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Natural elements spatial configuration and content usage in urban park

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Abstract

Urban parks are important public multifunctional space used for a wide range of activities. The usage levels of parks depend on the spatial characteristics of the spaces, where its forms and occupancies are referred as the usage-spatial relationship. Natural elements spatial complexity and park usability is of interest in this study. A photo - questionnaire was conducted among 296 of park users in Tabriz, Iran to gauge the relationship between park usability dimensions and natural elements complexity levels. The result revealed three dimensions for park usability namely social activities, passive nature activities, and nature appreciation where passive nature activities received the highest preference. The results from SEM models addressed non-significant relationship between park usability and high complexity level of natural elements; meanwhile there was a significant positive relationship between social activities and moderate complexity of natural elements. A negative significant relationship of nature appreciation and positive relationship of social activities with low complex natural elements were observed. Landscape designers should avoid suggesting crowded planting areas (high complexity), which obstruct visibility in urban park and probably reduce perceived safety. It seems that water features show positive effect on people's desire to do activities in urban park. Spatial configuration of vegetation contributed in park usability level and a safe feeling in urban park which might be necessary for future researches.

Keywords: *Urban parks, Landscape preference, Vegetation complexity, Park usability.*

1. Introduction

Urban parks are important public multifunctional space used for a wide range of activities. The usage levels depend on the spatial characteristics of the spaces (Goličnik and Ward Thompso, 2010). Its forms and occupancies are referred as the usage-spatial relationship (Whyte, 1982). The elements of spatial definitions were also discussed by Gehl (1987). Pubic preferences toward spatial configurations of park and its usability provide useful information to design better urban park in future. Preference is defined as a presentation model of the human brain which is a result of visual perception by conveying motivation, emotion and impression (Hammit, 1978).

Preference has been a popular approach in assessing perception of a certain setting, achieving a human response where it provides valuable information regarding the public's attitude towards a particular environment, which includes the reaction to the content and spatial configuration (Kaplan & Kaplan, 1989).

It has been stated that preference studies is a practical and a systematic approach that can be used in measuring people's preference for gathering data, categorizing landscape measurements such as; level of human effects and as well as the elements and features in landscaping as preferred or disliked by people (Moula, 2009). In general, the concept of preference is known as the simple perceptual response regarding a particular setting preferred by individual.

Vegetations visual preference is an aesthetic response to a fundamental concept of human evaluation of landscape (Kaplan & Kaplan, 1989; Zube, et. al., 1982). It is defined as an individual's degree of like or dislike for the visual appearance of a place as compared to another (Daniel., 2001). Vegetation visual preference has been considered by different scientists in the field such as landscape architecture, forestry, outdoor recreation and psychology (Zube et al., 1982). Since the study concentrates on the visual aspect, "natural elements visual preference" term is used to distinguish the other senses such as sound, smell and touch. One study suggested three main factors for landscape visual preferences namely physical feature, region's biology (vegetation and other biological components of the environment), and human interest (how the vegetation impresses people) (Leopold,

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1969). This means that the human's interest is connected with the environment where certain phenomena occurs (Haghshenas & Jafari, 2006). Thus, vegetation visual preference is a result of the interaction of certain features of the landscape with psychological (perceptual, cognitive, and emotional) processes in the observer (Daniel, 2001).

There are components of an individual's physiological response to the environment as illustrated by Nasar and Jones; the effective emotional reaction; the behavior change, and the aesthetic response which is the conglomeration of the three responses (Nasar & Jones, 1997). Majority of landscape perception studies focused on the effective appraisal reaction section (Haghshenas & Jafari, 2006). Nasar explained the effective appraisal is the individuals' judgments of like and dislike of a certain environment. This study attempts to understand public's opinion for like and dislike of vegetation scenes in comparison to others. Thus, a preference study is established to obtain a public opinion on vegetation complexity quality to examine its relationship with preferred activity of urban parks.

Several theories interpret vegetation preference studies and the information- processing theory as one of the more comprehensive concept. Preference for an environment is explained mainly by the information that is derived from the setting. Kaplan and Kaplan's (1989) information-processing theory elucidates the indicators that cover preferences for an environment. Kaplans' theory supports both the ecological and psychological explanation. The ecological part focuses on the environment and its supports for life and the psychological explanation concentrates on the process of landscape preference within the individuals' mind (Haghshenas & Jafari, 2006). People interpret environment not only because of the basic needs but also because of its contribution for the recreational activities and the entertainment it provides.

