

Analysis of the Satisfaction Rate Affected by Environmental Indicators of Neighborhood Greenway; Case Study: Greenway of Nezami Ganjavi Neighborhood of Tehran

Mehdi Saidi^{a*} - Mostafa Behzadfar^b - Seyed Majid Mofidi Shemirani^c

^a Ph.D. of Urban Development (Urban Planning and Design), School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran, Iran (Corresponding Author).

^b Professor of Urban Design, School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran, Iran.

^c Assistant Professor of Urban Design, School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran, Iran.

Received 31 May 2019;

Revised 21 July 2019;

Accepted 04 August 2019;

Available Online 21 June 2021

ABSTRACT

Greenway as an underlying element in environmental sustainability has a variety of species and leavers different environmental, physical, tourism-economic, and social effects on the neighborhood and city. The presence of river valleys and greenways in Northern Tehran are important environmental capabilities, which are not mostly supported by the efficient policy-making processes of urban management, and have been ignored in urbanization studies. In the greenway of Nezami Ganjavi Neighborhood, some environmental qualities show no adequate responsiveness based on initial field analyses. In this field, the present study has discussed the relationship between the satisfaction of neighborhood residents with the environmental indicators of greenway and has also estimated the satisfaction rate. This study aimed in investigating types of greenways and their characteristics, and providing efficient suggestions to improve the status of environmental indicators of neighborhood greenway based on measurement of study neighborhood. The method used in this study was the qualitative-quantitative method, and this is applied research in terms of purpose. To analyze the correlation between independent variables and dependent variables, multivariate regression was used in SPSS. The results showed that satisfaction was affected significantly by indicators including the existence of park and recreational green space, clean and pollution-free air in the greenway axis, soothing and non-disturbing sounds, presence of urban animals and birds, and beautiful view at the confidence level of 95%. However, satisfaction was not significantly affected by indicators including clean and pollution-free air in the immediate vicinity, cleanliness of the soil cover and durability, and connection between green zones. According to the obtained adjusted coefficient of determination, 75% of changes in satisfaction were associated with the defined indicators and can be estimated. Finally, the study provided suggestions due to the measurement of the existing situation to promote environmental conditions of the greenway.

Keywords: Greenway, Environmental Indicators, Satisfaction, Nezami Ganjavi Neighborhood.

* E_mail: mehdi.saidi87@yahoo.com

1. INTRODUCTION

Over the decades, modern urbanization streams have emphasized sustainable development. Accordingly, the policy-making process of urban space development should be in line with creating public natural livable spaces. Greenway is vital in this field as a space that brings the natural environment in the urban life on one hand, and a space that paves the way for the presence of different age groups in this space on the other hand. Various studies are available in this field:

Olmsted, the father of the greenway movement in America implemented the best combination of greenway through creating the Boston Park system (Fabos, 2004). In Europe, the formation of greenways was analyzed for the first time in Germany in the articles conducted by Schmitt on spatial planning published in 1912. According to the developing industrialization process in the early years of the 20th century in the European societies, especially Germany, he emphasized the creation of a network of greenspaces to separate the habitats, provide recreation, and improve air quality (Von Haaren & Reich, 2006). The Abercrombie design was implemented in London, and the design can affect its structure until the time that London exists (Hanachi & Ghaznavi, 2009, p. 62). In 1991, London's Green Strategy created a series of green networks, which were overlapped in some paths including pedestrian paths, bicycle paths, and natural path axes. Switzerland, which is known because of the Alps has allocated large space to greenways and green spaces (Fabos, 2004). Also, Spain with arid and semi-arid climates began its greenway plan in 1993 under the title of Vias Verdes in different locations (European Greenways Association, 2000, p. 12). The greenways in Asia and east and southeast states like China, Japan, and Singapore were also emphasized. In Singapore's Strategic Development Plan, the open spaces and parks were planned as a part of a network, so that restricted available resources could be used as much as possible. Large parks and wide expanded open spaces were connected by the green corridors with the least width of 20m (Tan, 2006, p. 46). Various studies have been conducted on the effects of greenways and the sequential features. Given Sims-Gould et al. (2019), the favorable design of the greenway is a suitable opportunity for physical-recreational activities, active transportation, and social interactions of residents in the neighborhood of the greenway. Along with the rapid growth of urbanization in the 21st century and various disasters created for the urban habitats, the necessity of paying attention to greenways on different scales can be felt more than before. Liu et al. (2020) have conducted a study to investigate the effect of corridor width traffic, and land use as determinant factors of greenway heterogeneity. The greenway heterogeneity is the consequence of a pervasive approach regardless of local coordinates in the greenway planning process and has resulted in lots of problems in the field of greenway planning. In this

field, considering the local conditions can decrease the greenway planning challenges.

A few studies have been conducted in Iran on environmental subjects. The Joint Statement of Kuhsaran Gathering for the Protection and Rehabilitation of Tehran Valley Rivers was defined for several different cases in 1999. Maghsoud Beik Valley River in Tehran, the investigations of which were conducted by Consultant Engineers of Abardasht to promote the role and identity of the river to provide sustainable development. This study has emphasized the investment in strengthening the urban role of the valley river and the improvement of environmental qualities. Farahzad Valley River in Tehran designed by consultant engineers of urban fabric has been created for purpose of creating man-nature interaction, recreation, and tourism through the pedestrian and bicycle path, environmental protection, pollution prevention, greenspace development, organizing the space around valleys, and promotion of the quality of natural and urban environment landscapes. Strategic Project of Vakil Abad Valley River in Mashhad was designed with the aim of protection and sustainable utilization, and continuity of Vakil Abad Valley influence through wall-making by the existing canal (Pasban Hazrat, 2001). Velenjak Valley River in Tehran, the greenspace and body of Chamran Highway with the greenway approach designed by consultant engineers of urban fabric have been created to promote the environmental qualities. According to the indicators of greenways, it is necessary to pay attention to greenways in urban planning and design (Makhdoum, 2002, p. 107). Rafati and Bemanian (2016) conducted a study under the title of "analysis of the principles of urban greenway designation for the empowerment of social sustainability". In this study, components of the social sustainability of greenways included the realization of justice, security, comprehensiveness, social interaction, quality of life, and flexibility. Vatanparast et al. (2015) conducted a study under the title of "urban greenway planning based on calibrated attraction formula using AHP and GIS". The study provided solutions for locating urban greenways. The findings showed that creating greenways can be realized in the cities with an adequate platform to change urban form and man-nature interaction and urban space.

