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Assessing Factors Influencing on Sidewalks Desirability in Urban Environment Case Study: Old Context of Marvdasht City

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ABSTRACT

Sidewalk desirability is one of the most important issues in defining walkability in urban environment, sidewalks with the highest usage among pedestrian should be comfortable in order to encouraging pedestrian to walk in their daily travels, the aim of this study is to pay attention to factors in which influence on sidewalks desirability in urban environments, in first step by reviewing literature the indices that define desirability of sidewalks collected and after that by using a questionnaire pedestrian satisfaction measured, data analysis done by using factors analysis in Lisrel software, Results showed that among six variables define Path Context, the Street design and streetscape have the most effect about 52 percent and after that the Attractive wall and Active walls with 40 percent in the second rank and Green spaces with 38 percent in third rank and Peace of mind with 23 percent in forth rank and the least effect is for Cleanliness with 18 percent.

KEY WORDS: Desirability, Sidewalks, Lisrel, pedestrian, Marvdasht city

1. INTRODUCTION

One of the most important factors effecting walkability and also encouraging people to walk and use the sidewalks is providing sidewalks with high qualities, so to measure a sidewalk quality we should take into consider some factors in which they affect sidewalks desirability. These factors are gathered by studying literature about the issue .There are many studies that emphasize the importance of a good design for the creation of a pleasant walkable environment but not many studies speak to what constitutes the good design and how to achieve it. Lund (2003) in his article only talks about presence of neighborhood shops and parks as a part of pedestrian friendly streetscape while testing the New Urbanism claims and does not test the impact of the design of the buildings or the street itself on walking. According to the Complete Street Coalition, street design should be safe for drivers, bicyclists, public transit users and pedestrians of all ages and abilities South worth (2005) in his article "Designing the Walkable City", talks about the quality of the path and the path context along with other variables such as connectivity, linkages and safety. According to his case studies, the pedestrian path quality can be improved by aesthetical elements such as landscaping and street arts along with utility elements such as bus shelters and manhole covers. In path context, he points out the importance of "design of street as a whole" and mentions aspects such as visible activity, street trees, lighting and views that compete the street design. His research supports some of the New Urbanism principles although not all. He states that intimate street scales, narrow streets and smaller buildings that face the street create more comfortable environment for pedestrians.

Design refers to the layout and arrangement of the entire pedestrian setting including streetscape, sidewalks, roads, adjacent building facades and planted setbacks (Schellinger & Priest 2006).

Although theories of New Urbanism and Neo-traditional Developments emphasize the design of urban form to reduce car usage, not much research has been carried out in this field. Various studies that talk about streetscape design address only certain aspects and do not study incomprehensively.

Moudon et al. (1997) attempts to find the impact of site design on pedestrian volume in mixed use medium density neighborhoods. It looks into the completeness of the street by looking into the connectivity, sidewalk lengths and route directness as the major factors of site design. The findings show that density, land use and income variables alone are not sufficient to increase or decrease walking and that design of the neighborhood surroundings plays a key factor in the choice of people to walk

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2. RESEARCH METHODOLOGY

The research process in a systematic and planned to find facts or understanding issues that seeks to find answers to the questions. (Hafez Nia, 2006)

Yin (Yin, 2000) Says that when the main question of the research starts with why and how, and also when the research point at a contemporary phenomenon, we usually use case study for our research. So in this study we used case study method that this method is a kind of qualitative research. In this study, we used literature to extract factors which effects pedestrian path context.

After that to measure pedestrian satisfaction of path context we used 7 variables. Then to check the indicators in the study area we used questionnaire that its reliability has been checked by content analysis method which in this method the questionnaire was accessed by experts and the necessary correlation was done. Then we checked the validity of the questionnaire by help of Cronbach's alpha Test. Cronbach's alpha of the questionnaire was 0.804 that it shows high reliability of it.

Determination of the minimum sample size necessary for gathering data relating to structural equation model is a very important. Although there is not an overall agreement in the case of the sample size required for the structural equation model and factor analysis, but in spite of many researchers minimum sample size are 200 samples. Kline believes in exploratory factor analysis we need 10 or 20 sample for each variables. But the minimum sample size is 200 samples (Hooman, 2011).so 200 questionnaire were fully loaded which the results are as follow.