1.1. Vegetation complexity levels

The early research emphasized the role of plants in environment complexity (Robert & Atwood, 1978). The industrial park, urban park, and residential landscape were rated having the lowest complexity whilst highway landscape had the highest complexity (Robert & Atwood, 1978). Their study did support the idea that plants increase complexity and provide more pleasure for the visitors. This study reveals that vegetation complexity would be classified into three categories; 'high complexity', 'moderate complexity', and 'low complexity' (Table 1).

Table 1 Complexity levels of vegetation in urban park

Number	Complexity Levels	Parameter
1	High Complexity	Number of plants' varieties and repetitions are high
2	Moderate complexity	High number of plants' varieties with low repetition and vice versa
3	Low Complexity	Low number of plants' varieties with low number of repetitions

Another study examines various items through theoretical concepts for aesthetic preference and cognitive ratings (Sevenant & Antrop, 2009). They determined that cognitive attributes are reliable predictors for aesthetic landscape preference. Four cognitive factors emerged from factor analysis results namely 'coherence', 'undisturbed', 'historicity', and 'complexity' and all these 4 factors cannot be found in the subjects, however, some items seem to have association in most of the cases. Except 'complexity', the three other predictors belong to a different factor. This finding demonstrates that complexity is the only cognitive item that can be used in many subjects to assess landscape quality evaluation.

Kaplan et al. (1972) examined the relationship between human senses particularly pleasing with spatial quality (complexity) of the vegetation scenes. Their experimental research revealed that complexity has straight- line (direct) relationship with pleasure. It was one of the earliest research to understand and explore the communication of human senses with landscape spatial quality especially complexity. However, the relationship between other aspects such as activity and preferences for complexity concept has remained. In this research, complexity is divided into three levels namely low, moderate, and high. Hence, the effect of park usability is examined based on preferences for vegetation visual complexity levels in urban parks.

1.2. Park usability

Gehl (1987) has categorized people's outdoor activities based on how 'compulsory' or 'voluntary' they are. His contribution was attributed to different types of activities (e.g. walking, cycling) and shows how to interpret, evaluate, and observe the behavior. Gehl (1987) also found a significant role of environmental quality in social cohesion and outdoor activities, which can be developed through the design and spatial arrangement of urban setting. The current study aims to investigate relationship between parks usability and complexity quality of natural elements in urban park.

1.2.1. Affordance theory

Affordance theory states that human perceives the environment for the actions they can make out of it. According to Gibson (1979), people's preference towards an environment depends on its capacity to provide activities for human such as walking, when they see a surface. Natural elements in urban park have potential to offer different types of recreation for the users. This portion of the study discusses the activities related to park vegetation areas.

Several studies have investigated people's preference for nature-related activities in urban park (Chiesura, 2004;

Gobster, 2001; Hami, 2009). Based on the literature, the potential activities in park vegetation areas can be classified into four different groups such as physical activity, passive activity, social activities, and nature appreciation (Hami, 2009). Passive activities are referred to less active activities such as watching water and sitting around water pool.. Physical activities are such as walking around, and taking picture. Social activities are activities done in groups like family picnics and meeting friends. Finally for the nature appreciation, it includes being with nature, admiring landscape scenes, and drawing nature figures.

Regan & Horn (2005) argued that people prefer to do activities in parks and green areas more than built environment, for the reason that, parks and green areas encourage people to engage in activities such as walking or jogging at the same time admiring the landscapes (Regan & Horn, 2005). Another research showed that the amount of green and recreational areas influences physical activities (Pratt, 2008). Parsons and Daniel (2002) claimed that a strong positive association between passive activity and green spaces exist. They explained that people are motivated to involve with passive activities in the setting with more green spaces than the environment with less green space. However, there is a lack of information on the correlation between vegetation complexity quality and activities involvement. The need for green spaces and facilities for activities are highly demanded in Tabriz urban parks (Hami, 2009). Therefore, assessment of the relationship between vegetation complexity levels and activities provides helpful information for proper planting design and renovation.

