

Assessment the Quality and Ability of Walking Based on Sustainable Urban Development Patterns (Case Study: Black-Stone District in Shiraz City)

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ABSTRACT

The current investigation tries to study the ability to walk (walkability) in Shiraz urban space (Black-Stone district), the observation and field analysis of walkability components. This study seeks to answer the question: how does the walking axis, in Black-Stone district, affect the walkability issue on sustainable developmental patterns?

The research design is descriptive-analytical and data collection is done via surveys. The population comprised the citizens living in Black-Stone area with a population of 4694 persons, and the sample consisted of 355 people which was obtained via the Cochran formula. In order to measure the degree of walkability, a 28 item researcher-made questionnaire was used, in which walkability components such as safety, relaxation, access, etc. were measured. The face and content validity of the questionnaire was ascertained by the Urban Planning department of Isfahan University and other professionals in the discipline; also, the reliability index was obtained (0/863) which indicated the stability of the questionnaire. After collecting the questionnaires and indicating their normality by Kolmogorov-Smirnov test; and in order to display the mean of every variable, the single sample t-test was used; and to display the interconnectedness of the means the Bonferi test was incorporated. In addition, to display maps, the ARC GIS software was used. The results of this study show that walkability and its components do not have a good condition in Black-Stone district.

KEYWORDS: Black-Stone District, Shiraz, sustainable urban development, Tourism Axis, Walkability

1. INTRODUCTION

In historical investigations, it's evident that even in ancient human societies like Iran, Egypt and Greece man has always been on the move either in the form of religious ceremonies or etc. And during history he has conducted various movements and immigration acts for excitement and enhancing his family and his safety and life; the most glorious ancient nations are an evidence to this claim. Today, however, in metropolitans such as Shiraz, social-cultural connections have been forgotten; roads have turned into parking lots for differing automobiles, and most of man's life is wasted in these traffics.

This has caused many problems for man, for example air pollution, visual and acoustic pollution i.e.the destruction of outlooks and view (Gharib, 2007)[1]. To solve these problems, urban designers have thought up to turn to the main variables of urbanization in societies. This thought is a subcategory of the Sustainable Urban Development Movement in which human scales are of primary importance in urbanization. One very important point to consider in urban design is the dependence on local movement, either in the form of being on foot or using a bicycle, so as to enhance social relations, fitness and sports in the public form, simultaneous to using urban facilities (Ebrahimpour & Partovi, 2006)[2].

But unfortunately, this form of urbanization and man-centered urban design has not received much attention. As a result, living in big cities has resulted in distancing citizens from activity and developing a high degree of dependence on automobiles; and even in times of leisure, minimum body activity is used. The majority of investigations have proven that there is a relationship between the level of citizens 'walking and the physical quality and well designing of the district; and to quote Sir Koolin Buchannan ' ' the most important sign of good quality of environment is the situation that man has to freely walk in the urban area and look around (Tibalds, 2004) [3].

In our country this a novel issue in urbanization and urban design, and this negligence can be seen not only in theoretical investigations, but also in the programming of urban spaces. Because up till now, the practical urbanization of Iran has considered pedestrian walkways not as independent spaces but as dependent on moving vehicles; and automobile programming has been prior to human programming. So, the main objective of this study is to determine the walkability status, and also, to define the safety axis situation, the accessibility, easiness and easement of the quality and ability to walk in relation to Black-Stone district. The results of this research can provide the necessary ground for urban management to improve the quality of sidewalks and walkable tourism axis. And finally, this topic is the basis of developing the culture to walk, citizen safety and tourism (Habibi, 2000) [4].

1.2.Sustainable Development

According to Brant Land, Sustainable Development comprises development that secures the world’s current needs without endangering the needs of the future generation (UNDP, 1998) [5]. The International Commission of Environment and Development define Sustainable Development as the change in the utilization of resources, guidance of capital, and orientation of technological development; and generally, the fundamental change that is compatible with current and future needs (Nasiri, 2000)[6]. Likewise, according to the Asian Productivity Organization, Sustainable Development is a strategy to boost the productivity and function of environment with the end of social and economic development (i.e. in all aspects), and to endure man’s quality of life.

