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Design's factors influencing social interaction in public squares

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Abstract

This study provides a clear picture of effective use of public squares by taking into account the perceptions of users in Sabze Meydan of Qazvin (Iran). The study adopts a quantitative line of inquiry. The specific survey method used is cross-sectional survey design and a questionnaire survey. In the present study, the sampling method is non-probability (convenience) sampling with a sample size of 208 participants. The questionnaire includes a total of three constructs measuring design factors, social activity type and perception of users (about social environment of public square). Items in all scales used 5-point agreed-disagreed statements. In assessing the reliability of the questionnaire the coefficient of Cronbach alpha was applied. The validity of the questionnaire, was tested using the content and construct validity. The structural equation modelling was used to test the hypothesis and the finding of the research which has the potential to enrich the body of knowledge among academicians as well as practitioners. In this study, new and un-established relationships have been hypothesized based on theory. The result revealed that the function of the public square has changed and there is a positive relationship between design factors, social activity and users' perception.

Keywords: Public Square, Design Factors, Social activity, Users' Perceptions

Introduction

The main aim of this study is to extend the understanding of how public square design affects the users' social interaction from an urban design perspective; and to provide empirical knowledge that can be utilized to develop future design guidelines. This study provides a clear picture of effective use of public squares by taking into account the perceptions of users. Many previous studies were conducted to investigate the deficiencies of public space's redevelopment, the concept of effective use and the value of public spaces, but few of them integrated these issues into a study. Furthermore, most of the previous studies relevant to this research are based on the situations in the western countries. The purpose of this study is to examine how public squares are effectively used; the dimensions of impressive use and the multiplicity of the urban spatial dimensions in order to appreciate the importance of Public Square in the daily lives of the people.

A new wave of urbanization and physical urban growth, following the rapidly growing population of the cities imposed new urban needs of the city centre. Looking back into the history of cities, the public spaces traditionally had three significant functions in relation to the life of the cities. The public spaces functioned as meeting place, market place and as a means of connection or traffic space. People were talking, exchanging merchandise or moving about in this space. All functions were vital and in the traditional cities, these three functions took place side by side in the same space in a proper balance. In recent years, we have seen how this balance in many cities has been deeply upset by a number of factors, particularly the growth of vehicular traffic (Gehl, 2003). However, the urban spatial structure roles had changed as a result of urbanisation. The integrated role of the square that invites people to

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stop and watch has now changed to the role of distribution and passageway. The square, as an interactive space and behavioral setting has now changed to a space in the city for people to turn and choose their directions. Since the invention of the motorized traffic, squares are being turned into vehicular crossings for facilitating safe and effective movement (Naz and Ashraf, 2008). Under the thrust of technological changes, the increase in population and vehicular traffic meant that the squares have lost their significance and are no longer the main nodes of the society (Madanipour, 2000).

The quality of education in environmental design and urban planning in Iran is quite adequate, but the dimension of the current urban development problems is such that the young generation of planners and architects cannot handle them (Ferdowsian, 2002). Moreover, the recent master plan of Tehran demonstrates the lack of urban public spaces designed for the purpose of people's social gatherings (The ministry of housing and urban development, 2008). New towns have been developed without concern and respect for Iranian architectural heritage and without cultural identity (Ferdowsian, 2002). Most squares in Iran were converted to the great circles long time ago, allowing cars to pass through or sometimes bypassed (Carmona, 2010). Nowadays the squares have lost their function as a popular gathering space where people can communicate. (Carmona, 2010).

Literature review

Design Factors

There are studies that provide an approach which is a combination of both physical and psychological approaches (Bonnes and Secchiaroli, 1995, Stokols, 1987). Urban square is a place where people gather and accomplish a diversity of social, cultural, political and economic requirements. It is a place, where people have positive social interactions, meet each other, have lunch, hold a pleasant chat, watch the world, read something, rest for a while and shop around. In addition, urban squares are the stages of political contests, yet today this is not the main function as it used to be (Tavakolian, 1990, Whyte and Underhill, 2009, Gehl, 2011).