It is important to explore how vegetation complexity levels are associated with preferred activity. Understanding this relationship provides valuable information for authorities to take vegetation complexity into consideration in urban parks in providing successful setting for people's requirements. Thus, an appropriate plantation in parks leads to minimize re-planting issues to avoid changing the park's vegetation. Review of literature showed that activity items can be measured by using the Likert scale technique. In the current study, the activity alternatives are measured by applying 5 point Likert scale (1= strongly disagree, 2= disagree, 3= neither agree nor disagree, 4= agree, 5= strongly agree).

2. Methodology

A photo-questionnaire was used to gather data to allow a significant population to participate as well as having accurate and exact answers that will be achieved. Photo-questionnaire has been acknowledged as a valid and reliable method to represent a real and actual environment (Gau & Pratt, 2008). The questions regarding park usability (independent variable) and vegetation complexity levels (dependent variable) measured by a Likert scale (1= strongly disagree to 5= strongly agree), and demographic questions (measured by categorical technique). The photo-questionnaire was systematically prepared and the process of questionnaire preparation is discussed in the following subsection.

2.1. Scene classification procedure

The scenes were prepared according to three complexity levels of natural elements in urban parks in Tabriz (Table 2);

Table 2 Identified vegetation complexity levels in urban park in Tabriz

Number	Vegetation Complexity
1	High Complexity
2	Moderate Complexity
3	Low Complexity

Summer season was selected for photos to be taken because vegetation have the maximum grow and plants are still green. The scenes were collected from urban parks in Tabriz. These parks include large vegetation areas. However, the problem of less-use and non-use still exist, which deters visitors to come to vegetation areas of the park. The scenes were taken from natural elements areas meanwhile hard-landscape of the parks such as buildings, walkways, and other constructions were excluded from the scenes. In addition, the scenes with minor construction were also excluded because the researcher believes that the scenes with construction might influence people preference for park vegetation. The scenes were not taken if there is any user to prevent affecting of peoples' judgment. All the scenes were taken at the eye level and did not include any noise such as hard-landscape and presence of people.

In the first stage, the scenes were grouped into 3 complexity levels by landscape architectures later on the scenes were printed out on A3 size paper with 4 scenes located in each paper. All together, 45 scenes include 15 scenes numbered from 1 to 15 for each complexity level were presented to a group of people (10 male and 10 female) in order to rank their appropriateness for three complexity levels. The participants were asked to indicate the smallest number for the more relevant scene. At the end of this part, 27 scenes (9 scenes for each complexity level) with highest affirmation were selected by the participants. The results of public survey for scene selection were presented to the experts in university and they ranked the top five related scenes of each group. From the result of experts' selection survey, three scenes were picked for each complexity level. Therefore, all together, 9 scenes were selected for final survey presentation in booklet. The research was held among 296 participants of urban parks in Tabriz by using a systematic sampling method. The data were analyzed by using SPPS and SEM software.

The survey was conducted among the visitors during both weekdays and weekends throughout the summer season of 2011 where the parks are still highly used. At the beginning of the survey, the participants were asked whether they are interested to participate in this research and the value and importance of their opinion in the research were explained. If the answers were yes, they participated in the survey, but if the answer was no, they were not involved in the survey. The participants were picked according to a

multiple of 10 among the park visitors. For example, the questionnaires were distributed to the number 1, 10, 20, 30, and it lasted with a multiple of 10. Within one month the park users filled 304 sheets of questionnaires and 8 questionnaires out of 304 were excluded because they were not completed and they might make a biased data. Before conducting the survey, the purpose of this survey was explained to the participants. It was elucidated that their involvement is on a voluntarily basis and all the information given would only be used for the purpose of this study. In fact, the intention of a photo questionnaire is that participants are asked to give their preferences for the presented scenes on how much they agreed to be in the particular scene. All the scenes were groups based on complexity levels of each planting pattern style.

The first application of the SEM technique is to examine first-order model designed to test the multidimensionality of a theoretical construct. Second application of SEM is to test factorial validities throughout measuring model instruments and finally to test the validity of a casual structure model (Byrne, 2010). The SEM method is chosen in this research because it helps to evaluate the effects of the multi-independent variables on dependent variable simultaneously. No previous studies in the field of landscape spatial quality or peoples' attitudes to landscape in urban parks were found testing models or variables in conforming theories for landscape quality in recreation and leisure fields. Therefore, for the purpose of the current research, SEM model is used to identify factors and measure the effect of exogenous factors (Activity dimensions) on the endogenous variables (Complexity levels). SEM is a confirmatory approach to data analysis that needs priori assignment of inter-variable relationship. It provides an assessment of predictive validity, specifies the direct and indirect relation among the latent variables (Blunch, 2008).