1.3.Sidewalk and Pedestrian-orientated

Sidewalks are passages with maximum social influence, and in which total dominance is given to passer; the automobiles function only to give service to the people in the passage. Sidewalks are tools for group activities, especially in connection to city economy, environmental quality and social health (Pakzad, 2005)[7].

Walking is one of the most important aspects of human existence in urban spaces that results in the excitement and dynamism of these spaces, and also increases their social function. Sidewalks provide social activity, interaction, personal relaxation and a chance to disport.

Pedestrian orientation relates to widespread designing topics that are connected to walking. A pedestrian orbit comprises a location where the locals with any age and ability can walk and experience attraction and amiability, easement, convenience and safety while walking not only in time of leisure but also while practical movement.

The characteristics of an appropriate space for tourist and passerby crossing are listed below:

Table 1.Characteristics of suitable space for pedestrian crossing

Future	Providing facilities for passersby to satisfy their current and future needs.
Producing connections between different applications.	Providing passersby the facilities to shopping centers, transportation systems and tourism attraction via pedestrian corridors.
Shortening travels by convenient access.	Providing the link between the source and destination via the shortest path.
Separating walking and traffic paths.	Omitting traffic paths that disturb walking ones and separating them.
Considering passersby’ convenience when designing land patterns.	The utilization of checkered applications or small blocks in shopping centers and city centers to increase passerby’s mobility.
Efficient use of pedestrian facilities.	Appropriate width, best view distance, correct slope, lack of blind spots in the drainage system and appropriate pavement.
Determining pathways	The utilization of signs, signs marking line, safety reflectors and enough pathway indicators.
Safety and visibility	Sufficient light, appropriate visual horizons for passersby, and using appropriate safety equipment in pathways.
Tranquilizing the local traffic	Planting trees to display narrow streets, building ring roads and decreasing the number of cross roads are among the techniques to decrease car speed.
Attractive public spaces	Building attractive and safe public spaces in the course of sidewalks.
National pride	The use of historical and cultural architecture in passerby’s facilities.
Urban view	The use of attractive and beautiful spaces increases the number walking trips, especially if the passerby’s facility is provided (e.g. the use of public chairs)
Appropriate Green space	Planting trees and flower in between streets and sidewalks to heighten pedestrian beauty.
Preserving facilities	Repairing and cleaning facilities so as to preserve and persuade people to use them.

2. RESEARCH METHOD

The current investigation is of descriptive- analytic and data collection is in the form of survey. The population comprised of 4695 people living in Black-Stone area in Shiraz. Using the Cochran formula, 355 people were chosen by simple random sampling. The research instruments used to measure the degree of walkability in Black-Stone area is a questionnaire made up of 28 items, in which effective urbanization components (safety,

accessibility and convenience, relaxation and walkability) were measured and field analysis was conducted. Face and content validity was established by the urban planning lectures at Isfahan University and other professionals in the field; also, the reliability index was calculated as 0/863. After validity and reliability had been determined, the questionnaires were distributed according to the following table (2):

Table 2. Distributed questionnaires in the study area

Study area	North	South	West	East	Total
Number	80	90	85	100	335

Subsequently, after collecting the questionnaires and eliciting the data, the Kalmograph Smirtough test was used to determine the distribution situation. Then, in order to ascertain the mean situation of every component, the single sample t-test was used; and to indicate the relationship between the means of every component Bonferroni test was used.

2.2. Scope of Research

In this study, Black-Stone area was chosen as the research scope to obtain desired result. The Black-Stone district with an area of 54 hectors and a population of 4694, located in zone 8 of Shiraz and has old texture. This area is limited from the north to Sar-Bagh district and King’s Square, the south to Gateway Kazeroon and the east to Sardozak district which is separate area. From the time of Karim Khan Zand districts were made smaller and the city walls were much tighter. The Kazerron Gateway, which was separate area, became united with this district and together they were referred to as Black-Stone district. The name (Black-Stone) has come from the great scientist ‘Omar- ebne Osman Abu AL-Bashar’ famous as ‘Sibboye’. The great tomb is made of black stone, and is located in a small and abandoned room, and is in a very inappropriate condition. It was first named as ‘Sibboye Stone’, i.e. the district that has his black stone tomb; but over the years, due to public misunderstandings and the presence of the black stone, the name ‘Black-Stone’ has replaced the original name (Salimi, 2014)[8].

