

Obtaining Pedestrian-Oriented Paths Based on the Urban Area Quality Accessibility Parameters (Case Study: Chizar District, Between Upper Hashemi and Kalhori streets)

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ABSTRACT

In recent decades, specific paths have attracted a special attention in urban issues in order to improve the quality of urban space. The quality of urban areas has been decreased due to the growth of science and technology, the invention of the automobile and unorganized expansion of the cities, leading to the lack of human-centered spaces. In the present study, after reviewing the concepts and theories related to the walkways, a Case Study (Chizar district) has been discussed. The data collection and the statistical sample selection was done using questionnaire technique and Cochran formula, respectively. Finally, by using the factor analysis technique using SPSS it was concluded that there was a significant relation between the functional and aesthetic parameters and obtaining pedestrian paths in Chizar district, between Upper Hashemi and Kalhori streets.

Key words: Pedestrian-oriented, parameter, urban space quality, district.

INTRODUCTION

Urban development and governing effects of modernization in the past few decades has been accompanied with a lot of problems and concerns including heavy traffic and reduction of human position in urban areas. This has caused walkways to lose their position day by day and movement of vehicles dominates the urban space. On the other hand, a quick look at the metropolis of Tehran, in particular its districts reveals the weak role of these spaces. Identification of the urban space quality principles and taking them into account in obtaining pedestrian-oriented paths can restore the role of such spaces in cities.

Literature Review

Basic definitions and concepts

Walkways are paths with the highest social role dominated by the pedestrians and motor vehicles are only used to serve them. Walkways are tools for group activities including urban economics, environment quality and social health. A new consideration to move on foot, as the most healthy urban transportation has been seriously taken by the urban management as an agenda (Pakzad, Jahanshah, 2005). In this context, various conferences around the world are being held in order to explain the importance of the issue and share the ideas. Among the most influential thinkers of the walkways is Jacobs that criticized the modernist

thinking about the streets, and emphasized the importance of walkways. Gordon Cullen, in "the urban landscape", in confirmation of Jacobs and against modernist architects, considers an urban environment as a desired one if the man could walk through the city and the city scale would be a human scale. Rob Carrier (1979) in "Urban Space" considers the structure of a city being made up of streets and squares, and pays more attention to the social role of the streets and their being supervised by the people (Uhlig, Klaus, 2003).

Effective parameters on the spatial quality of the walkways

According to many theorists, the effective parameters on the space quality can be divided into 2 groups of functional and aesthetic parameters, each of which is divided into sub-parameters. For example, functional parameters include sub-parameters of accessibility, safety and attention to vulnerable individuals, and aesthetic parameters include sub-parameters of vitality and readability. Here is a brief description of the above mentioned concepts.

Vitality

The word is defined as viability in urbanism. Diversity and being active are the two parameters that probably influence the vitality of urban spaces. One way to achieve diversity is to use urban symbols, which are defined using the existing body and texture values that in turn adds to the path readability and change it to a symbol (Khastu, M. 2010).

Readability

Normally, some degree of the choice offered by a place is related to its readability. Walkways are public areas, which can provide a variety of options to improve public life quality. The cleanliness and beauty of the walkways will increase people attendance and the use of the space.

Accessibility

Only available places to the people present them a choice. Since the accessibility is one of the major factors in achieving the desirability, it should be considered in the initial design steps of the walkways. In case of a public place, it consists of the accessibility to the walkway and the possibility of a visual interaction between the path and

body. Accessibility is the most important element, characteristic and function of the walkways.

Safety

Active presence of people in the city is among the factors that increase the safety and security of urban spaces that should be considered for its survival. If neglected, the quality of the city is reduced and the meaning of city disappears. Citizens should always be secure against vehicles and motorcycles in the walkways and vehicles traffic should be strictly controlled (Zadeh, Shahab, (2011).