Physical factors

Physical factors at the spatial level involve accessibility and location including facilities, lighting, landscape and recreational space; as well as safety (Nathiwutthikun, 2006). Physical aspects of squares consist of tools and facilities to serve the daily needs of the people. Physical aspect covers initially, the form of the square, then its size and visual complexity (Zeka, 2011). There is no conformity in terms of the shape of the square. However, Moughtin (2003) suggested that the shape, like the size of the plaza, should be in proportion with the dominating structures. The shape and sizes of the square should, therefore be sympathetic to the human scale and it is important to recognize that they are (traditionally) closely related to the dominant building in the square (Moughtin and Moughtin, 2003).

The importance of the human scale highlighted the point noted by Zucker (1970), and was also indirectly referred to by Short (1996) and PPS (2006c), which pointed out that the design of any elements in a city should be in harmony with the human being that could be measured through his physical dimensions, his senses and his movements. According to many studies on visual complexity, aesthetic and visual factors (such as seating and landscape factors), there are important factors of a successful square in physical phrases (Marcus and Francis, 1998).

Behavioral and Psychological Aspects

Talen (2000) argued that the doctrine of new Urbanism, which seeks to promote a sense of community by adhering to certain principles about the physical arrangement of space, brought the debate about the use of public space and its effect on social life to the forefront. Sternberg (1996) elucidated that perception is the set of process by which one recognizes, organizes, and makes sense of the sensations that one has received from the environmental stimuli. In the context of urban design, almost all spaces have intrinsic multifunctional facts, through which the users express their needs in them (Sternberg, 1996). In the use of space, this normally arises through a misunderstanding of the intended or posited use of specific built space and its actual use (Hall and Pfeiffer, 2000).

Comfort is one of the essential physical, mental and social human needs that has a direct effect on place satisfaction (Austin, 2003). There are physical and activity based approaches to create secure and comfortable public spaces. Physical approaches include effective lighting at night-time, designing visible and focal gathering spaces; and preventing

cars from entering as well (Austin, 2003, Charkhchian and Daneshpour, 2009). Comfort is primarily achieved by providing appropriate spots to linger, sit, eat, drink and converse. According to the analysts of effective public spaces, these "comfort" opportunities are crucial to make that place work. Public spaces perform as a placefor relaxation, which provide people with a relief from the stresses of daily life (Carr, 1992). On the physical plane, the spaces in the urban landscape provide the forum for day-to-day activities as well as relaxation and recreation (Laughlin, 2008). Public spaces are significant because they are able to bridge that link. Carr et al. suggested that aside from bridging this link, public spaces are important because they provide avenues for movement, means of communication and a common ground for enjoyment and relaxation (Madanipour, 2003).

Managerial aspects

The managerial aspect covers the way that the public space is managed, which is a vital point to be considered for the success of a square. Management of place for a secure and safe environment can be done using two approaches, which are hard and soft controls (Carmona *et al.*, 2010). The square, which is at the very heart of urban public open space, creates a meeting place for the people, humanize them and providing them with a protection against the haphazard traffic, and freeing them from the tension of rushing through the web of streets (Zucker 1970). The other function such as a marketplace, parade ground, ceremonial place; setting for important buildings, as a place where people to move and mingle, and a place for leisure activities, have all been associated with the ancient as well as modern squares (Department of the environment (DoE), 1997).

Food and drink outlets can attract people in a public space. These range from cafes and bars with outside tables to portable refreshment kiosks where people can get takeaways to be consumed in adjacent sitting areas (Shaftoe, 2008). One important factor to be considered is the provision of suitable litter bins and their regular emptying. Public spaces can rapidly appear unappealing if they are strewn with discarded food and drink containers or overflowing bins (Shaftoe, 2008). Provision of vending opportunities in a square raises the vitality and activity in the place; and since there is going to be increasingly many people around, it assists in sustaining the safety of the environment (Marcus and Francis, 1998). Despite the drinks and food, vending should contain particular products such as flowers, handiworks; vendors and may be artisans (Marcus and Francis, 1998). There should also be a plan about the vendors whether they are going to be temporary or permanent. The design of the vending constitutions (stalls, kiosks etc.) should be considered since they also contribute to the character and identity of the placeand become an icon of that square/plaza (Childs, 2006).