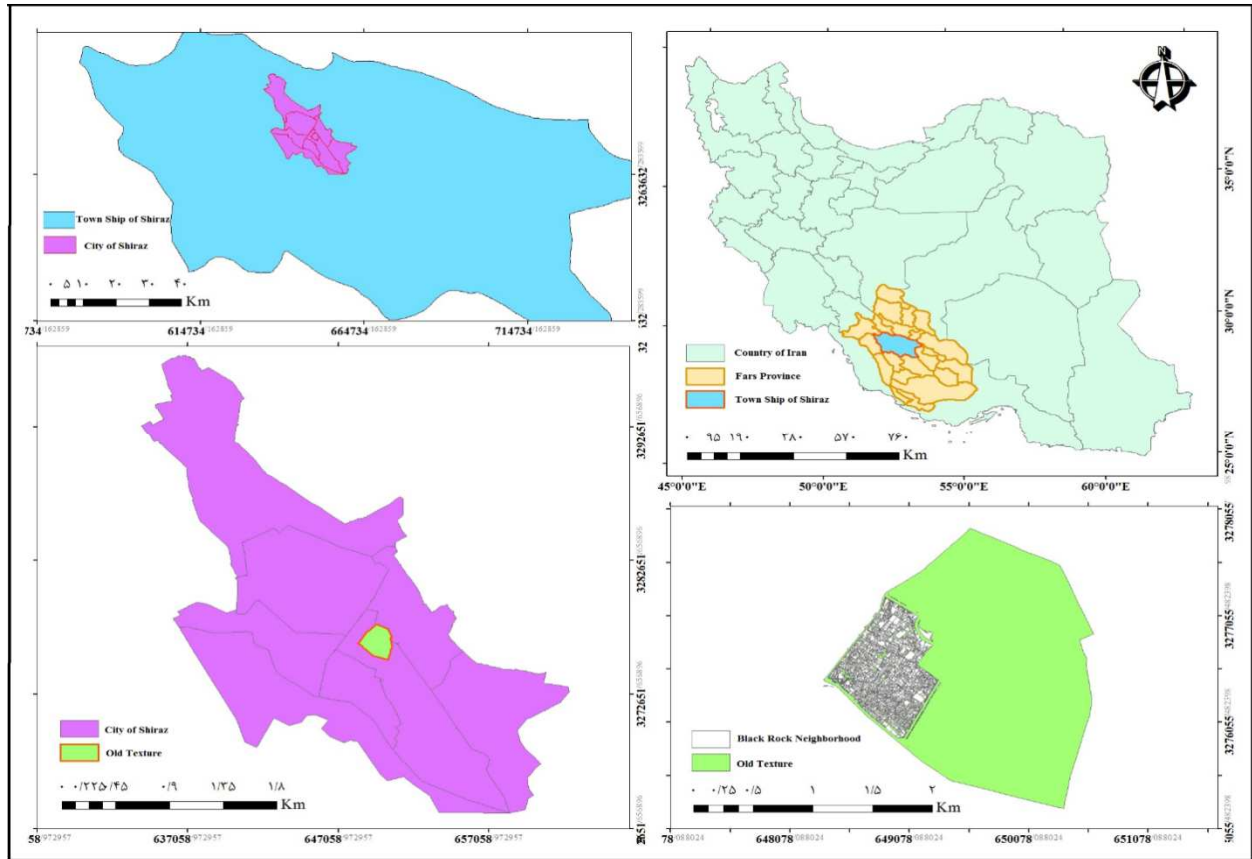


Figure 1. Old area and Black-Stone location in Shiraz

3.RESULTS AND DISCUSSION

3.1.Descriptive Results

The findings of the study indicated that 52/11%, 185 people, of the participants were women, and 47/88%, i.e. 170 people, were men. The participants' educational background had the following distribution:

- 1- Illiterate, 12/11%, i.e. 43 people.
- 2- Diploma and above diploma, 43/09%, i.e. 153 people.
- 3- B.A/B.SC, 30/70%, i.e. 109 people.
- 4- M.A. or above, 14/08%, i.e. 50 people.