In adjacency of the main valley rivers in Tehran (Lark, Darabad, Jamshidieh, Golabdareh, Darband, Velenjak, Darake, Farahzad, and Kan), there are also secondary valleys, which play a role as the middle line of the main valley rivers or in different locations as greenways. Greenways have a variety of functions, which can be followed in the goals such as ecological, environmental, protection, recreational and other purposes. One of the secondary valley rivers or greenways in the Nezami Ganjavi Neighborhood has been located in District 6. On one hand, there are a few neighborhoods with a greenway in their centers. On the other hand, a few studies have been conducted on neighborhood-scale

on greenways, and the urbanization plans and projects have neglected them. The natural and manmade layers and components have created Nezami Ganjavi Greenway. The greenway has encountered a lack of care and time-worn over time, and the early field studies show a lack of responsiveness of some environmental qualities of the greenway. In this regard, the research question of the present study is: how is the satisfaction of residents with environmental indicators? And what satisfaction rate of residents can be predicted by the said indicators? According to the study subjects, the main objective of this study is to introduce the most important environmental indicators of greenway and analysis of satisfaction rate with each indicator. Also, this study has presented efficient suggestions to improve and promote the environmental situation of the study's greenway. The physical, environmental, social, and spatial dimensions can affect the organization process of the greenway. The environmental components are vital in the greenway space. Hence, concerning the priority of the issues, this study has analyzed the environmental indicators of greenways.

2. LITERATURE REVIEW

Different subjects and fields form the theoretical and academic framework of the present study. Ecologic-oriented and sustainable neighborhoods, the environmental conditions, history and function of greenway, sorting, and typology of types of greenways, and the advantages are the most underlying issues reflecting the literature of the study.

2.1. Ecologic-Oriented and Sustainable Neighborhood

The existence of green spaces in the neighborhoods can empower the ecologic city and show the least interference in the natural environment and more adaptation between man and living environment (Bahrainy, 2006, p. 276). Observance of environmental considerations for the development and continuity of neighborhood life is hidden in the concept of ecologic neighborhood and city. Life can be meaningful in an ecologic neighborhood with the existence of basic environmental elements. Life can be meaningful in the ecologic neighborhood just in presence of basic environmental elements. The design and organization of neighborhoods with an ecologic approach should be in line with the concept of sustainability. Accordingly, the existence of green elements and spaces in urban neighborhoods can be a vital step toward the realization of neighborhood livability (Zayyari, 2001, p. 381). in a healthy neighborhood, environmental elements (air, soil, water, plants, animals, and humans) should be in ultimate natural balance and perfection to create a healthy, peaceful, and happy environment with the least environmental standards. Appropriate per capita and desirable spatial distribution of greenspace can enhance different environmental qualities of the

healthy neighborhood (Bahrainy, 2006, p. 103).

The conditions of environmental sustainability should be provided in a healthy neighborhood, and different dimensions of sustainable development should be considered (Jepson, 2001, p. 491). Realization of sustainable development in the neighborhood needs constructive and balanced relationships among triple dimensions of sustainable development (social, economic, and environmental dimensions) (Quan, 2019; Azizi, 2001). There are various indices and measures to explain sustainable neighborhoods and cities. Currently, under the dominant conditions of the modern world, the livability indicators of the sustainable neighborhood should be considered based on urban needs. The most important indicators are:

- Wide and network corridors of greenspace for animal habitat,
- Agricultural and valuable lands of natural resources,
- Green belts around the urban fabrics and neighborhoods,
- Prohibition of any kind of construction on catchment areas and river borders,
- Decreased consumption of resources, and prevention of producing types of pollutants and different contaminations in neighborhoods and cities,
- Appropriate regulations to use renewable energies for buildings,
- Using renewable energies in different manufacturing and service departments (Shokri, 2013).

2.2. The Neighborhood and Environmental Conditions

In Dehkhoda Dictionary, neighborhood means alley and some part of urban or rural sections. In Moein Dictionary, it means the place for landing, some part of city, and alley. In English, the neighborhood has been considered in different concepts. In this case, the neighborhood is a social unit and a place for the community of some people to live there (Aryanpur Kashani, 1984). Different social groups living in urban neighborhoods have various expectations from the neighborhood based on time and place conditions and think about various demands. The demands can't be always realized, and various conditions interfere in the presence or absence of the desires. In this field, one of the underlying necessities for public life can be taking benefit of appropriate environmental conditions (Cowan, 2005; Wang, Dai, Wu, Wu, & Nie, 2019). Various urban neighborhoods can be analyzed based on different physical, environmental, social, and cultural dimensions. The higher the desirability of the dimensions is, the more qualified the neighborhood would be for living. Appropriate environmental conditions in the neighborhoods are strongly associated with the presence of green spaces, and the desirability of existing climatic conditions of the neighborhood (Boone & Modarres, 2010; Yankel, 2004). According to the mentioned, it could be found that the existence of

green space in neighborhoods plays the role of lungs of the city, and the greenways in neighborhoods can leave positive effects based on their linear distribution in the neighborhoods.