Management of a square needs a persistent and regular maintenance facility in order to maintain the success and use of it. With the provision of rapid repairs, normal clean ups and clearing litter bins; grass care and planter preservation, it will express that the square is being cared for and considerably affects the users' perception of the square as a more delight- giving environment (Shaftoe, 2008). In this regards, Marcus & Francis (1998) represented that in any public space, people will mind in an environment if they see that management minds. A place that has obviously been cared, will be much more popular than one that looks neglected. Lack of adequate maintenance also leads to "tipping": an escalation of damage and deterioration (e.g. Graffiti tagging that is not swiftly removed will encourage more; if rubbish is not cleared up promptly, users will not hesitate to dump more) (Shaftoe, 2008).

Geographical aspects

The geographical factors have high effect in the shaping and physical development of the city. Location (urban core, neighbourhood or suburb) – generally public spaces work best when they are reasonably central, either in a town or neighbourhood, and are at the convergence of routes that people use for other purposes. They also work better when they are surrounded by mixed uses rather than monocultures such as offices or housing (Shaftoe, 2008).The other key factor that determines whether people are drawn to use certain public spaces is their location. Geographical factors can often override design and other considerations. Triangular public space, wedged between the cathedral, the town hall and an arterial road could not be regarded as a particularly attractive place from the design point of view, and the management positively discourages certain uses, most notably skateboarding. One of the main elements in spatial design is traffic as a structure, which divides and connects urban spaces (Bendikat, 2002). Accessibility is related to traffic, either vehicular or pedestrian. Talen (2000) asserted that,

with the exception of streets and sidewalks, the accessibility of all public forms of public space could be measured and used as an indication of the degree of the public space dispersion (Talen, 2000). That accessibility, which covers mobility and linkages, depends on a number of factors.

Another main point contributing to the success of a public space is accessibility. Location of a square directly affects the accessibility concerning whether it is situated within a close distance to major pedestrian and vehicular traffic routes and transportation nodes (referring to the accessibility of the square by all earnings of vehicular, but not being dominated by them) (Shaftoe, 2008). Whyte (2009) introduced a visual accessibility perception aside from physical accessibility for the grab of the people. On the other hand, the visibility of an urban square is significant for the society's utilization of the square (Marcus & Francis, 1998).

Social interaction

An evaluation of the literature on the public space level of social interaction, including the theory of the sense of community and incivilities literature, has shown six significant points. 1) Sense of community is correlated to both environmental level and individual level variables, nevertheless, a previous study has not produced reliable findings about which community level features and indicators are related to individual level variables, 2) there is no existing empirical evidence of a direct relation between sense of community construct and the physical attributes of the Public Square with its complete meaning. Although, there are two researches suggesting a link between the sense of community and the physical environment, these studies did not investigate the concept with its comprehensive meaning, including all the dimensions proposed in the literature. 3) The physical aspects of the environment can contribute up to improved levels of social interaction between residents, which is only one feature of the sense of community. Such studies have not examined sense of community with its affective variables.

Regarding these points, in order to realize the correlation between the public square physical environment and social interaction, "sense of community" construct may be useful to a certain degree. Following the approach that the sense of community is a multi-level construct, with multi-dimensional and environmental variables only, have restricted potential to make a sense of community. On the other hand, it should be considered that, in the public space size, there is an evidence of connecting the public environment with interaction and human behavior. How a Public Square is designed to physically have direct and indirect effects on the social life of its users due to human encounters and use of space is an important aspect to consider. In this regard, to understand the associations between social interaction and public square design, rather than a sense of community, may be more valid and useful. Compared to the sense of community, social interaction has the strongest empirical evidence where the character of the relationship can be framed more specifically. Figure 1 shows the researcher's conceptual model. The focus of this model is the effects of design factors on social interaction patterns.

