeon, Hwang, and Hong 2014). In another research entitled "Protecting contemporary cultural soundscapes as intangible cultural heritage: sounds of Istanbul", Yelmi (2016) evaluated the culture and traditions of everyday life from a sound perspective using a qualitative evaluation approach and a questionnaire and interviewing local people and suggested some

ways to protect them. This multidisciplinary research, rooted in fields such as soundscape studies, intangible cultural heritage, documentary, and sensory studies, showed that sounds of religious places and religious rituals play a key role in strengthening the identity of the soundscape of Istanbul (Yelmi 2016). Yilmazer and Acun carried out a study entitled "A Foundational Data Theory for Assessing the Indoor Soundscape in Anatolian Religious, Historical, and Cultural Spaces; Case study: Haji Bayram Mosque" in 2018 using a qualitative approach and in-depth interviews, the results of which included the extraction of a grounded theory from the soundscape of mosques to obtain and interpret people's auditory sensation of its soundscape. The obtained conceptual framework indicated the relationship between the elements of soundscape, spatial function, and place identity and how the soundscape of the physical environment of the mosque influences the worshipers (Yilmazer and Acun 2018). Also, Park (2012), in his research entitled "Soundscape of Three Worship Places", evaluated the soundscape of three worship spaces with a mixed method (quantitative and qualitative) approach by recording physical sound indices and using the soundwalking technique, and then, analyzed the different effects of each index on the worshipers. According to the findings of this research, the concept of soundscape can be used as one of the important components in defining worship spaces and their territories (Park 2012).

The third category includes research that has addressed or evaluated soundscape on the urban scale by examining domestic cases. Shobeiri Nejad (2009), in her master's thesis entitled "Managing Urban Soundscape by Urban Design: Guidelines for Urban Soundscape", attempted to provide a suitable descriptive system for investigating the soundscapes of urban spaces based on the sustainable place model and its various dimensions. Next, she provided a suitable method for designing different soundscapes on a micro scale and presented some suggestions in the form of urban design guidelines based on the presented system (Shobeiri Nejad 2009). Also,

Mohsen Haghghi (2016), in her master's thesis entitled "Urban Design Emphasizing the Impact of Sound Scape on the Perception of Urban Spaces (Case Study: Naghsh-e-Jahan Square in Isfahan)", evaluated the soundscape of Naqsh-e-Jahan Square using a mixed approach (measurement of physical sound indices, soundwalking, and psychoacoustics) and designed the soundscape of Naqsh-e-Jahan Square based on the aforementioned evaluations (Mohsen Haghghi 2016). Also, in another research entitled "Evaluation of the soundscape in urban spaces (a case study of pedestrian Khayyam Way, Urmia City)", Ghalenoie and Mohsen Haghghi (2016) evaluated the soundscape of pedestrian Khayyam Way in Urmia City using a mixed method (measurement of physical sound indices and psychoacoustics) (Ghalenoie and Mohsen Haghghi 2016).

Reviewing research background indicates that international studies including those by Jeon, Hwang, and Hong (2014), Kiser and Lubman (2008), DeWitt (2008), Yelmi (2016), and Yilmazer and Acun (2018), used the approaches proposed for the evaluation of the soundscape, to only qualitatively assess the soundscapes of sacred places, and national studies such as those by Mohsen Haghghi (2016) and Mohsen Haghghi and Ghalenoie (2016) used mixed methods to evaluate the soundscape in urban spaces qualitatively and quantitatively. It should be noted that no similar research has been carried out on the soundscape in sacred places or their territories, as well as on the case study of the present study, i.e. the territory of the Shrine of Hazrat Masoumeh. So, considering the importance of pilgrims' needs, the spiritual values of pilgrimage sites, and their effects on pilgrims, it is required to carry out such studies.

4. METHODOLOGY

Soundscape can be evaluated with various approaches. In general, these approaches are categorized into three categories: quantitative, qualitative, and mixed. Table 1 presents the most important existing soundscape evaluation approaches.

Table 1. Soundscape Evaluation Approach

Quantitative Evaluation	
Types of Methods/Tools	Physical sound indices such as the equivalent sound pressure level (Leq) are considered in the evaluations using quantitative methods.
Physical Indices	Leq refers to the average urban sound level. Since the sounds produced in the city and during the day and night don't have the same sound level, it is required to consider an average sound level (without considering sudden sounds) to calculate the sound level in the intended space (Maghrebi 2016).
Phonography	Phonography is a method used in combination with the soundwalking technique. This term was proposed by Moler (1972) for sound recording compared to photography. It can preserve the specificity of the sounds in urban sites in such a way that every sound phenomenon is preserved in a way that makes it possible to recognize that sound. This method is in contrast to the classical method of sound spectrum measurement, where only metric properties such as the equivalent sound level are considered (Shobeiri Nejad 2009). In phonography, sound can be recorded and photographed even in images (of course, how to recognize the meanings is of particular importance). Sound coding and decoding are applied (Musician 2015). It is useful to analyze and manipulate recorded sounds, such as amplifying weak sounds, replaying them in a laboratory environment, and receiving responses from people (Polli 2012) in various types of phonographic analysis of soundscapes.

Qualitative Evaluation

Types of Methods/Tools	Various tools and techniques such as psychoacoustic questionnaires, observation, interviews, and the soundwalking method are used in the evaluations using qualitative methods.
Soundwalking	This is a common method used for evaluating soundscapes in open spaces. A systemic soundwalk has advantages for quantitative and qualitative soundscape evaluations and brings a set of experiences. It can compensate for the shortcomings of quantitative methods and be useful for the subjective responses of users and objective measurement of soundscapes. Therefore, recent studies have used soundwalking as a tool for interpreting the soundscape (Yong Jeon, Hong, and Lee 2013). This technique is an experimental method to identify the soundscape and it is applied by walking to identify and perceive experiences of the sonic environment of the city and by focusing on audible sounds instead of visual sights. The observer carefully listens to the sounds in the environment and judges the sonic environment. Using this technique, sounds are recorded in different forms and with various accuracies. In such a way, single sounds are identified and located on the map (the sound mapping of soundscapes graphically depicts the findings in the sample) (Shobeiri Nejad 2009). This technique brings a wide range of different interpretations. Some experts have described it as a tool to immerse the researcher in the soundscape, while others have used it as a way to involve others in the practice of listening to the city and describing it, each with its own value and usefulness. Therefore, soundwalking can be conducted in a group or individually using recorded or unrecorded sounds (Adams et al. 2008). For example, in a group of studies, both experts and people who were not trained in the field of acoustics and soundscapes participated in soundwalks. However, recent studies focus more on the participation of experts in soundscapes and urban planning (Yong Jeon, Hong, and Lee 2013).
Psychoacoustics	The main goal of the psychoacoustic approach is to evaluate the users' perception of the soundscape (Blanco 2012, cited by Mohsen Haghighi 2014), i.e. the purposeful evaluation of sound sources determining the features of the sonic environment and whether they are perceived as pleasant or unpleasant by people. Psychoacoustic indices are defined by indices of satisfaction, sensitivity to noise, and experience of being in a place (Ghalenoie and Mohsen Haghighi 2016). It can include a variety of questionnaires in different ranges such as semantic differential analysis, sound preferences, etc.
Interview	The interview method can be used in all qualitative approaches.