2.3. The History and Function of Greenway

The first generation of greenways under the title of axes, boulevards, and parkways dates back to years from 1700 to the early 20th century. The greenways have been derived from the axes relevant to the axes of ceremonies in the Middle Ages, which used to connect seven church areas as pilgrimage paths. The function of these axes was the displacement of sequential sight experience and connection of separated areas. Then, glorious boulevards such as Elysees Boulevard in Paris were created, which were used to connect urban spaces. Such paths were created for the manifestation of beauty and power. Hausmann created the main axis in Paris to connect separated areas and to control and show the glory in 1850 and connected other access points to this axis. The parkways and park systems were created with the inspiration of European boulevards and based on a beautiful landscape approach, which could be an introduction to the concept of the greenway (Zakaria El Adli Imam, 2006, pp. 194-195). The concept was developed during 1900-1945 and was a beginning for open and green space planning on a large scale (Fabos, 2004, p. 323). The greenbelt was recommended in 1829 for London. The second generation of greenways was created in response to the industrialization and automotive orientation of cities in the second half of the 20th century (Bischoff, 2003). Linear parks and recreational corridors, the access points to the nature of rivers, coastal paths, river edge canals, and the forbidden areas for cars were created for the recreation of pedestrians and bicycle riders. With the beginning of the environment movement in early 1980, the concept of the greenway as urban landscape began to meet the challenges created in the environment and urban landscape. In the third generation, according to Sirens (2004), the greenway was responsible for meeting recreational needs in addition to protecting natural habitats and destroying ecosystems, protecting cultural resources, protection against river floods, erosion control, and training and interpreting nature. Long-term economic advantages became a strong reason for the implementation of greenway projects around the world (Zakaria El Adli Imam, 2006, pp. 194-195). According to the importance and the effect of open and green spaces in the urban ecosystem, a variety of

studies have been conducted using various approaches over the years in the field of functions and features of greenways. A branch of the studies was associated with the improvement of the performance of these spaces. Among the approaches, the Greenway Network idea was the most successful one (Turner, 2006). In this idea, the adjacent green parts are connected by the greenways as linear corridors and have created ecologic networks to make greenspaces sustainable. The function of connection is vital in greenways (Zhang & Wang, 2006; Viles & Rosier, 2001). Also, the greenway is capable to provide appropriate space for bicycle riding, skating, walking (Lindsey, 1999; Chang, 2020), and environmental protection (Von Haaren & Reich, 2006). In addition to being paths for pedestrians, the greenways can be considered recreational areas. As a result, greenways have a special position on urban and neighborhood scales. Greenways have a variety of functions. They are generally common in terms of the following functions:

- Linear greenspaces along with the natural or manmade elements such as roads, rivers, and canals (Little, 1990),
- Creating an interconnected network of access points connected to other recreational paths, such as bicycle riding paths, horse riding paths, walking, and skating paths (European Greenway Association, 2000),
- Urban corridors with recreational, social, and environmental functions (Baris, Erdogan, Dilaver, & Arslan, 2010; Chang, Tsou, & Li, 2020).

2.4. Classification and Typology of Greenways

Little has divided greenways into 5 classes in the book "Greenways for America" (1990): 1. Urban riverside greenways: as some part of the redevelopment plan of forgotten or destroyed coastal and river ridges of cities; 2. Recreational greenways: long distances made based on nature; on tunnels, destroyed railways, and public spaces; 3. Valuable natural environment corridors: these areas are usually along the river line and are less bordered, and are used for the migration of animals and displacement of animal species, studying nature, and walking; 4. Beautiful historical paths: these elements are usually created along the roadside, freeways, or waterways with long-lasting antiquity, and in places for pedestrian access; 5. Comprehensive greenway networks and systems: placed in a wide range according to landform such as valleys and hills (Watson, Plattus, & Shibley, 2004, p. 500). various types can be counted for greenways based on their nature (Table 1).

Table 1. Typology of Greenways

Types of Greenways	Corridor Type	Greenway Functions and Features
Recreational Greenways	Line, Lane, Watercourse	Natural and cultural corridors of urban and rural areas with public access and aesthetic features: long paths, walking trails, bicycle riding ways, special sport ways, riverside parks, canals, bike riding ways, waterways, and coated ways
Historical-Cultural Landscape Greenways	Line, Lane, Watercourse	Includes usually cultural corridors (roads or ways) or natural ones (waterways) in urban and rural environments with relevant historical, cultural, and aesthetic values, and available for all people

Types of Greenways	Corridor Type	Greenway Functions and Features
Ecologic Greenways	Line, Lane, Watercourse	Including natural corridors (river, watercourse) located in rural areas with high ecologic and aesthetic values; used to protect or improve biodiversity by protecting, making, communicating, and managing residences, and enabling natural environment studies; public access is limited. These areas include middle corridors, high-rise corridors, natural pathways, waterways, and wildlife corridors
Riverside Greenways	Watercourse	Natural corridors (Floodplains, corridors, wetlands) are located in rural and urban areas with high aesthetic and ecological values. In most cases, residence protection or reaction are emphasized in these greenways: urban riverside greenways, waterways
Urban Area Greenways	Lane	Natural corridors (rivers) and cultural paths (urban borders) are located between urban and rural areas. They have high aesthetic and ecologic values and are public places. Development is restricted in these areas. The areas include greenbelts and parkways
Greenway Networks	Line, Lane, Watercourse	Natural corridors (valleys): the corridors are regional and transregional places, which are used sometimes for types of infrastructures, and connect various biologic systems in a wide range

(Viles & Rosier, 2001; Fabos, 2004)

2.5. Advantages of Greenway

The integration of the environment is generally protected in greenways in the urban green infrastructures. In other words, greenways play the role of connected linear parks or urban green infrastructures. As urbanization and increased urban population in Iran has created conflicts in urban development and environment,

private and public interests of citizens, physical, mental, and cultural requirements, implementation of greenway projects can decrease such conflicts, and enhance environmental quality, aesthetics, recreational, educational, and welfare quality and habitat protection. Table 2 has presented the advantages of greenway based on landscape ecology, agricultural, social, managerial, and economic attitudes.