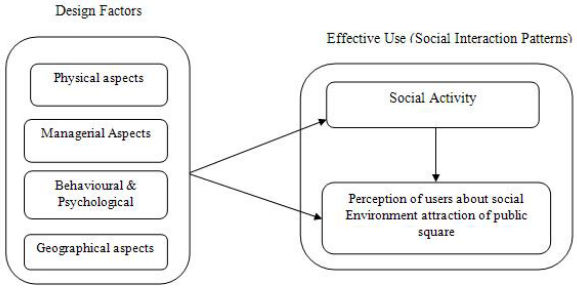

Figure 1. Conceptual Framework.

Based on the literature the following hypothesis was formulated:

H1: There is a positive relationship between design factors and social activity types.

H2: There is a positive relationship between design factors and perception of users about environmental attractions of Public Square.

H3: there is positive relationship between social activity types and perception of users about the social environment's attraction of the public square.

Methodology

Design of the Study

The proposed study adopted a quantitative line of inquiry. The specific survey method used in this study is cross-sectional survey design using questionnaire forms. This study addressed the content validity and construct validity. Several drafts were evaluated in order to increase the content validity of the research instrument In the next step, drafts

of the questionnaire were assessed. In the present study, the sampling method was non-probability (convenience) sampling and sample size was chosen based on DeVaus (2002) table. After distributing questionnaires and screening data, around 208 questionnaires were suitable to analyze. The respondents are chosen from the square's public users including the city's inhabitants.

Instrument and data collection procedure

The instrument in this study consists of a survey and a questionnaire. The questionnaire comprises of a total of three constructs. These measures are design factors, social activity type and perception of users (about social environment of public square). Items in all scales used 5-point agreed-disagreed statements. For this purpose, this research, in advance, reviewed the related literature and used standard questions. In the next step, drafts of the questionnaire were evaluated. Hence, a panel of Iranian urban design lecturers (3 people) was selected for checking the content validity of the instruments. All items were translated into Persian language (by official English translators) to let the panel of lecturers verify the format, arrangement, appropriateness of the content and the language used in the tool. The finalized questionnaires were examined in the pilot study. In this study, for assessing the reliability of the questionnaire the coefficient of Cronbach alpha was applied.

Demographic

A total of 208 respondents took part of whom 67.3% were male and 32.7% were female (table 6-1). Of those surveyed, the highest percentage of the respondents ie. 55.8% are of the old age group that reflects on the age group of the respondents who regularly visit Sabze Meydan Square. Based on the table (1) 88.5 % of visitors were locals and 11.5% of them were non-locals. In fact, most of the visitors of Sabze Meydan are local and they use this square for different purposes.

Table 1. Summary of the profiles of participants.

Variables	Category	Frequency	Percentage
Gender	Male	140	67.3
	Female	68	32.7
Indigene	Local	184	88.5
	Nonlocal	24	11.5
Occupation	Student	39	18.8
	Retired	27	13.0
	Self-employed	91	43.8
	Executive / Managerial	8	3.8
	Housewife	6	2.9
	Professional	33	15.9
	Others	4	1.9
	Total	200	100

Table 2. Demographic of visitors.

	Category	Frequency	Percent
Visiting hours in a week	1-5	104	50.0
	6-10	48	23.1
	11-15	22	10.6
	>16	34	16.3
	Total	208	100.0
Visitor	Alone	51	24.5
	Friends	93	44.7
	Family	58	27.9
	In a big group (More than 5 people)	6	2.9

Based on table the majority of respondents visit this square around 6-10 hours and most of them visit with friends 40.9 % and family 27.9%. Around 49.7% of participants visit this square every day.

Data analysis

In the study a structural equation modelling was used to test the hypothesis. SEM allows the researcher to ''answer a set of interrelated research questions in a single, systematic, and comprehensive analysis'' (Gefen *et al.*, 2000). This simultaneous analysis provides the researcher with a richer information about the extent to which the data supports the research model than is possible with the first generation data analysis techniques. The researcher chose the partial least squares (PLS) approach for its advantages over the covariance approach. The advantages of this soft-modeling approach include theoretical conditions, measurement conditions, distributional considerations and practical considerations (Falk and Miller, 1992). PLS creates latent variable component scores using the weighted sum of indicators (Chin and Newsted, 1999).

Results

In two stages, PLS model will analyze and interpret the assessment of the reliability and validity of the measurement model, and the assessment of the structural model.