Mixed approach

In this approach, a set of qualitative and quantitative recording techniques are used. For example, the physical sound indices are examined along with individuals' perception of soundscapes. Although the mixed method is more complete in determining the quantitative and qualitative features of the soundscape than other methods, people's perception of the soundscape is of primary importance (Mohsen Haghighi, Ghalenoie, and Ghaffari 2017).

The present research aimed to evaluate the soundscape of the peripheral territory of the Shrine of Hazrat Masoumeh using a qualitative-quantitative approach. After reviewing the literature on the research topic, the initial qualitative identification and analysis were carried out using the soundwalking technique and recording the components of the soundscape (biophonic, geophonic, and anthrophonic sounds). Quantitative soundscape evaluation was also carried out by measuring the physical index of the equivalent sound pressure level (Leq) in two periods of day and night, according to the standards of urban spaces, using a TES-1358 Sound Level Meter (SLM) after being calibrated at specific stations. Since the most famous periods for measuring sound indices are 7:00 am-10:00 pm as the day level and 10:00 pm-7:00 am the next day as the night level per the approval of the Supreme Council for Environment, the present research considered the abovementioned periods for

the sound level measurement. It should be noted that day sound levels were measured in peak hours and night sound levels were measured in the late hours of the night when pilgrims and neighbors were still in the peripheral territory of the Shrine of Hazrat Masoumeh to measure the equivalent sound pressure levels more accurately. Also, the grid layout was made to determine the measurement stations at 20 m intervals, per the relevant standards. The collected values of the Leq index (in dB) at each station were entered into the GIS software to perform interpolation on the input data to obtain day and night Iso sonic graphs of the soundscape. Since the case study was considered a commercial-residential area according to the standard developed by the Supreme Commission for Environment (2008), the obtained data were analyzed and inferred per this standard. Figure 2 shows the research process.

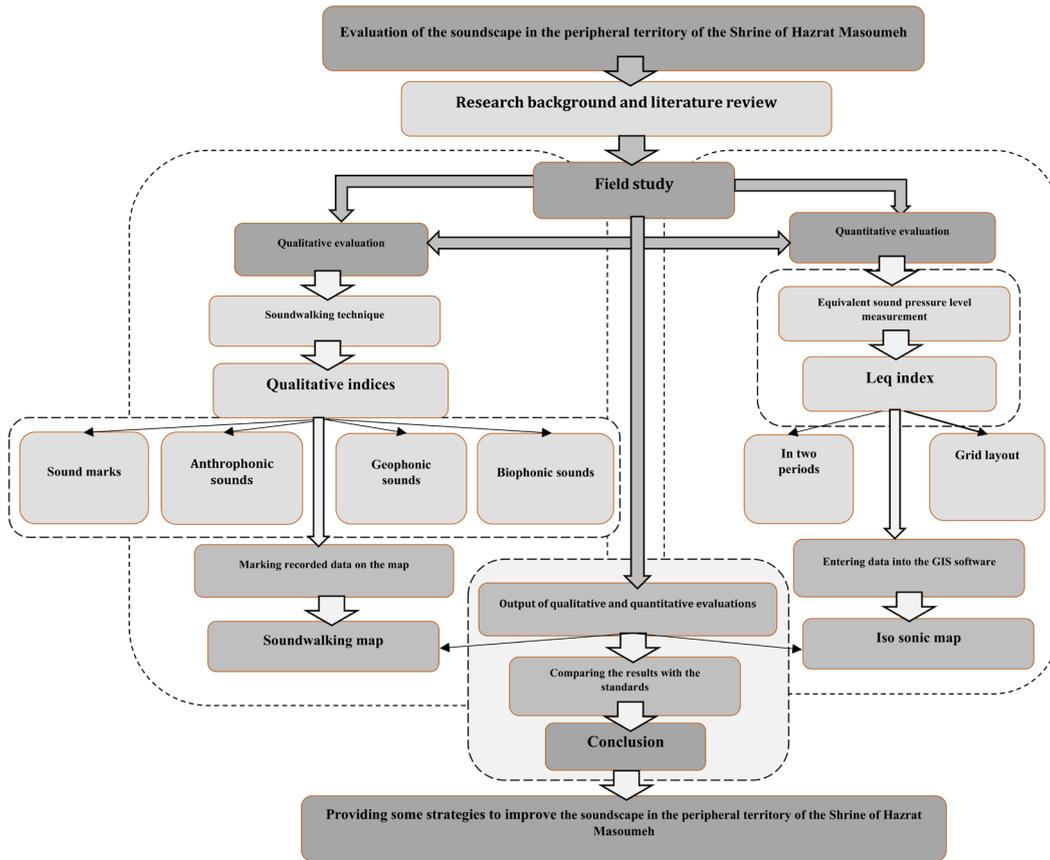


Fig. 2. Research Process

4.1. The Soundscape Evaluation Process in the Present Research

To measure and assess sound levels, it is necessary to completely know the measurement methods, the features of the studied environment, the way of exposure to sound, etc., so, the present research applied a quantitative-qualitative evaluation method,

as described in the following sections.

4.1.1. The Points Considered in the Quantitative Soundscape Evaluation

The most important points considered before, during, and after quantitative sound measurement are briefly listed in Table 2.

Table 2. The Points Considered in the Quantitative Evaluation of the Soundscape of the Shrine of Hazrat Masoumeh

Quantitative the Equivalent Sound Pressure Level (Leq) Measurement Process		
1	Measurement Goal	To distribute the sound pressure level in the environment
2	Device	TES-1358 Sound Level Meter (SLM)
3	Data Collection	In the sound level measurement process, the first step is to collect the necessary information from the sonic environment. In this step, a simple map of the environment showing the sources of sounds, hours of exposure to sounds, sound marks, and everything effective in recording sound levels is presented.
4	Calibration	Before each measurement, the precision and accuracy of the device are calibrated using a calibrator.
5	Measurement Method: Regular Grid Method	This method is used to prepare a sound zoning map and to determine different zones based on the determined sound pressure level ranges in such a way that the studied area is divided in the form of a regular grid.

Quantitative the Equivalent Sound Pressure Level (Leq) Measurement Process

6	Determination of Measurement Stations	The centers of the cells in the grid layout are considered measurement stations. After measuring the sound pressure level in the center of all the cells, the results are coded on the map or in a table.
7	Number of Iterations	Different countries have adopted different periods for measuring the equivalent level. The most famous periods are 7:00 am- 10:00 pm as the day level and 10:00 pm-7:00 am the next day as the night level. In Iran, the abovementioned procedure is considered the basis for action per the approval of the Supreme Council for Environment.
8	Preparation of Iso Sonic Map/ Sound Zoning Method	Iso sonic map is one of the most widely used drawing methods in graphically expressing and analyzing noise pollution in the environment. In this method, considering what is mentioned for the grid method and the sound zoning map, the obtained data of sound pressure levels is entered into the Arc GIS software. Next, according to the input data, the software performs interpolation operations on the data to obtain graphic layers in the form of zoned areas or a contour map. These graphic layers show the sound pressure level ranges.