Given the increasing population and current status of disabled people in the world due to wars, disasters, disease, etc., their safety in all urban areas and planning, and attention to this vulnerable population should be more and more considered in all aspects of the society. Accordingly, attention to the disabled people rules and regulations in the planning and design of urban spaces is of utmost importance so that such people, like other populations of the society, could have a secure access to the urban areas. In addition, a quick look at the age groups in urban areas indicates that in line with adults, children also have a continuous presence. Because of the special needs by children in all aspects of life, special care should be taken in planning and design of urban areas to this vulnerable population of the society. This can result in the growth and progress of the children as builders of future society. An overview of the concepts has been presented in Table 1.

Conceptual Model

The present work is a case study (Chizar district) located in Tehran. Combined research method has been used in which theoretical basics of the research were studied in the qualitative section. In continue, a region located between Upper Hashemi and Kalhori Streets has been studied in the quantitative section, for validation of the obtained results in the qualitative section. Finally, both direct and indirect methods (questionnaires) were used in data collection. Cochran formula and SPSS software were used to select the statistical sample and perform the inferential and descriptive analyses. Two main hypotheses of this study include the followings.

- 1- Security and accessibility plays an important role in improving the walkways.
- 2 Readability and vitality are two important factors in improving walkway aesthetics.

questionnaires were distributed randomly among them.

Case study

Chizar district is one of the old districts in Tehran which is located in zone 1 of the municipal classification. Because of the large size of the district, and to obtain more accurate results due to the existing potentials, part of the district located between Upper Hashemi and Kalhori Streets was selected considering the following criteria: (1) lack of appropriate walkways and also paths for the dominant and irregular traffic of the vehicles within range, (2) location of the religious centers (Holy Shrines of Emamzadeh Ali-Akbar and Emamzade Ismail) in this area induces the greatest potential for the people visiting on foot, (3) Commercial stores provide the necessary conditions for the district being pedestrian-oriented.

Data collection methods and tools

Concepts and literature review data, and also the data used to confirm or refute the hypotheses of the study, were collected using library and field methods. Data was collected using questionnaire tool in which a series of targeted questions were designed to evaluate perspectives and insights of the individuals using different scales (Hafez Nia, M. 2009).

Statistical population and sample selection

A statistical population is a collection of individuals or units, which have at least one common characteristic. The statistical population should be defined comprehensively to include all the studied units in terms of time and space (Hooman Heydar Ali. 2002). Residents of Chizari district, between Upper Hashemi and Kalhori streets form the statistical population of this work. The objective of all samplings in scientific research is to prepare accurate and meaningful statements about a group by studying a subset of the study group. Characteristics of the study group are obtained only if different states or different instances of the phenomenon under study would be tested several times (through observation or experience) (Hooman Heydar Ali. 2002). To determine the sample size, a pilot study was performed by preparing questionnaires to 25 individuals from the statistical sample and a 95 percent significance level, and the sample size was calculated using Cochran formula:

The questionnaire consisted of two sets of general and especial questions. General questions included demographic characteristics of the respondents, and 24 special questions were also included. The questionnaire was valid and reliable. Validity of the questionnaire means that the included questions in the tool carefully evaluate the variables of the study subject (Hafez Nia, M. 2009). Reliability of the questionnaire implies that in the same conditions, to what extent do the same results are obtained (Hafez Nia, M. 2009) that can be calculated using Cronbach’s alpha coefficient. For this purpose, the variance of each of the questionnaire questions and variance of the whole test must be first calculated. Then, Cronbach’s alpha coefficient is calculated using the following formula.

$$n = \frac{\frac{Z^2 pq}{d^2}}{1 + \frac{1}{N} (\frac{Z^2 pq}{d^2} - 1)} \dots(1)$$

$$\alpha = \frac{k}{k - 1} \left(1 - \frac{\sum S_i^2}{S_x^2} \right) \dots(2)$$

Where α is Cronbach’s alpha, K is the number of questions in the questionnaire, S_i is the variance of *ith* question, and S_x is the variance of the whole test.

According to the calculations, 150 people were selected as the statistical sample and

In this study, a Cronbach’s alpha coefficient of 0.82 was obtained in a pilot study containing 30 questionnaires. It is worth mentioning that Cronbach’s alpha coefficients greater than 0.7 indicate a good reliability of the questionnaire.