Also, scrutinizing the participants' occupation indicated that 21/97%, i.e. 78 people, had government jobs; 41/60%, i.e. were self-employed and comprised most of the population; 9/58% were unemployed, i.e. 34 people; and 26/76%, i.e. 95 people, were students. The following table displays the number and duration of walks conducted by the participants in a week. This information was obtained via the distributed questionnaires.

Table 3.Frequency distribution of the number of hours people walk per week

Variable Option	Number of hours people walk per week		
	frequency	Frequency percent	cumulative frequency
Less than 2 hours	172	48.45	48.45
2to 4 hours	74	20.85	69.30
4to 6 hours	42	11.84	81.13
More than 6 hours	58	16.33	97.46
No answer	9	2.53	100
Total	355	100	100

According to table (4), maximum frequency belonged to people who walked less than 2 hours a day, i.e. 172 people equal to 48/45%; and minimum frequency was dedicated to people who walked 4to 6 hours per week (42 people, equal to 11/84%). As can be observed 9 people didn't respond.

Table 4. Frequency distribution of the number of times people walk per week.

Variable Option	Number of times people walk per week		
	frequency	Frequency percent	cumulative frequency
1 or 2 times	96	27.04	27.04
3 or 4 times	78	21.98	49.02
5 times or More	85	23.94	72.96
Did not Walk	47	13.24	86.2
No answer	49	13.80	100
Total	355	100	100

As stated by table (5), 27/04%, i.e. 96 people, walked 1 to 2 times per week which comprised the lowest amount; and 21/98%, i.e. 78 people, walked 3 to 4 times per week, and comprised the most. Also, from a total of 355 people 47 people indicated that they don't walk, and 49 people didn't answer.

3.2. Inferential Results

First to determine the normality of distribution, the Kolmogorov-Smirnov test was used, and the following table is an illustration of the results.

Table 5. Determine the normality of data distribution (Kolmogorov-Smirnov test)

Variable	Statistical index			
	Z	Sig.	Number	Test result
Walkability	0.793	0.555	355	Normal distribution

As the table presents, the level of significance exceeds 0/05, and this specifies that the null hypothesis is accepted. That is the null hypothesis 'the sample has been obtained by normal distribution' cannot be rejected. In other words, it has a normal distribution, and parametric tests were used to gain inferential analysis.

3.2.1. Investigating Walkability: The Case of Black-Stone (Black-Stone Tourism Axis)

Table 6 illustrates the results from the single-sample t-test that compares the means, and the hypothesis of walkability in Black-Stone area located in Shiraz.

Table 6. Single-sample t-test results of the comparison of observed and hypothetical ability to walk

Index	Variable	Hypothetical mean	observed mean	t-test	df	Sig.
	Walkability	88	77	-11.40	373	0.001

Likewise, and according to table6, it can be claimed that there is significant difference between the observed means and the hypothetical one. The hypothetical mean equates 88 and the observed mean equates 77, and this indicates that walking situation is not in an appropriate condition in Black-Stone district.

3.2.2. Investigating the Components of Walkability on Black-Stone Tourism Axis: The Case of Black-Stone District

Table 7 displays the results from the single-sample t-test that compares the observed and hypothetical means of every walkability component in Black-Stone district located in Shiraz.

Table 7. Single-sample t-test results of the comparison of observed and hypothetical Components of Walkability

Index	Variable	Hypotheticalmean	observedmean	t- test	df	Sig.
	Desirability and pleasantness	21	10.5	-6	373	0.001
	Comfort and convenience	23	18.7	-17	373	0.001
	Safety and Security	26	23.9	-6	373	0.001
	Facilities and Accessibility	19	17	-9	373	0.001

The results from table 7 indicate that there is significant difference between the observed and hypothetical means. For instance, considering the component of convenience and pleasantness the observed mean equated 19/5 and the hypothetical mean equated 21; the relaxation component had an observed mean of 18/7 and a hypothetical mean of 23; the safety component had an observed mean of 23/9 and a hypothetical mean of 26; and the accessibility component obtained an observed mean of 17 and a hypothetical mean of 19. As can be seen from the results, all the component observed means are less than the hypothetical counterparts; therefore, it can be claimed that all walkability component are not in an appropriate condition in Black-Stone area.

3.2.3. Determining the Relationship between Every walking component with the other:

Considering the objectives of the research and studying the difference between the four walkability components, the following table will display the results from the Bonferroni test.