		Area	Day (7 am to 10 pm)	Night (10 pm to 7 am)	
9	Allowable Sound Pressure Level (Leq) (dBA)	Residential	55	45	In the present research, the Iranian outdoor ambient sound pressure level standard (2008) is considered the basis for action and the case study is considered commercial-residential.
		Commercial-Residential	60	50	
		Commercial-Administrative	65	55	
		Residential-Industrial	70	60	
		Industrial	75	65	

4.1.2. The Points Considered in the Qualitative Soundscape Evaluation

To evaluate sounds qualitatively, it is necessary to completely know the sound marks and biophonic, geophonic, and anthrophonic sounds in the environment. Since the soundwalking technique is used to better understand the sonic dynamics of the environment at different times of the same period, in the present study, this technique was applied at different hours in the morning, evening, and night for 8 days to monitor possible conditions affecting the sound measurement. Also, special pilgrimage days were considered. For example, on Tuesdays, as days specific to pilgrimage to the Jamkaran Mosque, and Thursdays, there is the presence of more pilgrims (these two times were considered due to the increased attendance of users in this territory). For this purpose, the soundwalks were conducted between the 12th and 20th of July 2020 by a trained native observer. During

the physical movement within the fabric and by focusing on all audible sounds in specific points along each passage (according to the observer's familiarity with the context), the observer had pauses of approximately one to two minutes to focus on pleasant and unpleasant sounds. It should be noted that in the abovementioned period, the weather condition was normal to prevent the effects of changes such as rain, wind, etc., as external interventions, on the observer's evaluation. Sound marks, and anthrophonic, biophonic, and geophonic sounds, were marked on the map of the peripheral territory of the Shrine by the observer. Figure 3 shows the number of repetitions and importance of them. Table 3 briefly presents the items investigated in the qualitative evaluation of the soundscape in the territory of the Shrine of Hazrat Masoumeh, along with supporting studies by experts who have emphasized the importance of studying these items in sacred contexts.

Table 3. The Points Considered in the Qualitative Evaluation of the Soundscape of the Shrine of Hazrat Masoumeh

The Process of the Qualitative Sound Evaluation using the Soundwalking Technique		
Sound Mapping	<p>The Volume of Sound Marks</p> <p>(Kiser and Lubman 2008; Park 2012; Dumyahn and Pijanowski 2011; Barrie 2013; Stoller 1989, cited by De Witte 2008)</p>	<p>Religious sounds such as the call to prayer in worship places (mosques, holy shrines, and sacred places), the sound of the holy shrine's Naqareh Khaneh on special occasions, the chime of the clock in the holy shrine, the sound of mourning processions on religious occasions, religious tunes played at religious service stations on special occasions, can form the pilgrims' mental image of the soundscape in the territory of the shrine.</p>
	<p>The Volume of Anthropronic Sounds</p> <p>(Gregory 2009, cited by Day, 2002; Wang and Ho 2011; Mazumdar and Mazumdar 2004; Rana 1994; Khakzand and Ghorbanzadeh 2015)</p>	<p>Disturbing sounds such as the sounds induced by vehicles, especially motorcycles, uses, activities, children's playing, cycling, walking, conversations, vendors, external facilities and equipment such as air conditioners, etc., affect the pilgrims' mental peace in the hierarchy of pilgrimage to the holy shrine if their intensities are above the allowable upper limit.</p>
	<p>The Volume of Biophonic and Geophonic Sounds</p>	<p>Among biophonic and geophonic sounds, the sounds of birds such as pigeons near the Holy Shrine and flowing water or fountains are considered relaxing sounds in sacred places that provide the mental peace of pilgrims in the hierarchy of pilgrimage to the Holy Shrine in a sacred territory.</p>

5. DISCUSSION AND FINDINGS

This section presents the research findings in the form of quantitative and qualitative evaluations conducted in the territory of the Shrine of Hazrat Masoumeh as follows.

5.1. Qualitative Sound Evaluation in the Territory of the Shrine of Hazrat Masoumeh using the Soundwalking Technique

A part of the soundscape in the territory of the holy shrine is composed of sound marks appropriate to its religious context such as the call to prayer, the set of religious sounds in the holy shrine - which is

considered the main sound mark in this territory- and the sounds produced on religious and social occasions. The biophonic and geophonic sounds were recognized as pleasant sounds, and inappropriate anthropronic sounds as unpleasant sounds in the territory of the holy shrine. Using the soundwalking technique, pleasant and unpleasant auditory stimuli, and sound marks in the peripheral territory of the Shrine of Hazrat Masoumeh are shown with graphic signs in Figure 3. Table 4 analyzes the qualitative results of soundwalks in the territory of the Shrine of Hazrat Masoumeh. Table 5 presents the quality of some audible sounds as examples.

Table 4. Analysis of the Qualitative Results of the Soundwalks in the Territory of the Shrine of Hazrat Masoumeh

Analysis of the Results of the Qualitative Soundscape Evaluation	
<p>The Volume of Sound Marks Appropriate to the Religious Context</p>	<p>Sounds produced in religious events such as the call to prayer, mourning in mosques, imamzadehs, takyehs, and the holy shrine complex, the sound of the Naqareh Khaneh on special occasions, and the sound of pigeons near the Holy Shrine are somehow the sound representatives of the cultural identity of this territory. The frequencies of these sound signs are higher in the Eram walkway, the Astaneh walkway at the point where it is connected to Astaneh Square, and the Imam Musa Sadr axis at the point where it is connected to Javad al-aeme Square. The sounds of music and street performances are not heard in this territory, but religious music is played on special days or live performances of musical groups can be seen in gathering spaces such as Imam Khomeini Square, Astaneh Square, and walkways on special days.</p>
<p>Inappropriate Anthropronic Sounds in the Territory of Sacred Places</p>	<p>Unpleasant sounds such as noise pollution induced by the traffic of automobiles, motorcycles, and sirens at the beginning of the walkways such as Eram Walkway, Enghelab Walkway, Bahar Walkway, Javad al-aeme Square, and Imam Khomeini Square, at the entrance of which the traffic of vehicles is prevented from entering pedestrian arenas, are considerable. There are also land uses and activities such as air pollution-induced activities related to automobile repair on Imam Musa Sadr Street and Imam Khomeini Axis in the peripheral territory of the holy shrine. These unpleasant sounds reduce the quality of the soundscape and also decrease the influences of pleasant sounds and religious soundmarks in this area.</p>

Analysis of the Results of the Qualitative Soundscape Evaluation

The Volume of Biophonic, and Geophonic Sounds

Geophonic sounds such as the sound of flowing water and fountains can only be heard in the Qomrud region, the Bahar walkway, and the green space of Astaneh Square. It should be noted that this quality is very weak in the Qomrud region due to the seasonality of the river, the non-flow of water on all days of the year, and the predominance of anthropogenic sounds due to vehicle traffic. Biophonic sounds such as the sound of birds can be heard in the areas surrounding the holy shrine such as the Eram Walkway, the Enghelab Walkway, the Bahar Walkway, Imam Khomeini Square, and Astaneh Square, due to the presence of pigeons near the holy shrine and the presence of sparrows during most of the day.