Test of data normality

Because structural model-based researches are based on the data normality assumption, so the normality test was done at the first step. Normality assumption of data in the significance level of 5%

was tested using Kolmogorov-Smirnov test using the following statistical assumptions:

- H_0 : Data distribution of each variable is normal;
- H_1 : Data distribution of each variable is not normal.

The results of the data normality test are shown in Table 2. In all cases, a significance level larger than 0.05 was obtained. Therefore, null hypothesis of a normal data distribution is not rejected. In other words, research data is normal and parametric tests can be performed.

Confirmation of the hypotheses

After verification of the applied scale, collected data was used to confirm the hypotheses using one-sample t-test. Because the five-point Likert

scale was used, so the hypotheses of the test were statistically stated as follows:

$$H_0: \mu \leq 3$$

$$H_1: \mu > 3$$

This test was performed at significance level of 95%, therefore an error level of 0.05 was considered. In other words, the error level was 0.05. So if the test statistic (or significant value of P-Value) would be lower than the error, the null hypothesis will be rejected, and the test hypothesis would be confirmed. Otherwise, null hypothesis would not be rejected.

Table 1: Theorist views based on parameters (Authors, 1389)

Parameter	Sub-parameter	viewpoints
Functional parameter	Accessibility	Attention to human population, mixed use, various activities, flexibility, applicability, compatibility, accessibility of spaces, access to the activities, existence of accessible spaces.
	Security	Attention to moving on foots, security, spatial safety, rules, monitoring and surveillance.
Aesthetic parameter	Attention to vulnerable groups	Disabled-centered, child-centered
	Vitality	Social vitality, attention to the spaces, attention to the ancient elements, diversity, and social activities.
	Readability	Meaning, relevance, readability, geometric order, being rich, visual suitability, order priority, visual order and aesthetic principles, landscape diversity.

Table 2: Data normality test

Test	Kolmogorov-Smirnov		Shapiro -Wilk	
	Significance	Degree of freedom	Significance	Degree of freedom
Accessibility	0.091	150	0.982	150
Security	0.116	150	0.978	150
Vitality	0.069	150	0.992	150
Readability	0.115	150	0.970	150

Table 3: One-sample t-test results of the first research hypothesis

Research hypotheses	T-value	Average	Significance	Confidence Interval 95%	
				Lower limit	Upper limit
Security	8.138	3.495	0.000	0.374	0.615

According to the results listed in Table 3, a significance value of 0.000 was obtained that was smaller than the error level (0.05). Therefore, the null hypothesis is rejected. In addition, the upper and lower limits of the confidence interval were positive values (greater than zero) and regarding the mean value which was larger than 3, the study claim was confirmed. Thus, with a significance level of 95% it can be stated that security plays an important role in improving a walkway performance.

According to the results listed in Table 4, a significance value of 0.000 was obtained that was smaller than the error level (0.05). Therefore, the null hypothesis is rejected. In addition, the upper and lower limits of the confidence interval were positive values (greater than zero) and regarding the mean value which was larger than 3, the study claim was confirmed. Thus, with a significance level of 95% it can be stated that accessibility plays an important role in improving a walkway performance.

According to the results listed in Table 5, a significance value of 0.017 was obtained that was smaller than the error level (0.05). Therefore, the null hypothesis is rejected. In addition, the upper and

lower limits of the confidence interval were positive values (greater than zero) and regarding the mean value which was larger than 3, the study claim was confirmed. Thus, with a significance level of 95% it can be stated that vitality plays an important role in improving aesthetics of a walkway.

According to the results listed in Table 6, a significance value of 0.023 was obtained that was smaller than the error level (0.05). Therefore, the null hypothesis is rejected. In addition, the upper and lower limits of the confidence interval were positive values (greater than zero) and regarding the mean value which was larger than 3, the study claim was confirmed. Thus, with a significance level of 95% it can be stated that readability plays an important role in improving aesthetics of a walkway.