Table 2. Advantages of Greenway from Different Perspectives

Perspective	Advantage
Landscape Ecology	Potential of greenways to create integration and continuity in landscape and reduce negative effects caused by discretion Creating synergistic in the landscape by connecting cultural and ecologic resources to a network or system Creating readability and transparency in landscape structure, and enhancement of the sense of place
Agriculture	Preventing soil erosion, and formation of runoffs, empowerment of food cycle, reduction of wind speed, creating shelter for animals, and creating humidity in the air and soil
Social	To have educational aspects relevant to nature, creating transportation paths with no energy consumption (walking, bicycle riding, skating, etc.)
Managerial	As greenbelt: limiting physical expansion, reducing pollution, and promotion of landscape aesthetics
Economic	Increased value-added, development of tourism, and creation of job and business opportunities

(Viles & Rosier, 2001; Rafati & Bemanyan, 2016)

3. ENVIRONMENTAL INDICATORS OF GREENWAYS DERIVED FROM THE THEORETICAL FRAMEWORK

The features and functions mentioned for greenway show a variety of its functions in environmental, physical-spatial, social, cultural, and other domains

(Zakaria El Adli Imam, 2006; Zhang & Wang, 2006; Vatanparast, OladiGhadikolaee, & Akbari, 2015; Liu, Lin, DeMeulder, & Wang, 2020). The greenways can be deployed in various local and nonlocal scales and can take special features based on functional scale. In this study, environmental indicators of the greenway are presented at the neighborhood level (Table 3).

Table 3. Documentation of Environmental Components and Indicators of Neighborhood Greenway

Component	Indicator	Author
Greenspace and Vegetation	Existence of Parks and Happy Greenspace	(Vatanparast, OladiGhadikolaee, & Akbari, 2015; Bahrainy, 2006; Von Haaren & Reich, 2006; Chang, 2020; Chang et al., 2020)
Air Conditioning	Clean and Pollution-Free Air in Greenway Clean and Pollution-Free Air Near the Greenway	(Hanachi & Ghaznavi, 2009; Viles & Rosier, 2001; Chang, 2020)
Soil Softening	Soil Coating Cleaning	(Hanachi & Ghaznavi, 2009; Zakaria El Adli Imam, 2006)
Sound Comfort	Calming and Non-Disturbing Sounds	(Bahrainy, 2006; Walmsely, 2006)
Urban Animals (Nonharmful)	Presence of Urban Animals and Birds	(Viles & Rosier, 2001; Baris et al., 2010; 2001)
Cohesion and Continuity in the Landscape	Continuity, Cohesion, and Integration of Greenways and Spaces	(Zhang & Wang, 2006; Liu et al., 2020; Rafati & Bemanyan, 2016; Turner, 2006)
Favorable Landscape	Existence of Beautiful Landscape and Sight	(Viles & Rosier, 2001; Tan, 2006; Sims Gould, Race, Vasaya, & McKay, 2019)

4. METHODOLOGY

The study is an applied research work in terms of purpose, and the method used in this study is qualitative-quantitative. The problem statement was done using observations and field studies. Then, the most important environmental indicators of the greenway were introduced using library methods and literature. The said indicators include the existence of happy greenspace and parks; clean and pollution-free air in the greenway axis and immediate vicinity; clean soil coating; calming and non-disturbing sounds; the presence of urban animals and birds; continuity, cohesion, and connection of green spaces; and beautiful landscape. Observation, photography, and questionnaire were used to measure the situation of Nezami Ganjavi Neighborhood. In 2016, 10150 people were living in the study area¹. In the secondary field studies, 370 questionnaires were used for data collection due to the neighborhood population and using the Cochran formula. The respondents were those people who were present in the greenway, and the residents of the Nezami Ganjavi Neighborhood. The qualitative items of applied techniques in the field survey were changed into quantitative data using the Likert scale. A multivariate regression model

was used in SPSS to analyze the correlation between research variables. The validity of the questionnaire was confirmed by content analysis of the items using introduced indices. The reliability of the obtained data was confirmed by Cronbach's alpha. As Cronbach's alpha was obtained more than 0.791, it could be found that the data have acceptable reliability. This shows the validity of the data and the high accuracy of obtained results.

5. STUDY AREA

Nezami Ganjavi Neighborhood with the area of 62ha is located in Tehran, Iran (Figure 1). Nezami Ganjavi Park is located in the south of the neighborhood, and Dustan Park is located in the north. The two parks have been connected by a greenway in a north-south direction. The satellite image map of the neighborhood and the spatial distribution of uses in this area (Figure 2) showed that the existing greenway in the center of the neighborhood has connected Hemmat and Resalat highways just like a green corridor, and has left various environmental effects. Some images of various positions of the greenway are illustrated in Figure 3. Figure 1.