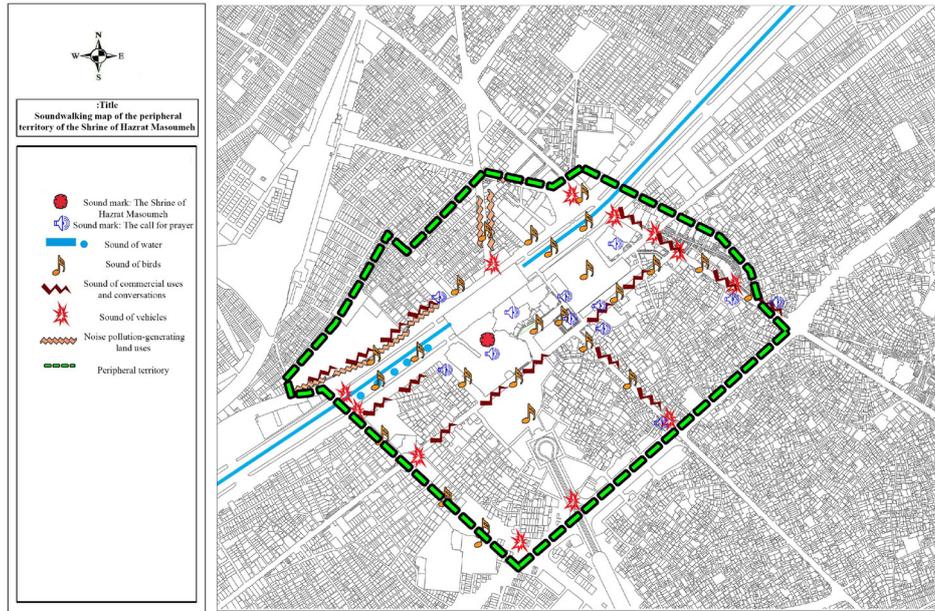


Fig. 3. The Qualitative Sound (Soundwalking) Map of the Territory of the Shrine of Hazrat Masoumeh

Table 5. Examples of Sounds Heard in the Territory of the Shrine of Hazrat Masoumeh

Religious songs and tunes are heard from religious service stations on special occasions

The sounds of the call for prayer and religious chants are heard from the holy shrine complex. They are the main sound mark in the territory.

The sound of the Naqareh Khaneh of the Holy Shrine on special occasions



The sound of water in the Bahar walkway

The sound of flowing water in Qomrud (seasonally) and its being influenced by biophonic sounds

The sounds heard on religious, political, and social occasions



5.2. Quantitative Sound Evaluation in the Territory of the Shrine of Hazrat Masoumeh using the Leq Index

The day and night equivalent sound pressure levels (day and night Leq) were measured per the descriptions listed in Table 2, and Figure 4 compares the average day Leq and average night Leq in the peripheral territory of the Shrine of Hazrat Masoumeh. In all areas specified for the pilgrimage to the Shrine of Hazrat Masoumeh, the obtained day sound pressure level was above the allowable value for commercial-residential areas (60 dBA) in the standard approved by Iran's Supreme Commission for Environment. The values obtained for the day sound pressure level were higher than those for the night sound pressure level, due to more pedestrian and vehicle traffic, the location of this territory in the center of Qom City, and its proximity to the functional areas of Qom Bazaar, Miveh-va-Tarebar Square, offices and uses supporting the holy shrine complex. It should be noted that the presence of pilgrims is less at certain times due to the arid climate of this city and the high frequency of sun hours. So, the average day sound pressure level is lower at certain times, and the levels of traffic and sounds caused by activities are higher at the cooler times of the day. In general, for the pedestrianized areas such as the Bahar Walkway, Eram Walkway, Enghelab Walkway, and the territory of the Shrine in Astaneh Square and Imam Khomeini Square, the average day sound pressure levels were lower than those obtained for the Imam Musa Sadr axis, Imam Khomeini Street (the distance between the Ghaffari Intersection and the Holy Shrine), Taleghani

axis (the distance between Motahari Square and the Ammar Yaser axis), Sepah Street, Moalem Street, and especially, Motahhari Square. Figure 5 shows the day sound pressure level (Leq) values measured in the territory of the Shrine of Hazrat Masoumeh. Figure 6 shows the night sound pressure level (Leq) values measured in the territory of the Shrine of Hazrat Masoumeh. Like the average day sound pressure level, in all areas specified for the pilgrimage to the Shrine of Hazrat Masoumeh, the obtained night sound pressure level was above the allowable value for commercial-residential areas (50 dBA) in the standard approved by Iran's Supreme Commission for Environment. The obtained average night sound pressure level values in Imam Musa Sadr axis, Taleghani axis, Motahhari Square, phase 1 of Payambar Azam Boulevard, and Astaneh Square were higher than those obtained in other areas in the studied territory (it should be noted that Astaneh Square experiences a higher night sound pressure level due to being pedestrianized and the presence of the sounds caused by the activities on its sides, the conversation of pilgrims, and the sound of the fountain). It can also be noted that the level of noise pollution induced by vehicles, especially motorcycles, and buses, significantly influences the average day and night sound levels in the category of unpleasant and undesirable sounds in the peripheral territory of the Holy Shrine. Table 6 presents the areas in the territory of the Shrine where the sound level was measured, along with a brief description of the equivalent sound pressure level and the day and night sound levels.

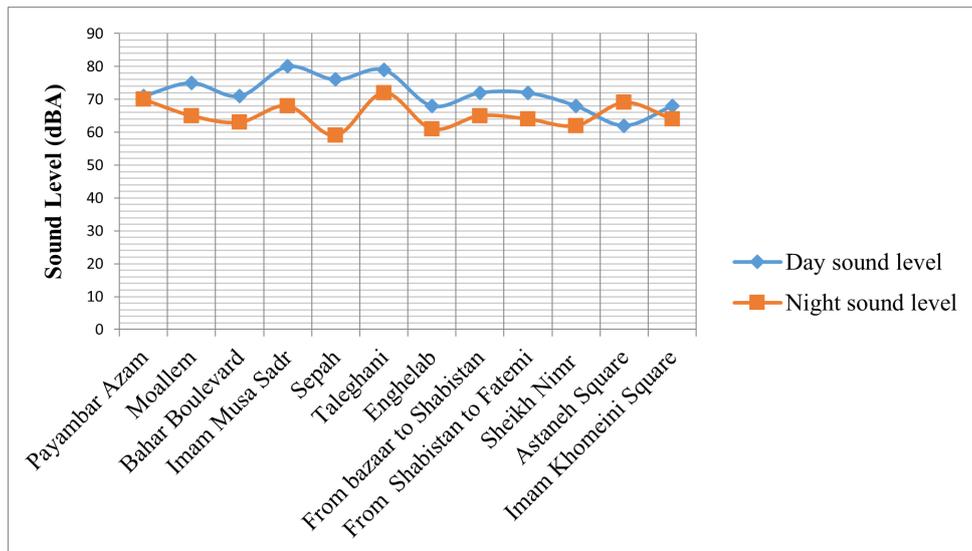


Fig. 4. Comparison of Day and Night Leq Values Obtained in the Peripheral Territory of the Shrine of Hazrat Masoumeh