Factor	indices	Reference					
sidewalk	Street design and	Walkedmonton report, Kumar 2009, Frank et al 2005					
desirability	streetscape						
	Green spaces	Soltani and Pirozi,2013 · .Ellaway et al 2005, Bhattacharyyaa and. Mitrab 2013					
	Attractivewalls	Soltani and Pirozi,2013,(Forster,2011), Ball et al, 2001; Giles-Corti& Donovan, 2003;					
		Giles-Corti& Donovan, 2002a, 2002b; Michael, et al. 2006; Owen et al, 2004; Pikora et					
		al. 2006: Sugivama et al. 2006					
	Active walls	Abershahr.blogfa.com					
	Peace of mind	Soltani and Pirozi,2013					
	Weather	Moeini, 2006, Kumar 2009, Stroner et al 2003, Brennan Ramirez et al					
	Cleanliness	Borst et al 2008,					

Case study:

Region of Marvdasht have a very long History and had leaving behind great historical developments, but the city of Marvdasht has started developing by creating Sugar Factory in year 1933. The city has located in 48 kilometer in east of shiraz and near the Shiraz-Esfahan highway, From the Geographic location this city is located in the Center of Kor Rod plain between Cine aftabe Gondashlo Height at the west and Rahmat mountain at the east. The city Geographic coordinate is in 55 degree and 29 minute width Northern and 53 degree and 52 minute length within Eastern and its Height from sea level is about 1600 m from the sea. Based on official statistics in 1390, the population of the city is 138649 people that 70221 people were male and 68428 people were female. The number of family in this year was 37918 Family. City of Marvdasht Has passed away 80 spring from the First physical appearance by Created sugar factory, thus if we can name a place historical in definition that have more than 100 year, so the marvdasht city have not a historical context, but we can find the old context of city in the central area of the city that have more than 70 years. The oldest context of the city are in this place that Sugar factory is in its center and Municipality building are near it . So Marvdasht has expanded along the main streets over times and urban centers with different uses made. These centers became weaker as far as they are farthest from the city center. Old context of marvdasht city include 4 zones of 10 neighborhoods that its area is about 175529 m2 (net area of old blocks) and 2340524 m2 (old context impure). The population of old context is 42475 people and the population of neighborhoods is 81631 (KhodAvand, 2009). In this study the author calls the old context as the old name because despite the renovation and improvement of some parts there are a lot of problems in this context, especially in terms of city infrastructure.



Pic 1:Marvdasht Map in Iran



Pic 2. Case study

3. **Research Finding Analysis** To check the sidewalk desirability we used 7 variabe that are shown in table 2.

	Factor	indices
	Path Context	Street design and streetscape
	Green spaces	
		Attractive walls
	Active walls	
	Peace of mind	
	Weather	
		Cleanliness

Table 2.Indices indicate sidewalk desirability

Table 3. Descriptive analysis of answers to sidewalk desirability Factors

Factor	Variable	Very High	High	Normal	Little	Very little
ability	Street design and streetscape	0.5	3.5	21	30.5	44.5
	Green spaces	2	9.5	29	28	31.5
lesin	Attractive walls	1.2	2.5	21.5	37.5	37
alk c	Active walls	12	20	25.5	23	19.5
sidew	Peace of mind	11	13	23.5	30	22.5
	Weather	55.5	32	6.5	2.5	3.2
	Cleanliness	4	5.5	42	28	20.5

Then by using Factor Analysis Method , Factor loading on each index calculated and goodness of fit indices of model were checked that results are shown as follow:



Picture 3. Sidewalk desirability model with Standardized ratio



Picture 4.Sidewalk desirability model with T- value

Considering the amount of T-Value reported in the above model, we observe that some of the paths are not significant and should be omitted in order to correct the model and after that we run the model again that results are shown below:



Picture 5. Corrected model for sidewalk desirability factor



Picture 6. T-value in corrected model for sidewalk desirability factor

Explore model results:

The method for parameter estimation is maximum likelihood method which Path coefficient between the variable Street design and streetscape and our latent variable (sidewalk desirability) is equal to 0.65 and its error is equal to 0.39. T-Value in order is 10.48 and 6.95, and it is meaningful at the level of less than 0.001. Also about 52% of the variance of latent variable (sidewalk desirability) is defined by the Street design and streetscape variable.Path coefficient between the variable Green spaces and our latent variable (sidewalk desirability) is equal to 0.66 and its error is equal to 0.72. T-Value in order is 8.40 and 8.08, and it is meaningful at the level of less than 0.001. Also about 38% of the variance of latent variable (sidewalk desirability) is defined by the Green spaces variable. Path coefficient between the variable Attractive walls and our latent variable (sidewalk desirability) is equal to 0.59 and its error is equal to 0.53. T-Value in order is 8.85 and 8.08, and it is meaningful at the level of less than 0.001. Also about 40% of the variance of latent variable (sidewalk desirability) is defined by the Attractive walls variable. Path coefficient between the variable Active walls and our latent variable (sidewalk desirability) is equal to 0.60 and its error is equal to 0.53. T-Value in order is 8.90 and 8.05, and it is meaningful at the level of less than 0.001. Also about 40% of the variance of latent variable (sidewalk desirability) is defined by the Active walls variable. Path coefficient between the variable Peace of mind and our latent variable (sidewalk desirability) is equal to 0.63 and its error is equal to 1.29. T-Value in order is 6.34 and 9.10, and it is meaningful at the level of less than 0.001. Also about 23% of the variance of latent variable (sidewalk desirability) is defined by the Peace of mind variable. Path coefficient between the variable Cleanliness and our latent variable (sidewalk desirability) is equal to 0.43 and its error is equal to 0.83. T-Value in order is 5.75 and 9.72, and it is meaningful at the level of less than 0.001. Also about 18% of the variance of latent variable (sidewalk desirability) is defined by the Cleanliness variable.