3. Results

3.1. Demographic profile of the participants

Participants in the survey are described according to gender, marital status, age group, and education level. From 296 participants, n= 163 (55.1%) are males and n= 130 (43.9%) are females. (See Table 3). The data support the study by Nohorly (1999) and Hami (2011) where they revealed that males are the main users of parks in Tabriz. Regarding to marital status, the majority of participants (n= 173, 58.4%) are married and n= 121 (40.9%) are single. In terms of age groups, 47.3 % (n= 140) have age between 18 – 29 years, 24.9 % (n= 87) are between 30-39 years, 12.2 % (n= 36) are 40-49 years, and 10.1 % (n= 30) of the participants have age above 50 years.

Table 3 Participants' backgrounds

Participants		**Number**	**Percent**
Total public participation		296	100.0
Factors	**Sub-category**		
Gender	Male	163	55.1
	Female	130	43.9
Marital status	Single	121	40.9
	Married	173	58.4
Age(years old)	19-29	140	47.3
	30-39	87	29.4
	40-49	36	12.2
	Above 50	30	10.1
Education	Secondary and below	25	8.4
	Under diploma	26	8.8
	Diploma	88	29.7
	University	152	51.4

For educational level, the majority of the participants have university education (n= 152, 51.4%). Some studies have shown that greater education associates with high leisure activities (Hami, 2009; Kelly & Steinkamp, 1987).

3.2. Preferences for park usability

The purpose of this analysis is to explain the participants' opinion toward preferred activities in parks. The participants voted thirteen items related to park usability using five Likert scale (1= strongly disagree to 5= strongly agree) and the items are; watch water flow, walking and sitting around water, photograph water features and flower scenes, settles down on the grass, touch flowers, sit under tree shade, socializing with friends and family, and finally playing with children. The results in Table 4 reveal that the highest mean value is for watching water flow in the park (mean= 4.72, sd= 0.55), followed by sitting around water pool (mean= 4.59, sd= 0.64), walking around water (mean= 4.53, sd= 0.66), and the lowest mean score is for playing with children (mean= 3.70, sd= 1.20).

The result discloses that participants prefer to involve in passive activities particularly related to sitting around water features and watching water. It supports the conclusion of the previous studies, which argued passive activities are the most preferred activities in parks (Gobster, 2001& Hami, 2009). Moreover, fascination with nature is another top priority to do in parks. It can be said that people seek water features' entertainment and nature

involvement in urban parks in Tabriz.

Activities such as nature related activities might attract more people to visit the parks. It is interesting to know the relation between plants' contribution to activities done in urban park. A factor analysis for activity scales revealed three factors containing twelve items namely Passive Nature Activities (mean= 4.44, sd= 0.67), Social Activities (mean= 4.19, sd= 0.69), and Nature Appreciation (mean= 4.04, sd= 0.93) received the highest rate respectively (Table 5).

Table 4 Preferences for park usability

	Activities dimensions	Mean	Sd.
a)	I like to watch water flow in park	4.72	0.55
b)	I like very much to walk around water	4.53	0.66
c)	I want to sit around water pool	4.59	0.64
d)	I like very much viewing landscape scenes	4.46	0.87
e)	I like to sit under trees' shade	4.37	0.78
f)	I like very much to socialize with friend	4.33	0.83
g)	I like very much to eat dinner on grass area	4.33	0.88
h)	I like to have picnic with family in green areas	4.27	0.93
i)	I like to touch flowers in park	4.12	1.03
j)	I like very much to photograph flower scenes	4.08	0.88
k)	I like to lie down on the grasses	3.96	1.15
l)	I like very much to photograph water features in park	3.93	0.90
m)	I like very much to play with children in the parks	3.70	1.20