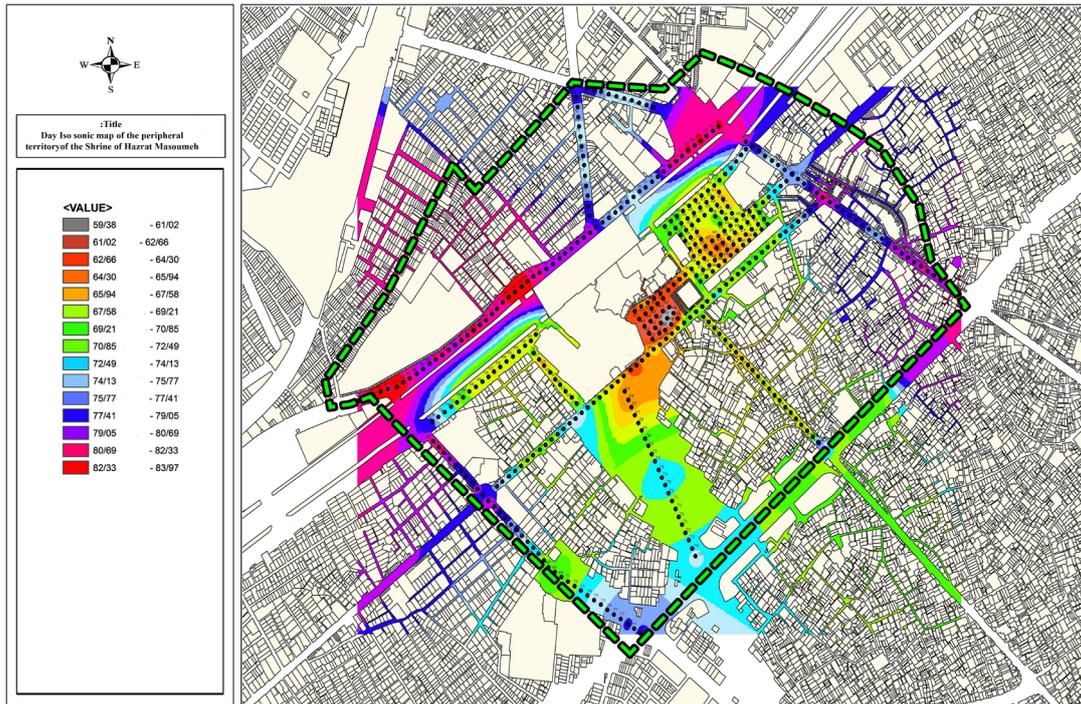


Fig. 5. Day Iso Sonic Map of the Peripheral Territory of the Shrine of Hazrat Masoumeh

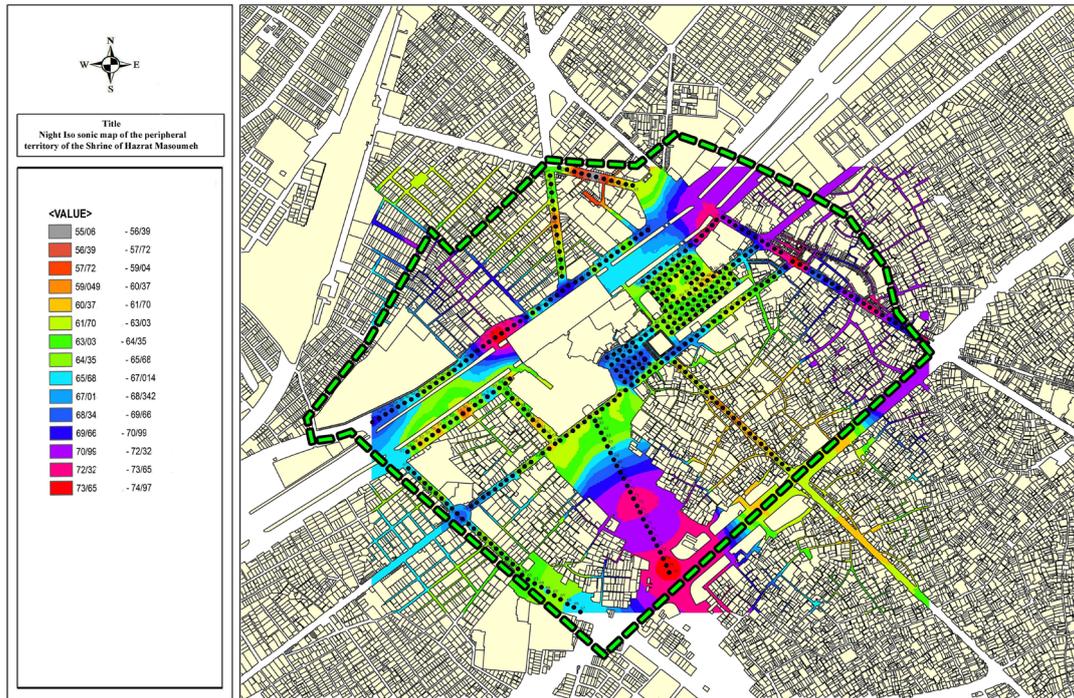
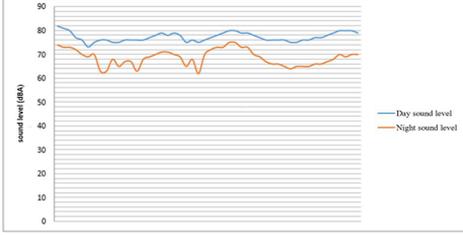
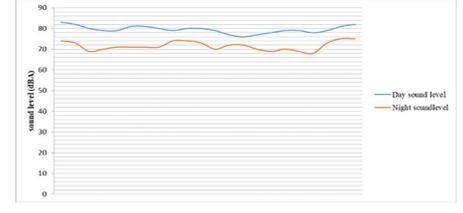
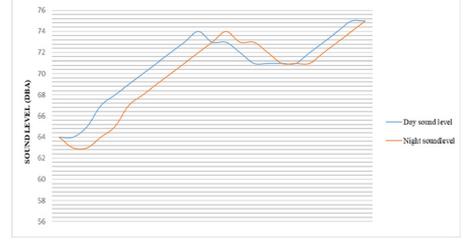
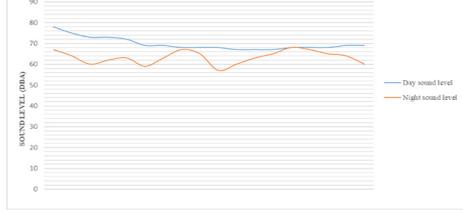
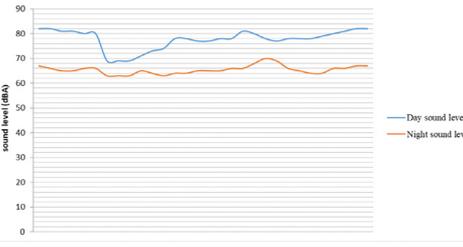


Fig. 6. Night Iso Sonic Map of the Peripheral Territory of the Shrine of Hazrat Masoumeh

Table 6. Analysis of Obtained Leq Values, by Different Measurement Areas in the Peripheral Territory of the Shrine of Hazrat Masoumeh

Area	Analysis of Leq	Day and Night Sound Level Graph
<p>Imam Musa Sadr Street - the Distance between Hojatiyeh Bridge and Motahhri Square</p>	<p>Imam Musa Sadr Street is one of the main routes for pilgrims to pilgrimage the Shrine from the western front of Qomrud, through the existing cross passages and Javad al-Aeme Square. In this area, the average day sound level has increased sharply due to the existence of activities such as automobile repair shops and the resulting noise pollution. The average night sound level is lower than the average day sound level, due to the closure of uses generating unpleasant sounds at night.</p>	
<p>Average Day Sound Level (dB) = 80 \ Average Night Sound Level (dB) = 68</p>		
<p>Taleghani Street, the Distance between Motahhari Square and Ammar Yaser Axis</p>	<p>Taleghani axis, due to its location in the center of the city with vehicle and human traffic and its proximity to Qom's Grand Bazaar complex, has an average day-night sound level above the allowable limit and is considered one of the axes with the highest average sound level.</p>	
<p>Average Day Sound Level (dB) = 79 \ Average Night Sound Level (dB) = 72</p>		
<p>Phase 1 of Payambar Azam Boulevard</p>	<p>Since this area is currently used as a parking lot, there is no significant difference between the average day and night sound levels. In a part of the route, buses are driven, causing the sound level to rise at certain hours. This level increases on special days due to the increased traffic.</p>	
<p>Average Day Sound Level (dB) = 71 \ Average Night Sound Level (dB) = 70</p>		
<p>Bahar Walkway</p>	<p>Due to the implementation of a vehicle traffic control plan on the road next to this walkway, the passage of vehicles on this walkway is controlled. However, the passage of vehicles on the river bed, which is near the walkway, the sound of conversation, and the presence of fountains, are effective in increasing the day sound level.</p>	
<p>Average Day Sound Level (dB) = 71 \ Average Night Sound Level (dB) = 63</p>		
<p>Moallem Street</p>	<p>This road experiences more traffic during the day than other axes, due to its proximity to the Shrine and major activity centers such as Qods Shopping Center, Ayatollah Marashi Library, etc., being the road connecting to the Shohada Axis, and access to Districts 1 and 4. As a result, the day sound level measurement results indicate a high average day sound level and the night sound level is lower than the day sound level due to the closure of many of the mentioned centers.</p>	
<p>Average Day Sound Level (dB) = 75 \ Average Night Sound Level (dB) = 65</p>		