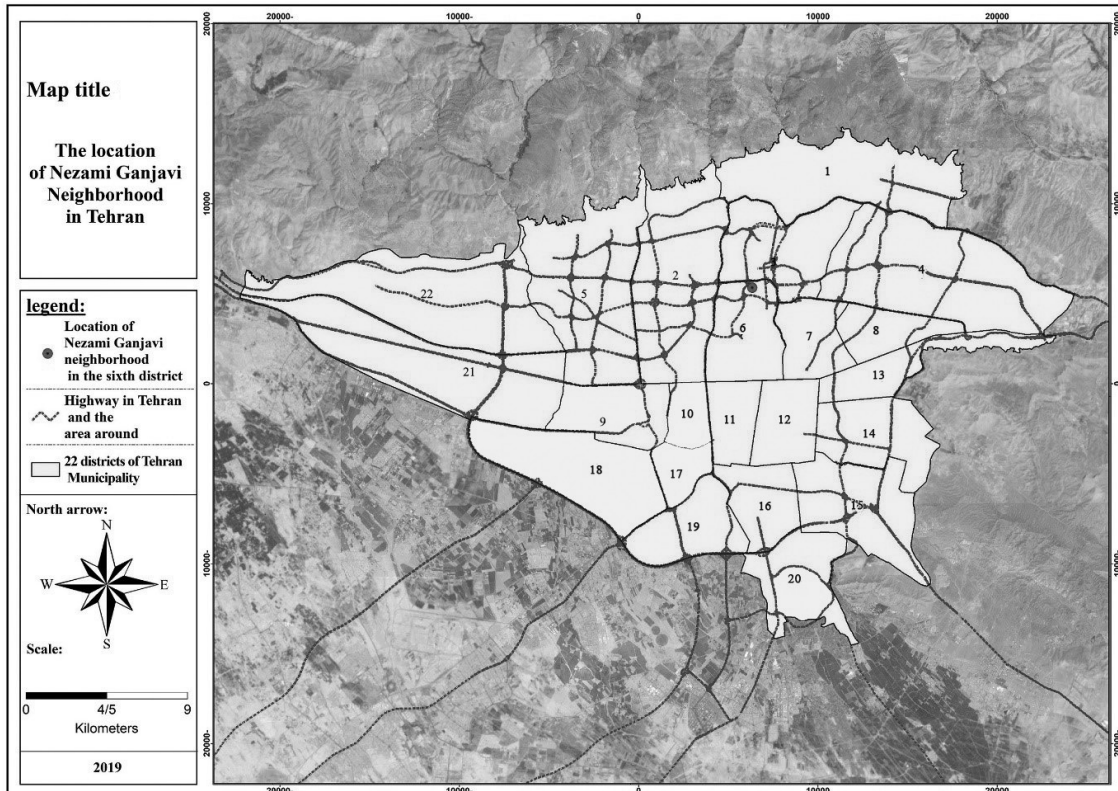


Fig. 1. The Location of Nezami Ganjavi Neighborhood in Tehran

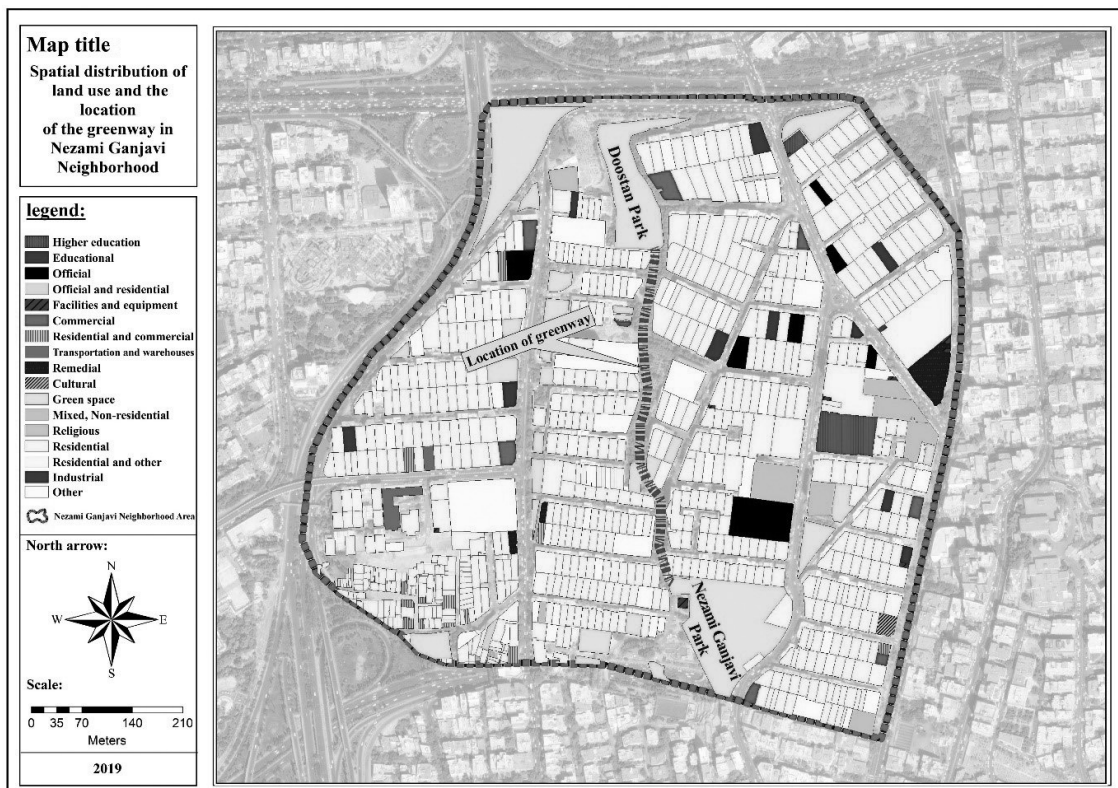


Fig. 2. Land Use of the Existing Location

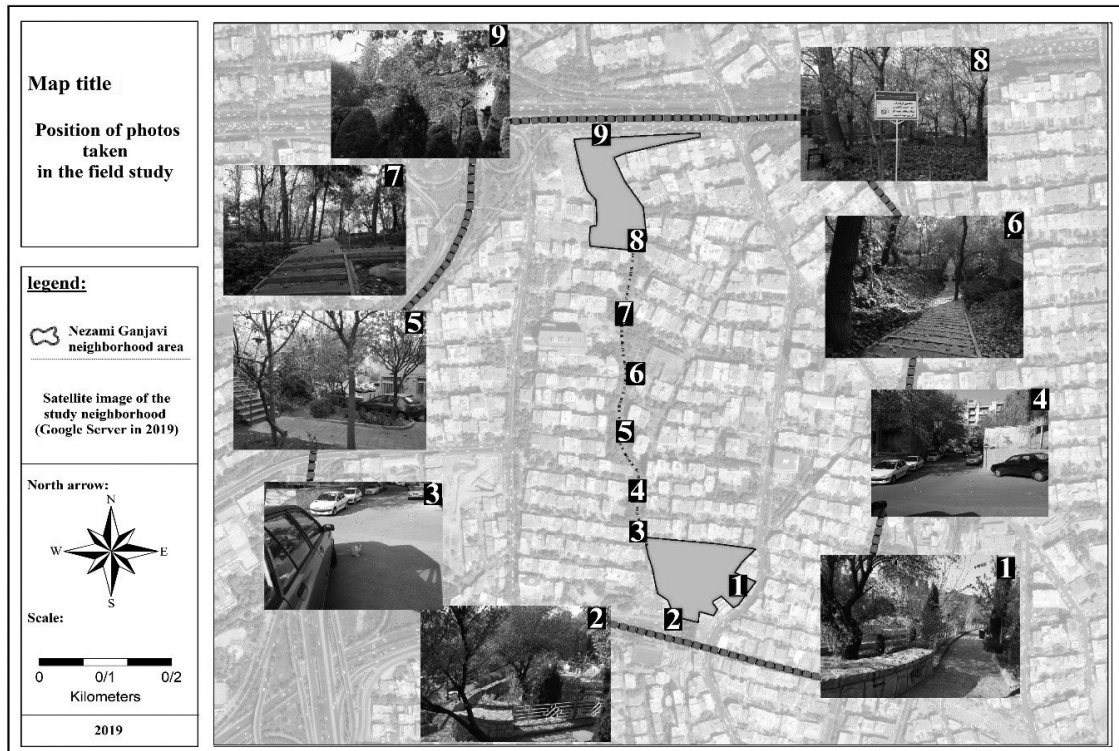


Fig. 3. The Position of Mages in Field Survey

6. RESULTS AND DISCUSSION

According to the literature, the indicators including clean and pollution-free air near greenway, soil cleanness, the existence of happy greenspace and parks, calming sounds, presence of urban animals and birds, cohesion and continuity of green spaces, and beautiful landscape have been considered as independent variables. The correlation of these variables with the variable of public satisfaction was analyzed using multivariate regression. In this model, the coefficient of correlation between the independent and dependent

variables, model fitness, and the determination power of dependent variable using independent variables, and regression coefficient of independent variables have been analyzed. The model summary has been presented in Table 4. The correlation (R) between variables was obtained at 0.878, which shows a significant correlation between independent and dependent variables. The adjusted regression (R^2 adj) at 0.757 shows that 75.7% of total variances of satisfaction was explained by the 8 mentioned independent variables. In other words, the independent variables estimate 75% of variances in satisfaction.

Table 4. Summary of Regression Model

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.878	0.771	0.757	0.44247

The F value in multivariate regression presents the model fitness level. The value shows that whether the independent variables can explain the variances of the dependent variable properly or not. This can be cleared by an F value lower or higher than 0.05. The F value was obtained by dividing mean squares of regression into residual mean squares. In this study, based on the

significance level of the F-test (53.04) and confidence level of 95%, and p -value < 0.05, it could be mentioned that the regression model is fit, and the independent variables can explain satisfaction variances properly. It means that independent variables have affected dependent variables significantly (Table 5).

Table 5. F-test of Regression Model

Model	df	Mean Square	F	Sig.
Regression	8	20.385	53.042	0.000
Residual	361	0.396	-	-
Total	369	-	-	-

The status of environmental indicators of greenway in the Nezami Ganjavi Neighborhood showed that each indicator has affected satisfaction levels different from

others. The effectiveness coefficients of independent variables are presented in Table 6.

Table 6. Coefficients of Independent Variables

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.178	0.177		1.008	0.004
Existence of Parks and Happy Greenspace	0.212	0.04	0.301	7.068	0.000
Clean and Pollution-Free Air in Greenway	0.202	0.045	0.204	4.68	0.000
Clean and Pollution-Free Air Near the Greenway	-0.004	0.056	-0.005	-0.065	0.948
Soil Coating Cleaning	0.067	0.056	0.075	1.206	0.23
Calming and Non-Disturbing Sounds	0.118	0.065	0.16	2.587	0.011
Presence of Urban Animals and Birds	0.147	0.042	0.128	2.661	0.000
Continuity, Cohesion, and Integration of Greenways and Spaces	0.014	0.055	0.016	0.257	0.797
Existence of Beautiful Landscape and Sight	0.111	0.045	0.121	2.009	0.004