Table 8. Determining the Relationship between walkability components with each other

Factor(I)	Factor(J)	Mean Difference (I-J)	Std. Error	Sig.	Lower Bound	Upper Bound
F1	F2	0.8	0.2	0.001	0.08	1.3
	F3	-4.4	0.3	0.001	-5.1	-4
	F4	2.5	0.2	0.001	2	3.2
F2	F1	-0.8	0.2	0.001	-1.3	-0.08
	F3	-5.2	0.3	0.001	-1.6	-5
	F4	1.7	0.2	0.001	1	2.5
F3	F1	4.4	0.3	0.001	4	5.1
	F2	5.2	0.3	0.001	5	6.1
	F4	6.9	0.2	0.001	6	7.4
F4	F1	-2.5	0.2	0.001	-3.2	-2
	F2	-1.7	0.2	0.001	-2.5	-1
	F3	-6.9	0.2	0.001	-7.4	-6

According to table 8, the difference between the means is significant ($p < 0/01$).

It should be noted that in this table F1 is related to Desirability and pleasantness, F2 to Comfort and convenience, F3 to Safety and Security, and F4 to Facilities and Accessibility.

4. Conclusions

In the last few years, an extensive amount of research has been conducted in developed countries by urban designers and public health specialists on pedestrian orientation and walkability. Currently, it is imperative that to pay attention to this issue, especially in developing countries, so that they can have dynamic, lively cities and citizens. This is due to the fact that today, in developed and developing countries, it is a need for citizens to have an appropriate yearly use of urban spaces and services. The walkability orbit in urban spaces has a direct relationship with safety, convenience, environmental attraction, accessibility, relaxation, etc. Other factors such as density and texture of streets and the green network can either increase or decrease walking in roads and areas. Cities should welcome citizens to walk and to use quite areas for walking, in order to create a sense of ownership between the citizens and the location. Experiencing a sense of ownership can only be established by walking not using cars; and its increase depends on diversity of application, presence, cognition and interaction. However, the absence of safety, traffic safety, easy access and convenience for walking individuals, results in people using sidewalks in hurried and speedy manner, and a sense of no feeling in people, which creates no wish in them to gather in these areas. Due to this fact, the current investigation studied the ability and quality of walking in the tourism axis of Black-Stone located in Shiraz city, on the basis of sustainable urbanization development patterns, and concluded that walkability does not have a good status in this regard.

On the other hand, Black-Stone area is located in sector 8 and has old texture with various historical-cultural monuments within and surrounding it; also, in comparison to other areas of Shiraz its facilities are much more accessible. Therefore, it can be concluded that creating and increasing the quality of walking components, and observance of modern urbanization basics, that yield stable urban development, can help to mend the current situation; and on this foundation, the citizens' physical and psychological conditions can be mended, and also, the attractiveness and convenience of the urban environment can be restored.

5. Suggestions

In general, walkability is used to describe the physical aspect of sidewalks, so techniques in skeletal terms are addressed. Considering skeletal terms, the inner and outer body of the sidewalks should be observable, and no laden spaces should be produced. To this end, appropriate lighting and the elimination of obstacles is imperative; specifying the accessibility and safe accessibility hierarchy to people on foot is a must. Enhancing physical and non-physical activities adjacent to sidewalks, so as to increase the number of people on foot, and, in application, constructing domiciles will increase the safety and observation probability during the day.

With respect to the data analyses, it is suggested that urban-related organizations should try to heighten the quality level of walkability components (such as safety, relaxation, etc.), and to increase citizen satisfaction with regard to pedestrian orientation; this topic can repair walkability status to an eye-catching degree, and yield positive results.

To address this, in addition to rigorous research, modelling countries that have succeeded in this attempt is a good idea. Likewise, it is suggested to urban managers and designers that in urban designing and programming they should consult citizens for their suggestions, and also include them in the programming. To enhance walkability in urban spaces, urban managers can create attractive milieus, provide seats, build information stands congruent to the location, conduct periodic inspection of sidewalk conditions, and conduct repairing, so as to achieve increased walkability in urban spaces.

With respect to the sidewalks narrow path, installing suitable urban furniture, inspecting negative and impeding attributes and techniques to reduce them, examining positive and moderating attributes and procedures to heighten them in sector 8 and other areas in Shiraz.

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