According to the results listed in Table 7, all the averages are greater than 3, which is the average of the Likert scale. However, relying on average values is not statistically a reliable approach and one-sample t-test was used. In all cases, significance levels were smaller than the error level (0.05). Therefore, the null hypothesis was rejected in all cases. The upper and lower limits of the confidence

Table 4: One-sample t-test results of the first research hypothesis

Research hypotheses	T-value	Average	Significance	Confidence Interval 95%	
				Lower limit	Upper limit
Accessibility	9.804	3.496	0.000	0.396	0.596

Table 5: One-sample t-test results of the second research hypothesis

Research hypotheses	T-value	Average	Significance	Confidence Interval 95%	
				Lower limit	Upper limit
Vitality	12.855	3.496	0.017	0.501	0.636

Table 6: One-sample t-test results of the second research hypothesis

Research hypotheses	T-value	Average	Significance	Confidence Interval 95%	
				Lower limit	Upper limit
Readability	3.564	3.235	0.017	0.104	0.365

Table 7: One-sample t-test results of all 4 hypotheses

Research hypotheses	T-value	Average	Significance	Confidence Interval 95%	
				Lower limit	Upper limit
Security	8.138	3.495	0.000	0.374	0.615
Accessibility	9.804	3.496	0.000	0.396	0.596
Vitality	12.855	3.496	0.017	0.501	0.636
Readability	3.564	3.235	0.017	0.104	0.365

Table 8: Friedman test outputs

Variable	Friedman Rank	Priority level
Accessibility	2.51	3
Security	2.56	2
Vitality	2.78	1
Readability	2.15	4

Table 9: Friedman test significance

Number	Degree of freedom	Significance
150	3	0.000

interval were also positive (greater than zero) and the study hypotheses were confirmed. In addition, in order to determine the importance level of the four studied variables, Friedman test was used and results are presented in Table 8.

According to Friedman test results, vitality with a Friedman rank of 2.78, security with a Friedman rank of 2.56, accessibility with a Friedman rank of 2.51 and finally readability with the lowest Friedman rank of 2.15 take the 1st, 2nd, 3rd and 4th priority levels, respectively.

Significance test was also performed to confirm the reliability of the results and a significance value (test statistic) lower than the error level obtained. Therefore, research findings could be relied on (Table 9).

CONCLUSIONS

Analysis of the obtained results using the theoretical (qualitative) principles as well as field (quantitative) studies (questionnaire) resulted in the following conclusions:

Among the qualitative parameters of the pedestrian-oriented spaces, vitality component that in turn includes the diversity and being active

parameters, takes the highest importance among other components in obtaining the pedestrian-oriented paths. Security, accessibility and readability take the next priorities, respectively.

According to the library researches that resulted in theoretical principles of the research, and collected data using questionnaire technique as well as analyses, research hypothesis evaluated as follows:

Vitality, security, accessibility, and finally readability components had significant effects on obtaining the walkways, respectively. In other words, the two principal space quality factors of performance (accessibility and security) and aesthetic (vitality and readability) play significant roles in obtaining pedestrian-oriented paths in Chizar district.

To provide a good strategy in obtaining the pedestrian-oriented paths in Chizar district base on aesthetic (vitality and readability) and functional (accessibility and security) components and also considering the district potentials, the following approaches were recommended:

With respect to the aesthetic (vitality and readability) component, location of the two holy shrines (Emamzade Ali Akbar and Emamzade

Ismail) as religious and social centers as well as the location of service applications in the region located between the two streets provide a strong potential for considering a walkway in the area. Accordingly, long-term resting places near the shrine as well as urban furniture suitable for short breaks along the path should be considered along with green spaces and proper lighting, walkway cleanliness and places with the capability of group activities, such as temporary exhibitions, theater performances etc. these measures can play an important role in obtaining walkways based on the aesthetic component and serve as incentives for people to use the walkways.

With respect to the functional (accessibility, security and attention to vulnerable groups) component, urban spaces should be created based on a human scale and the human needs so that barriers and elevation differences would not exist along the walkway as much as possible. In addition, considerations for people with disabilities, including standard floors should be considered along the walkways. Walkways should also have an appropriate access to the surrounding areas. Finally, regarding the security issue, by standardization of the walkways and vehicle paths as well as establishment of the police kiosks along the paths, a secure environment would be provided for the pedestrians. Observing these factors can highlight the effect of functional component on obtaining the walkways.

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