At the confidence level of 95%, it could be mentioned that indicators including the existence of happy greenspace and parks, clean and pollution-free air near greenway, calming sounds, presence of urban animals and birds, and beautiful landscape have significantly affected public satisfaction. However, clean and pollution-free air, soil cleanness, continuity, and cohesion of green spaces have not affected satisfaction significantly because of the t-value at $p\text{-value} > 0.05$. according to field investigations, scattered waste, unauthorized car parking in different locations, lack of appropriate ramp and stairs in the greenway, and discontinuity of the floor and wall of greenway axis confirm the insignificant effect of these indicators on the satisfaction of residents. The number of greenways is limited compared to the number of neighborhoods in Tehran. Weakness of the said indicators and insignificant effect on satisfaction showed that the urban management policies are not favorable to take benefit of studied greenway, and the strengths have not been used properly. Therefore, future policy-making processes should use operational solutions to solve these problems and the problems in the agenda of urban management, so that the efficiency and effectiveness of all indicators of greenway become significant.

The indicator "happy greenspace and park" with a regression coefficient of 0.301; clean and pollution-free air in the greenway with a regression coefficient of 0.204; calming sounds with regression of 0.160; the presence of urban animals and birds with regression of 0.128, and beautiful landscape with regression of 0.121 have has the most effect on satisfaction respectively. One percent increase in the standard deviation of each environmental indicator (respectively for said indicators), satisfaction was increased at 0.301, 0.204, 0.160, 0.128, and 0.121 respectively. This issue emphasizes planning and designing greenway indicators and elements due to their responsiveness to

the realization of maximum utilization of greenway in the neighborhood.

Over the decades, various problems have been created in the management and planning system of the majority of cities, especially cities in developing countries, based on rapid urbanization growth and increased population more than the ecologic capacity of cities. The increasing process of consuming types of nonrenewable energies, and producing various types of pollutants on one hand, and weakened man-nature relationship and its bad effects on lifestyle and human's soul, on the other hand, can be the most underlying problems in this field. According to the recreational, economic, historical, social, cultural, and ecologic features of greenway, it could be mentioned that providing conditions for the formation and development of greenways in urban neighborhoods can be an efficient strategy to solve a major part of these problems. In addition to bringing the natural environment into urban life, greenways can be a platform for neighborhood communications to realize 15-20min cities. Also, scattered distribution of green space through the neighborhoods can pave the way for different age groups to have access to green space. Efficient and organized greenway in neighborhoods prevents the spread of diseases and pandemics through decreasing trans-neighborhood communications and increasing greenness in the neighborhoods.