Area	Analysis of Leq	Day and Night Sound Level Graph
<p>Imam Khomeini Street – the Distance between Ghaffari Intersection and the Holy Shrine</p>	<p>The longest strategic axis specified for the pilgrimage to the shrine is the Imam Khomeini axis. In this axis, there is a high average sound level, especially during the day, due to the presence of automobile and industrial service activities as well as the passage of private and public vehicles.</p>	
<p>Average Day Sound Level (dB) = 77 \ Average Night Sound Level (dB) = 63</p>		
<p>Sepah Street</p>	<p>This axis is one-way. There is no public vehicle traffic in it, and only private vehicles can pass through it. There are no active 24-hour uses and activities in it. As a result, there is a great difference between the average day and night sound levels.</p>	
<p>Average Day Sound Level (dB) = 76 \ Average Night Sound Level (dB) = 59</p>		
<p>Enghelab Walkway</p>	<p>By changing this road from a vehicle road to a pedestrian path, an important step was taken to reduce noise pollution in the area around the holy shrine. There is a low average sound level in it, due to the lack of vehicle traffic. The difference between the average day and night sound levels is mainly due to the noise pollution induced by the surrounding roads and the sounds caused by the activities on its sides and pedestrians.</p>	
<p>Average Day Sound Level (dB) = 68 \ Average Night Sound Level (dB) = 61</p>		
<p>Eram Walkway (the Distance between the Bazaar and the Shabistan)</p>	<p>Due to the conversion of the Eram axis into a pedestrianized road, vehicle traffic-induced noise is noticeable at the entrance to it. Also, the unpleasant sounds induced by commercial activities, the presence of urban furniture, the sounds caused by the interactions of citizens, and the noise pollution of the surrounding roads, especially in the Bazaar-Eram axis intersection, have led to the increased average day sound level, which decreases at night.</p>	
<p>Average Day Sound Level (dB) = 72 \ Average Night Sound Level (dB) = 65</p>		
<p>Eram Walkway (the Distance between the Shabistan and Fatemi Intersection)</p>	<p>Traffic restrictions are applied to this axis and city taxis can pass through it in a one-way manner. It should be noted that this axis is pedestrianized in the present time, playing a key role in reducing unpleasant auditory stimuli.</p>	
<p>Average Day Sound Level (dB) = 72 \ Average Night Sound Level (dB) = 64</p>		

Area	Analysis of Leq	Day and Night Sound Level Graph
Sheikh Nimr Street	This axis is on the southern side of the Shabistan of the Shrine and connects Bahar Boulevard to Eram Walkway. There are no uses on the sides of this axis, it is only a route for city taxis, and pausing is not allowable. It should be noted that the passage of vehicles is currently prohibited, and this is effective in reducing unpleasant vehicle traffic-induced sounds.	
Average Day Sound Level (dB) = 68\ Average Night Sound Level (dB) = 62		
Astaneh Square	The average day sound level in Astaned Pedestrianized Square is less than in other studied areas. However, there is a higher night sound level, which is mainly due to the sounds caused by the activities in the place, the sound of conversation, the sound of birds, fountains, and the electric cars used to move the pilgrims.	
Average Day Sound Level (dB) = 62\ Average Night Sound Level (dB) = 69		
Imam Khomeini Square	Imam Khomeini Square, as a pedestrianized square, and a forecourt area for pilgrimaging the Shrine, is free from the annoying sounds induced by motor vehicles and the uses on its sides don't cause noise pollution. However, the western edge of the square, due to its proximity to the Qomrud edge and the vehicle traffic on the Qomrud bed, increased the sound level.	
Average Day Sound Level (dB) = 68\ Average Night Sound Level (dB) = 64		

5.3. Correlation between the Quantitative and Qualitative Sound Evaluations in the Territory of the Shrine of Hazrat Masoumeh

In general, the results of the qualitative (soundwalks) and quantitative (sound pressure level measurement) sound evaluations indicate that the presence of sound marks appropriate to the religious context, such as the call to prayer in worship places (mosques, sacred tombs, and the Holy Shrine complex), the playing of religious tunes, etc., is more noticeable in urban spaces adjacent to the Holy Shrine complex, like pedestrianized areas specified for pilgrimage, than other spaces. The pedestrianization policy implemented in these areas in recent years has been a positive step towards paying more attention to preserving and highlighting the value sound marks in this area. Following the aforementioned policy, the quantitative sound level evaluations in these areas also indicate lower average day and night sound levels in the pedestrianized areas

than those in non-pedestrianized ones. Also, the results of the quantitative sound evaluations reveal that the over-standard average day and night sound levels in the peripheral territory of the Holy Shrine influence the cultural identity of the identified sound marks. On the other hand, since the day sound pressure levels (in the period from 7:00 am to 10:00 pm per the approval of the Supreme Council for Environment) are higher than the night sound pressure levels, the majority of pilgrims pilgrimage the Holy Shrine during the day, and the majority of pleasant auditory stimuli, including biophonic and geophonic sounds (sound of water, including fountains, sounds of birds, etc.) and most of the sounds produced by sound marks are heard during the day, day soundscape management is more important in this territory than night soundscape management.

In addition to the qualitative results of soundwalks, which show the existence of noise pollution-producing uses, such as various activities related to car repairs, in the Imam Musa Sadr and Imam Khomeini axes,

the results of the quantitative evaluations also present higher sound levels in the mentioned axes, indicating the adverse effect of them on the mental preparedness of the pilgrims before pilgrimaging the Holy Shrine. Also, the unpleasant auditory stimuli of anthroponic sounds at the vehicular intersections connected to the entrance of the pilgrimage walkways negatively influence the sound level values in the entry and exit sequences and the sound average in general. This is while the entry sequences can manifest the first spatial characteristics of the pilgrimage paths and be effective in the formation of the initial mental image, which requires attention.