		sucwark ucsir ability				
Q. No.	Variable	Path coefficient	T-Value	Error	T-value	R ²
Q1	Street design and streetscape	0.65	10.48	0.39	6.95	0.52
Q2	Green spaces	0.66	8.4	0.72	8.08	0.38
Q3	Attractive wall	0.59	8.85	0.53	8.08	0.4
Q4	Active walls	0.6	8.9	0.53	8.05	0.4
Q6	Peace of mind	0.63	6.34	1.22	9.1	0.23
Q8	Cleanliness	0.43	5.74	0.83	9.72	0.18

Table 4. Path coefficient and its error with T-Value and Variance of sidewalk desirability model

Goodness of fit indices:

To what extent our model that has been based on a theoretical frame and literature is compliance with the facts is a question that we want to find the answer with the help of Goodness of fit. In other word, the scientific criteria for accepting model by using our collected data, is the main discussion in goodness of fit indices.

Those indices name goodness of fit because if it increases it show that our data support our model better and name badness of fit indices because the more it increases it means that the data support our model less. (Hooman,2012)

Table 5. Recommended indices by some Resear

Researcher	Recommended indices							
	X ²	RMSEA	CFI	NFI	NNFI	PNFI	SRMR	R ²
McDonald ,R.P. & Ho, R. M. 2002	*		*	*	*			
Hu, L.T &bentler, P.M. 1999		*	*		*		*	
Kline, R.B. 2005	*	*	*				*	*
Boomsma, A. 2000	*	*	*				*	*
Hooper et al ,2008	*	*	*			*	*	

Homan (2012) said that the acceptable values for mentioned indices are shown in table 6. So the author uses his indices for testing model fitness. (Hooman, 2012)

Analyze goodness of fit for sidewalk desirability model

Here the chi square with 7 degree of freedom is about 6.65 that is not meaningful because the meaningful level of it is large and equal to 0.47 (its larger than 0.05). So it means that chi square Test shows the exact model fit with the data.

In other hand the ratio of chi square to degree of freedom is equal to 0.95. Furthermore the RMSEA is lower than 0.001 and in 90 percent confidence level it is between 0.000 and 0.81. So because the low level of it is below 0.05 we conclude that the degree of model approximation in community is not large. The RMR is equal to 0.027 that is very small and shows the minimum error of model and it means that the model fit is acceptable.

Table 6. Goodness of fit for sidewark desirability model							
indices	Acceptable Range	Calculated					
Chi square (X ²)	Smaller is better	6.65					
Chi square / degree of freedom	Below 2.0	0.95					
Root Mean Square Error of Approximation (RMSEA)	Below 0.05	0.000					
Root mean residual (RMR)	Below 0.07	0.027					
CFI	More than 0.9	1					

Table 6. Goodness of fit for sidewalk desirability model

4. DISCUSSION AND CONCLUSION

Walking is one of the healthiest ways of transportation and everybody walk in its daily travels. If sidewalks and paths in the city were not suitable enough we don't enjoy walking and therefore we only walk when we are encouraged. But today urban planners and city makers are trying to find ways in which pedestrian enjoy walking and therefore tend to use cars less. So if we want to encourage pedestrian to walk we should pay attention to sidewalks desirability. Therefore in this study we tried to assess factors influencing on sidewalks desirability by studding on factors in which effects on desirability of sidewalks by using questionnaires. Results showed that among six variables define Path Context, the Street design and streetscape have the most effect about 52 percent and after that the Attractive wall and Active walls with 40 percent in the second rank and Green spaces with 38 percent in third rank and Peace of mind with 23 percent in forth rank and the least effect is for Cleanliness with 18 percent. According to the result we can say that in old context of marvdasht city one of the most important factors that effect on pedestrian choose of walking is street design, there is no interesting thing in streets and always pedestrian are tired of walking in sidewalks ,solving this problem should be place in working order of managers and city makers , paying attention to design issue will solve most of these problems, because pedestrian will walk more in places in which they enjoy the place and feel better when walking. In other hand there isn't enough trees and green spaces in old context of Marvdasht city .as far as we are human being we like live spaces that are green which are covered by trees and flowers and we feel more calm and more fresh in sidewalks there aren't enough garbage can and pedestrian are not satisfy with sidewalks cleanliness, so city managers should pay attention to sidewalk cleanliness in order to increase the presence of pedestrians in sidewalks.

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