7. CONCLUSION

According to the academic literature, it could be mentioned that the necessity of investigating environmental problems, and sustainable development in different fields, especially in the field of urbanization and architecture, has gained the attention of scholars in different fields. The environmental component can be one of the main dimensions of sustainable development. Various urban elements can affect the environmental conditions of urban habitats. Greenway

as an urban element leaves different environmental, physical, social, and other effects. It encompasses various recreational types, historical and cultural landscapes, ecologic, riverside, urban landscapes, and greenway networks. The linearity and spatial expansion of greenway make it encompass the distribution of environmental effects and a wide range of locations and limits. The greenways have possessed a few studies in the world, and the majority of studies are associated with greenways in the range beyond a neighborhood. According to the modeling process in this study, the analysis showed that 75% of variances of satisfaction with the environmental status of greenway in the study area was dependent on the effective indicators explained in the study. As a result, 25% of the satisfaction rate that is not predicted should be attributed to the weakness of indicators, which left no significant effect on satisfaction, and those indicators ignored in the modeling process. On one hand, the satisfaction rate varies under the effect of indicators of happy greenspace and park, clean and pollution-free air in greenway, calming sounds, presence of urban animals and birds, and beautiful landscape. Although the indicators have a significant effect on satisfaction, the functions of these variables are not the same. On the other hand, indicators of clean and pollution-free air in greenway, cleanness of soil, continuity, and cohesion of green spaces could not affect public satisfaction significantly. Therefore, it could be mentioned that future policy-making plans should consider instructions in the agenda of urban management to enhance the functional level of environmental indicators affecting public satisfaction (suggestions of second priorities). Also, the policies should pave the way for the effectiveness of indicators without effect and function, so that the weakness of the said indicators is met, and satisfaction with environmental conditions is increased as much as possible (suggestions of the priority). It should be noted that the present study aimed at introducing environmental indicators of neighborhood greenway, and analyzing the satisfaction caused by them in the study area. Analysis of the physical, infrastructural, and social indicators to continue the

investigations and richness of greenway organization situation can be the subject of further studies. Hence, the suggestions to enhance the satisfaction of residents with the efficiency of greenway in the Nezami Ganjavi Neighborhood are:

Priority:

- Preventing destructive constructions and avoiding occupation of natural spaces of greenway,
- An appropriate combination of natural and manmade landscape in the greenway and creating coherent floor and walls,
- Prevention of car parking in public spaces of greenway,
- Providing preparations to clean the environment and prevent leaving wastes in the greenway,
- Appropriate orientation of construction masses based on wind direction in the neighborhood for more infiltration of clean air produced by the greenway in the neighborhood.

Second priority:

- Adjusting greenway constructions with natural and climatic elements of the neighborhood,
- Preventing destruction, coverage, and removal of natural elements in the greenway corridor,
- Opening the sights to natural elements and landscapes, and indicator points of the neighborhood,
- Preventing closed sight by physical elements, and unfavorable volumes in the greenway,
- Using local vegetation based on the climate to provide climatic comfort in the neighborhood and increasing greenness,
- Controlling discomforting climatic factors, such as wind, glacial, and heavy snowfall in the winter based on topographic conditions of greenway.

According to the literature, and obtained results, it could be mentioned that natural spaces, especially greenway, should be pulled into urban spaces more than before and they should be considered in urbanization plans on one hand. The existing greenways in urban spaces need renewal and improvement over time, and they should be promoted in different periods based on a variety of needs, qualities, and quantities on the other hand.