Assessment of the Measurement Model

In first step measurement model was first evaluated using the full sample (208 individuals), all items and dimensions and then the Smart -PLS results were used to remove problematic items. To assess the significance of the measurement model, certain criteria needs to be evaluated. Reflective measurement models should be assessed with regards to their reliability and validity. The following tables give an overview of the quality criteria of all reflective constructs: Cronbach's alpha, composite reliability and confirmatory factor analysis: Average Variance Extracted (AVE). Table 3 shows alpha Cronbach reliability, composite reliability and average variance extracted from the variables.

The other criterion for assessment of measurement model is discriminant validity. Table (5) describes that diagonal elements are larger than off-diagonal elements in the same row and column. The result describes that the questionnaire had discriminant validity.

Table 3. Overview on the quality criteria of all reflective constructs.

Constructs	Composite Reliability	Cronbach Reliability	AVE
Design factors	0.890	0.865	0.503
Geographical	0.923	0.838	0.858
Managerial	0.850	0.764	0.586

Table 4. Correlation between latent variables (nomological validity).

Constructs	Design factors	Perception Of Users	Social activity
Design factors	1.000		
Perception	0.305	1.000	
Social activity	0.428	0.460	1.000

Table 5. Squared correlations of among Constructs (Discriminant Validity).

Constructs	AVE	Design factors	Perception	Social activity
Design Factors	0.503	0.503		
Users' Perception	0.538	0.093	0.538	
Social Activity Type	0.620	0.183	0.212	0.620

Factor loading is one of the methods to evaluate convergent validity. Table (6) shows that most of the factor loading is ideally 0.7 or higher.

Assessment of Structural Model

The Q2cross-validation test (Stone-Geisser) and f2 explaining the strength of effects; non-parametric tests like R2 for dependent variables, are used (Fornell and Bookstein, 1982). These values were well above the threshold level of zero (Fornell and Cha, 1994). However, regarding CV-redundancy index F2 (Q2) impulse buying tendency had high value. Furthermore, the 0.344 value of goodness-of-fit (GoF) index was quite acceptable. In addition, the results indicated that the model had an acceptable predictive relevance.

Discussion

Based on the table (8) the result revealed that, there is a positive and direct relation between de-

sign factors and social activity. This relationship with 95% confidence is significant at the 0.05 level (β = 0.428, std= 0.068, t-statistic = 6.268, P-value =0.000). In addition, there is a positive relationship between the design factors and perception of users. This relationship with 95% confidence is significant at the 0.05 level (β = 0.127, std= 0.076, t-statistic = 1.66, P-value = 0.048). Furthermore, there is a positive and direct relation between the social activity and perception of users. This relationship with 95% confidence is significant at the 0.05 level (β = 0.406, std= 0.064, t-statistic = 6.374, P-value =0.000).

Table 6. Factor loading of constructs.

Constructs	Index or Observe variables	Factor loading
Behavioural & psychological	Comfort	0.568
	Safety	0.722
	Discovery	0.795
	Joy	0.795
Geographical	Location	0.901
	Accessibility	0.950
Managerial Aspects	Vending	0.694
	Maintenance	0.808
	Food	0.783
	Uses	0.774
Perception of users	Generally, I am very attracted to the square	0.684
	I visit it with my neighbours	0.682
	If I needed advice about something I could go to someone in the square	0.777
	I regularly stop and talk with people in the square	0.783
Physical Aspects	Form	0.698
	Sitting	0.781
	Complexity	0.827
	Aesthetic	0.738
Social Activity	Social Activity type	0.869
	Social Contact	0.871

Table 7. Relevance of structural model.