On the other hand, soundwalks confirm that although there are few pleasant sounds (geophonic and biophonic sounds) appropriate to the context in the studied area, the dominance of anthroponic sounds disrupts their effectiveness. Because, as shown by the results of the quantitative evaluations, in all pedestrianized and non-pedestrianized areas specified for the pilgrimage to the Holy Shrine, the day and night sound pressure levels are above the allowable values. Also, regarding the limited biophonic and geophonic sounds in the studied areas, it can be mentioned that the pleasant auditory stimuli of biophonic sounds such as the sound of fountains and flowing water (in the temporary and seasonal form) are weakened due to the proximity of areas such as the Bahar Walkway to Qomrud River and the construction of several two-way vehicular lanes in its bed. It should be noted that in the present study, in the period when sound evaluations were carried out, the Sheikh Nimr axis and Phase 2 of the Eram axis were used by the vehicle traffic. But, a little later, the policy of pedestrianizing the mentioned axes was one of the positive measures effective in the reduction of unpleasant anthroponic sounds. In general, the results of qualitative and quantitative sound evaluations in the mentioned territory together indicate that despite the presence of walkways and pedestrianized squares in the peripheral territory of the holy shrine, the spiritual and cultural soundscapes in this territory are degraded due to being located in the structural-functional core of the city and being surrounded by high-traffic roads, vehicle-induced noise pollution, and the presence of noise pollution-generating activities.

6. CONCLUSION

Managing or designing the soundscape of religious and pilgrimage territories is a complex matter that requires the attention and intervention of different groups of designers, planners, and urban managers in the framework of different sciences and the realization of a set of policies considering the spiritual, historical and cultural values of these areas. Considering the significance of this issue, the present research has evaluated and analyzed the quality of the soundscape in the peripheral territory of the Shrine

of Hazrat Masoumeh using a mixed (qualitative and quantitative) approach. For this purpose, after reviewing the soundscape literature and identifying its position in religious territories, the qualitative sound evaluation was carried out by a trained observer and using the soundwalking technique at different hours in a given period. The quantitative sound evaluations were also conducted by measuring the equivalent sound pressure level (Leq) in two periods of day and night, per the standards approved by the Supreme Council for Environment. Using a mixed approach, the present study adopted a more comprehensive perspective to the evaluation of the soundscape in the peripheral territory of the Shrine of Hazrat Masoumeh compared to previous studies such as those by Jeon, Hwang, and Hong (2014), Kiser and Lubman (2008), De Witt (2008), Yelmi (2016,) and Yilmazer and Acun (2018) who only evaluated the soundscapes of sacred places qualitatively. This indicates that the aspects of the sensory landscape in specific value contexts, like the historic fabric of religious cities, have been less considered although the fabric around the holy shrines is considered important as a fabric with meaning, history, culture, and spirituality, and inattention to it will result in the lack of protection of the cultural and spiritual reserves of this category of religious fabric.

The results of the present study, based on the qualitative sound evaluation through soundwalks and the quantitative sound evaluation by measuring sound pressure levels, show that despite the abundance of sound marks appropriate to the religious context in the urban spaces adjacent to the Holy Shrine complex, such as the pedestrianized pilgrimage arenas, implementing the policy of pedestrianizing the peripheral territory of the Holy Shrine in recent years by city managers has been effective in maintaining the sound values of this territory. However, in all pedestrianized and non-pedestrianized areas specified for the pilgrimage to the Holy Shrine, the day and night sound pressure levels, for the two abovementioned periods, were estimated above the allowable values presented in the day and night sound pressure level standard approved by Iran's Supreme Council for Environment. In the pedestrianized areas specified for pilgrimage to the Shrine of Hazrat Masoumeh, such as the Bahar walkway, Eram walkway, Enghelab walkway, and the area surrounding the holy Shrine in Astaneh Square and Imam Khomeini Square, the average day-night sound levels were within a more favorable range compared to other areas, with Imam Musa Sadr, and Taleghani axes and especially, Motahhari Square with the highest average sound level. This amount of noise pollution is in contradiction with the expected spirit of the peripheral territory of the holy shrine to guide the pilgrims. The noise pollution induced by vehicle traffic and incompatible activities has significantly increased the average sound level and it is placed in the category of unpleasant sounds in this area. On the

other hand, since the day sound pressure level values are higher than the night sound pressure level values, day soundscape management is more important in this field. Also, despite the spiritual and religious role of this territory in preparing the pilgrims for the pilgrimage, there are limited pleasant geophonic and biophonic sounds appropriate to the fabric in this area, indicating the need for paying more attention to this quality. Religious sound marks such as the call to prayer, the sound of the Naqareh Khaneh on special occasions, and the sound of pigeons near the holy shrine are the sonic representatives of the cultural identity of this territory. Therefore, it is necessary to pay attention to their preservation in the soundscape by adopting urban design and planning policies and managing the predominance of anthroponic sounds since they reduce the influence of sound marks on pilgrims. It is also necessary to pay attention to concepts such as the role of pilgrims' perception and the difference between different groups of pilgrims in the perception of the soundscape in the territory of the Holy Shrine in future research. According to the research findings, the following includes some strategies for the improvement of the soundscape in the pilgrimage territory of the Shrine of Hazrat Masoumeh:

- Removing vehicle traffic from three- and four-road intersections with above-standard average day-night noise pollution in the bazaar zone.
- Pedestrianizing Taleghani (the distance between Motahhari Square and Ammar Yaser axis) and Imam Musa Sadr (the distance between Hojatiyeh Bridge and Khorshid, T-intersection considering an alternative route for vehicles) axes with above-standard average day-night noise pollution.

- Reducing noise along vehicular routes by implementing traffic strategies to reduce vehicle traffic and eliminate noise pollution caused by it, especially at the intersections connected to the entrance of the pilgrimage arena.

- Removing and relocating sound generators incompatible with the religious spirit of the peripheral territory, such as car repair-related activities.

- Using sound-dampening materials, such as wood, sand, and gravel flooring in the refuges of pilgrimage walkways.

- Providing the required platform- spatial and physical redefinition of the place- in the pilgrimage arenas with places for gathering and pausing for the performance of religious and ritual street music.

Also, the following strategies can be used as one-size-fits-all strategies in the territory of all sacred places:

- Soundscaping using the sound of water in pilgrimage arenas.

- Designing religious sound marks to broadcast religious sounds in pilgrimage arenas.

- Creating nests for pigeons and birds to enhance natural sounds in pilgrimage arenas.

- Using urban furniture such as benches, streetlights, etc., with wood covering to reduce noise in public areas.

- Using broadleaf vegetation in pilgrimage arenas to reduce noise.

- Using marble in the flooring near the sound marks in the peripheral area to reflect the sound.

- Using porous sound-absorbing materials in the structures leading to the Holy Shrine.

- Using porous concrete for the sidewalks in pilgrimage arenas to reduce noise.

ACKNOWLEDGMENTS

This article wasn't supported by any financial or spiritual sponsors.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