END NOTE

1. Statistical Center of Iran.

REFERENCES

- Aryanpur Kashani, A. (1984). The New Unabridged English - Persian Dictionary, Amirkabir Press, Tehran.
- Azizi, M. (2001). Sustainable Urban Development, Understanding and Analysis from Global Perspectives. *Journal of Soffeh*, 33, 14-27. <https://www.sid.ir/fa/Journal/ViewPaper.aspx?id=47098>
- Bahrainy, H. (2006). Modernism, Postmodernism, and after in Urban Design and Planning, Second Edition, Tehran University Press, Tehran.
- Baris, M.E., Erdogan, E., Dilaver, Z., & Arslan, M. (2010). Greenways and the Urban Form: City of Ankara, Turkey. *Biotechnology and Biotechnological Equipment*, 24(1), 1657-1664. <https://doi.org/10.2478/V10133-010-0022-6>
- Bischoff, A. (2003). The New Generation of Greenway Planning: More Sustainable Forms for the City, Department of Landscape Architecture and Regional Planning Press, Amherst.
- Boone, Ch., & Modarres, A. (2010). City and Environment. (J. Aghili, & Mandana Nourbakhsh, Trans.). Shahr-e Ab Press, Tehran.
- Chang, P.J. (2020). Effects of the Built and Social Features of Urban Greenways on the Outdoor Activity of Older Adults. *Landscape and Urban Planning*, 204(November 2019), 1-13. <https://doi.org/10.1016/j.landurbplan.2020.103929>
- Chang, P.J., Tsou, C.W., & Li, Y.S. (2020). Urban-greenway Factors' Influence on Older Adults' Psychological Well-being: A Case Study of Taichung, Taiwan. *Urban Forestry and Urban Greening*, 49, 1-32. <https://doi.org/10.1016/j.ufug.2020.126606>
- Cowan, R. (2005). The Dictionary of Urbanism, Streetwise Press, London.
- European Greenways Association. (2000). The European Greenways Good Practice Guide: Examples of Actions Undertaken in Cities and the Periphery. EUROPEAN COMMISSION: DG Environment. <http://www.aevv-egwa.org>
- Fabos, J.G. (2004). Greenway Planning in the United States: Its Origins and Recent Case Studies. *Journal of Landscape and Urban Planning*, 68(2-3), 321-342. <https://doi.org/10.1016/j.landurbplan.2003.07.003>
- Hanachi, S., & Ghaznavi, M. (2009). Greenway Planning: From Local Plans to Comprehensive Planning for National Multipurpose Roads. *Journal of Hoviat-e shahr*, 4, 59-70. https://hoviatshahr.srbiau.ac.ir/article_1102.html?lang=en
- Jepson, E.J. (2001). Sustainability and Planning Diverse Concepts and Close Associations. *Journal of Planning Literature*, 15(4), 499-510. <http://dx.doi.org/10.1177/08854120122093159>
- Lindsey, G. (1999). Use of Urban Greenways: Insights from Indianapolis. *Journal of Landscape and Urban Planning*, 45(2-3), 145-157. [https://doi.org/10.1016/S0169-2046\(99\)00023-7](https://doi.org/10.1016/S0169-2046(99)00023-7)
- Little, C.E. (1990). Greenways for America, Johns Hopkins University Press, Baltimore.
- Liu, Z., Lin, Y., De Meulder, B., & Wang, S. (2020). Heterogeneous Landscapes of Urban Greenways in Shenzhen: Traffic Impact, Corridor Width and Land Use, *Urban Forestry and Urban Greening*, 55(October 2019), 1-13. <https://doi.org/10.1016/j.ufug.2020.126785>
- Makhdoum, M. (2002). Fundamental of Land use Planning, Tehran University Press, Tehran.
- Pasban Hazrat, GH. (2001). River-Valleys of Iranian cities, Bond Platform of Human, City and Nature. *Journal of Architecture and Urban Development*, 9(58-59), 5-21. <https://www.sid.ir/fa/journal/ViewPaper.aspx?ID=104685>
- Quan, S.J. (2019). Smart Design for Sustainable Neighborhood Development. *Energy Procedia*, 158(2018), 6515-6520. <https://doi.org/10.1016/j.egypro.2019.01.108>
- Rafati, M., & Bemanyan, M. (2016). Assessing Principles and Criteria for Designing Urban Greenway to Improve Social Sustainability, The 4th International Conference on Civil Engineering, Architecture and Urban Development, Shahid Beheshti University, Tehran. <https://civilica.com/doc/620052>
- Shokri, R. (2013). Urban Land Use from Sustainable Development Approach, The First Conference on Sustainable Architecture and Urban Development, Tehran. <https://civilica.com/doc/213894>
- Sims Gould, J., Race, D.L., Vasaya, N., & McKay, H.A. (2019). A New Urban Greenway in Vancouver, British Columbia: Adolescents' perspectives, Experiences and Vision for the Future. *Journal of Transport and Health*, 15(August), 1-10. <https://doi.org/10.1016/j.jth.2019.100620>
- Tan, K.W. (2006). A Greenway Network for Singapore. *Journal of Landscape and Urban Planning*, 76 (1-4), 45-66. <https://doi.org/10.1016/j.landurbplan.2004.09.040>
- Turner, T. (2006). Greenway Planning in Britain: Recent Work and Future Plans. *Journal of Landscape and Urban Planning*, 76(1-4), 240-251. <https://doi.org/10.1016/j.landurbplan.2004.09.035>

- Vatanparast, E., Oladi Ghadikolaee, J., & Akbari, M. (2015). Planning Urban Greenways (Case Study: The Urban District 11 of Mashhad Metropolis). *Journal of Geography and Urban Space Development*, 2(2), 91-104. <https://dx.doi.org/10.22067/gusd.v2i2.45209>
- Viles R.L., & Rosier D.J. (2001). How to Use Roads in the Creation of Greenways: Case Studies in Three New Zealand landscapes. *Journal of Landscape and Urban Planning*, 55(1), 15-27. [https://doi.org/10.1016/S0169-2046\(00\)00144-4](https://doi.org/10.1016/S0169-2046(00)00144-4)
- Von Haaren, C., & Reich, M. (2006). The German Way to Greenways and Habitat Networks. *Journal of Landscape and Urban Planning*, 76(1-4), 7-22. <https://doi.org/10.1016/j.landurbplan.2004.09.041>
- Wang, H., Dai, X., Wu, J., Wu, X., & Nie, X. (2019). Influence of Urban Green Open Space on Residents' Physical Activity in China. *BMC Public Health*, 19(1), 1-12. <https://doi.org/10.1186/s12889-019-7416-7>
- Watson, D., Plattus A., & Shibley, R. (2004). Time-saver Standard for Urban Design, McGraw-Hill Press, New York.
- Yankel, F. (2004). *Sociologie de la Ville*, (A.H. Nick Gohar, Trans.). Agah Press, Tehran.
- Zakaria El Adli Imam, K. (2006). Role of Greenway Systems in Planning Residential Communities: a Case Study from Egypt. *Journal of Landscape and Urban Plannin*, 76(1-4), 192-209. <https://doi.org/10.1016/j.landurbplan.2004.09.032>
- Zayyari, K. (2001). Sustainable Development and Responsibility of Urban Planners. *Journal of the Faculty of Literature and Humanities*, 4, 371-386. <https://www.sid.ir/fa/journal/ViewPaper.aspx?id=11097>
- Zhang, L., & Wang, H. (2006). Planning an Ecological Network of Xiamen Island (China) Using Landscape Metrics and Network Analysis. *Journal of Landscape and Urban Planning*, 78(4), 449-456. <https://doi.org/10.1016/j.landurbplan.2005.12.004>

HOW TO CITE THIS ARTICLE

Saidi, M., Behzadfar, M., & Mofidi Shemirani, S.M. (2021). Analysis of the Satisfaction Rate Affected by Environmental Indicators of Neighborhood Greenway; Case Study: Greenway of Nezami Ganjavi Neighborhood of Tehran. *Armanshahr Architecture & Urban Development Journal*. 14(34), 215-226.

DOI: 10.22034/AAUD.2021.192118.1923

URL: http://www.armanshahrjournal.com/article_131929.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/>