Constructs	R^2	Q^2
Perception	0.225	0.112
Social activity	0.892	0.511
GoF	0.344	

Conclusion

Despite several limitations of this study, the present research makes valuable contributions to both theory and practice. The finding of the research has the potential to enrich the body of knowledge among academicians as well as practitioners. In this study, new and un-established relationships have been hypothesized based on theory. According to Beck (2009), high quality, well designed and managed urban public spaces such as public square will promote the quality of life. Since privatization Sabze Meydan Square has been standing as a place with poor quality design of architecture. From this point of view, the design and management – through privatization – need to change to be successful in generating public life. It can be said that private sectors are more capable in managing public space, since people are unsatisfied for physical quality aspects of Sabze Meydan Square but satisfied for such aspects of accessibility. According to Gehl (2002), the quality of lighting at night relates to the level of safety and security in public space. Further research is needed to study the safety and security matter at night in Sabze Meydan Square in Qazvin.

Table 8. Path coefficients, Std, ß, and T-statistics

Path	β	Standard Deviation	T Statistics	P_value
Design Factors ⟶ Perception	0.127	0.076	1.668	0.048
Design Factors ⟶ Social Activity	0.428	0.068	6.268	0.000
Social Activity ⟶ Perception	0.406	0.064	6.378	0.000

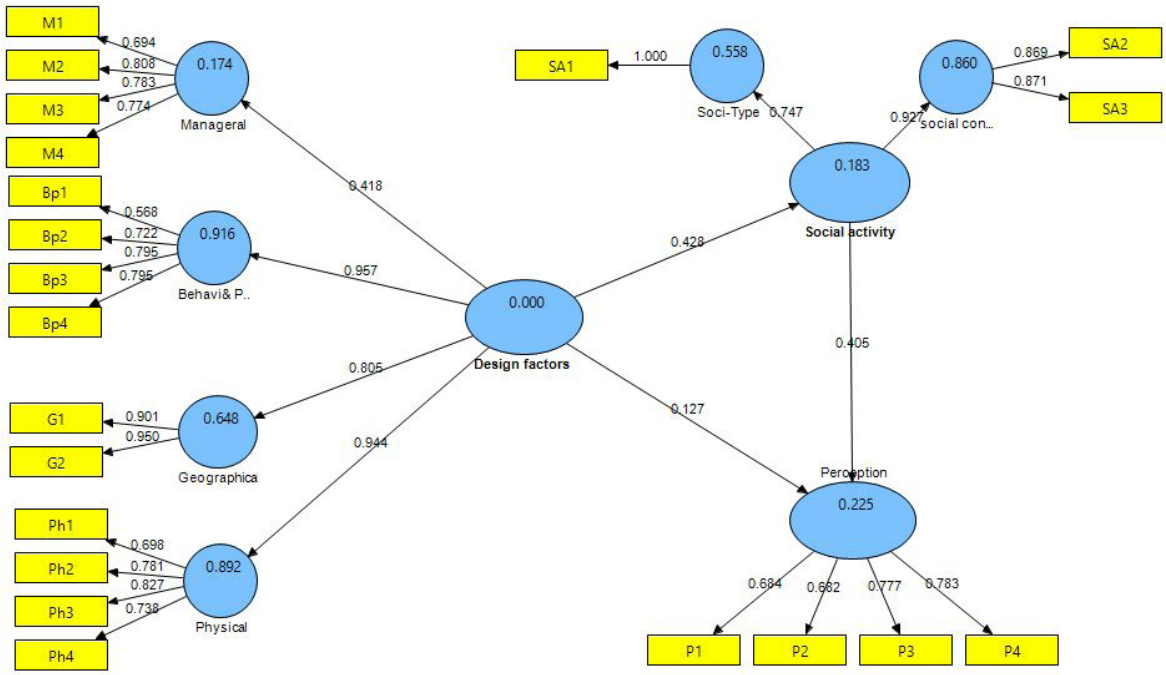

Figure 2. Final Model.

Limitation and recommendations

Although this research has managed to reach its stated objectives, there were, nevertheless, some limitations due to certain constraints, firstly the limitation in terms of the sample size. Due to limited time and budget, this research had only been able to collect 208 samples. Second, a possible limitation to the study could be due to the respondents were answering in a hurry and therefore might influence the accuracy of the response as we would prefer it to be and that is why a bigger number of respondents will be ideal. Studies on the public square in Iran are rare and few and this is one of the few. Moreover, this exploratory study also identified several salient research issues that require further investigation in the subsequent study effort in this area of study and several issues deserve consideration.

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