REFERENCES

- Adams, Mags D., Neil S. Bruce, William J. Davies, eds. 2008. Soundwalking as a methodology for understanding soundscapes. In *Conference, Proc. Institute of Acoustics*. <https://www.researchgate.net/publication/38303920>
- Aletta, Francesco, and Jian Kang. 2018. Towards an urban vibrancy model: A soundscape approach. *environmental research and public health* 15(8): 1-18. <https://www.mdpi.com/1660-4601/15/8/1712>
- Aletta, Francesco, and Arianna Astolfi. 2018. Soundscapes of buildings and built environments. *Building Acoustics* 52(3):195-197. <https://www.researchgate.net/publication/326914608>
- Arkette, Sophie. 2004. Sounds like city. *Theory, culture and society* 21(1): 159-168. <https://journals.sagepub.com/doi/abs/10.1177/0263276404040486>
- Bandarabad, Alierza, and Shahcheraghi, Azadeh. 2017. *Environed in the environment: Application of environmental psychology in architecture and urban planning*. Tehran: Tehran s' Academic center for Education, Culture and Research. [in Persian]
- Barrie, Thomas. 2013. *The sacred in-between: the mediating roles of architecture*. UK: Routledge. <https://www.taylorfrancis.com/books/mono/10.4324/9781315881119>
- Bernat, Sebastian. 2013. Awareness of noise hazards and the value of soundscapes in polish national parks. *Archives of Acoustics* 38(4): 479-487. <https://www.researchgate.net/publication/270176919>
- De Witte, Marleen. 2008. Accra's sounds and sacred spaces. *Urban and Regional Research* 32(3): 690-709. <https://www.researchgate.net/publication/4761740>
- Dubois, Danièle, Catherine Guastavino, and Manon Raimbault. 2006. A cognitive approach to urban soundscapes: Using verbal data to access everyday life auditory categories. *Acta acustica united with Acustica* 92(6): 865-874. <https://www.researchgate.net/publication/200045136>
- Dumyahn, Sarah L., and Bryan C. Pijanowski. 2011. Soundscape conservation. *Landscape Ecology* 26(9): 1327-1344. <https://www.researchgate.net/publication/225714699>
- Geertz, Clifford. 1993. Religion as a cultural system. In *The interpretation of cultures: selected essays*, 87-125. New York: Fontana Press.
- Gehl, Jan. 2017. *Life between buildings: using public space*. Translated by Ali Akbari, Fereshteh Karamian and Našaran Mehrabi. Tehran: Parham nagsh. [in Persian]
- Ghalenoie, Mahmoud, and Mohsen Haghghi, Nasrin. 2016. Evaluation of the soundscape in urban spaces, A case study of pedestrian Khayyam way, Urmia city. *Iranian Architecture and Urbanism* 7(2): 127-138. https://www.isau.ir/article_62035.html [in Persian]
- Golmohamadi, Roštam. 2010. *Noise and vibration engineering in industries and environment*. Hamedan: Dane-shjoo press. [in Persian]
- Gregory, Bartle. 2009. Sacred Places: Public Spaces. Supervised Research Project. McGill University. <https://www.mcgill.ca/urbandesign/files/urbandesign/SRP-FINAL-Bartle>
- Jeon, Jin Yong, In Hwan Hwang, and Joo Young Hong. 2014. Soundscape evaluation in a Catholic cathedral and Buddhist temple precincts through social surveys and soundwalks. *Acoustical Society of America* 135(4): 1863-1874. <https://www.researchgate.net/publication/262414796>
- Kato, Kumi. 2009. Soundscape, cultural landscape and connectivity. *social anthropology and cultural studies* 6(2): 80-91. <https://www.researchgate.net/publication/298803285>
- Khakzand, Mehdi, and Ghorbanzadeh, Davood. 2015. A Phenomenological Look to the sacred Landscape of Urban Design. *Urban Research Landscape* 3(5): 25-34. <http://ensani.ir/fa/article/358844> [in Persian]
- Kiser, Brenda H., and David Lubman. 2008. The soundscape of church bells-sound community or culture clash. *Acoustical Society of America* 123(5): 9433-9437. <https://www.researchgate.net/publication/5323837>
- Lotfi, Afsaneh, and Zamani, Bahador. 2015. The effect of Sensescape criteria in quality of Equipped Community Spine (Case study: Isfahan, Aligholiagha spine). *Motaleate Shahri* 4(13): 43-56. <https://www.sid.ir/paper/508420/fa> [in Persian]
- Maghrebi, Salman. 2016. *Acoustic- sound-voice in buildings and urbanism*. Tehran: simaye-danesh. [in Persian]
- Mazumdar, Shampa, and Sanjoy Mazumdar. 2004. Religion and place attachment: A study of sacred places. *environmental psychology* 24(3): 385-397. <https://www.sciencedirect.com/science/article/abs/pii/S0272494404000465>
- Mohsen Haghghi, Nasrin. 2016. Urban Design Emphasizing on the Impact of Sound Scape on the Perception of Urban Spaces (Case Study: Naghsh-e-Jahan Square in Isfahan). Art university of Isfahan. <http://library.aui.ac.ir/dl/search/default.aspx?Term=4618&Field=0&DTC=108> [in Persian]
- Mohsen Haghghi, Nasrin, Mahmoud Ghalenoie, and Ali Ghaffari. 2017. Assessing the Effective Elements of Acoustic Comfort and Soundscape Imageability of Users in the Naghsh-e-Jahan Square, Isfahan. *Architecture and Urban Planning* 10(19): 133-152. <https://www.researchgate.net/publication/345819220> [in Persian]

- Musician, Yasaman. 2015. Design Guideline for Public Spaces Considering Soundscape improvements in Golab-dareh region in Tehran. M. A Thesis of Urban Design. University of Atr. <https://ganj.irandoc.ac.ir/viewer/ef21dc-cd15049517338d3225c99a0543> [in Persian]
- Park, Sang Bum. 2012. Soundscape of Three Worship Spaces. Ph.D. Dissertation. University of Florida. https://ufdcimages.uflib.ufl.edu/UF/E0/04/36/78/00001/PARK_S.pdf
- Polli, Andrea. 2012. Soundscape, sonification, and sound activism. *AI and society* 27(2): 257-268. <https://link.springer.com/article/10.1007/s00146-011-0345-3>
- Shobeiri Nejad, Maryam. 2009. Managing Urban Soundscape by Urban Design: Guidelines for Urban Soundscape. M. A Thesis of Urban Design. Shahid Beheshti university. <https://ganj.irandoc.ac.ir/viewer/6f6844198e441127e-8f783a3cdb90ce6> [in Persian]
- Wang, Pi-Fen, and Ming-Chyuan Ho. 2011. Constructing a preliminary model for designing sacred space. *Bulletin of Japanese Society for the Science of Design* 58(4): 31-40. <https://www.academia.edu/79932557>
- Yang, Wei, and Jian Kang. 2005. Soundscape and sound preferences in urban squares: a case study in Sheffield. *urban design* 10(1): 61-80. <https://www.researchgate.net/publication/228739117>
- Yelmi, Pinar. 2016. Protecting contemporary cultural soundscapes as intangible cultural heritage: sounds of İstanbul. *Heritage Studies* 22(4): 302-311. <https://www.researchgate.net/publication/298803285>
- Yilmazer, Semiha, and Volkan Acun. 2018. A grounded theory approach to assess indoor soundscape in historic religious spaces of Anatolian culture: A case study on Hacı Bayram Mosque. *Building Acoustics* 25(2): 137-150. <https://www.researchgate.net/publication/323983145>
- Yong Jeon, Jin, Joo Young Hong, and Pyoung Jik Lee. 2013. Soundwalk approach to identify urban soundscapes individually. *Acoustical Society of America* 134(1): 803-812. <https://www.researchgate.net/publication/249996426>

HOW TO CITE THIS ARTICLE

Eslami, Shirin, Bahador Zamani, and Homayoon Nooraei. 2023. Evaluation of the Soundscape in the Territory of Sacred Places; Case Study: the Peripheral Territory of the Shrine of Hazrat Masoumeh. *Armanshahr Architecture & Urban Development Journal* 16(43): 53-71.

DOI: 10.22034/AAUD.2023.330004.2624

URL: https://www.armanshahrjournal.com/article_176015.html



COPYRIGHTS

Copyright for this article is retained by the author(s), with publication rights granted to the Armanshahr Architecture & Urban Development Journal. This is an open- access article distributed under the terms and conditions of the Creative Commons Attribution License.

<http://creativecommons.org/licenses/by/4.0/>