Table 5 Rotated component matrix for activity scales

Activity Scales	Label (SEM)	Factors[1]	Alpha[2]	Mean	Sd. dv.
1. Passive Nature Activities	----------	-	**0.64**	**4.44**	**0.67**
1. I like to watch water flow in park	ACTIVE_1	.734	.584		
2. I like very much to walk around water	ACTIVE_2	.698	.637		
3. I want to sit around water pool	ACTIVE_3	.667	.590		
2. Social Activities	----------	-	**0.663**	**4.19**	**0.69**
7. I like to spend time with family for picnic in green areas	ACTIVE_7	.746	.519		
8. I like very much to play with children in the parks	ACTIVE_8	.633	.524		
9. I like very much viewing landscape scenes	ACTIVE_9	.631	.583		
10. I like very much to eat dinner on grass area	ACTIVE_10	.597	.519		
3. Nature Appreciation	----------	-	**0.68**	**4.04**	**0.93**
4. I like very much to photograph water features in the park	ACTIVE_4	.892	.460		
5. I like very much to photograph flower scenes	ACTIVE_5	.852	.317		
6. I like touch flowers in park	ACTIVE_6	.656	.802		

3.3. Preferences for Natural Elements Complexity Levels

Vegetation scenes with high complexity received higher mean preferences (mean= 3.50, sd= 1.10) and it followed by low complexity (mean= 3.23, sd= 1.12) and moderate complexity (mean= 3.14, sd= 1.11) (Table 6). It supports the other research finding that trees with dense crowns increase peoples' preferences (Kuo et al., 1998).

Table 6 Preferences for vegetation visual complexity levels

	Preference for complexity	Mean	Sd. Dv.	Cronbach Alpha
1.	High complexity (6 scenes)	3.50	1.10	0.86
2.	Low complexity (6 scenes)	3.23	1.12	0.83
3.	Moderate complexity (6 scenes)	3.15	1.11	0.83

Plants have an added effect on complexity and people like city parks with trees and plants more than parks with no plants and trees (Thayer & Atwood, 1978). Rapoport and Hawkes (1970) support the definition of complexity, where they explained that "urban complexity" is a function of the violation of certain visual expectations that an environment may establish. Basing on this definition, high complexity is perceived when there is a view in any other type of change in every plant as an urban stimulus. It is obvious that low complex scenes provide great visibility and open areas for visitors compared to the scenes with moderate and high complexity do. However, it doesn't offer a suitable refuge place for people to hide which diminish its usability.

4. Results Interpretation for SEM Models

Fig. 1 illustrates the result of a structural equation modeling (SEM) to examine the effect of activity dimensions on natural elements with high complexity. Three activity dimensions are independent factors and complexity of park natural elements as dependent variable in this model. The model in Fig. 2 and Table 7 showed non-significant effect from independent variables (social activity (r= -0.02, p= 0.302), nature appreciation (r= 0.05, p= 0.582), passive nature activities (r= 0.11, p= 0.879)) on dependent variable (high complexity) in 5 % of significant level and the model regression was very low (R^2 = 0.02). In other words, vegetation with high complexity didn't contribute significantly in people willing to involve activities such as nature appreciation, passive, and social activities in urban park (Table 7). Since the regression value of the model is extremely low, it can be argued that this model is weak and the correlation between activity latent and natural elements with high complexity is not significant (Fig. 1).

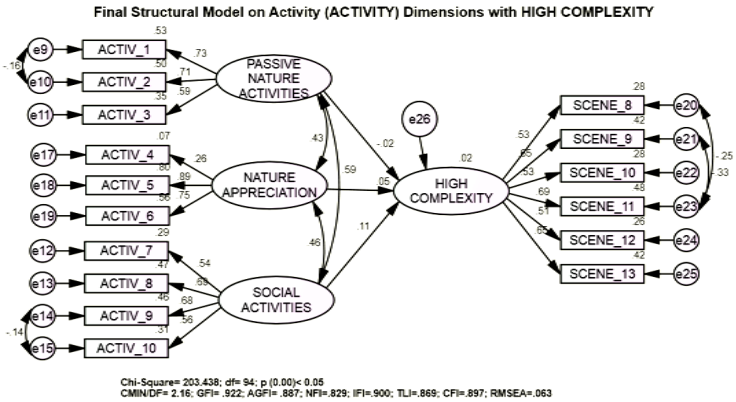

Fig. 1 CFA model on high complexity items

Table 7 Estimates of regression weights or significant estimates for high complexity

Items – Constructs[1]			Estimate	S.E.	C.R.	P[2]
HIGH_COMPLEXITY	<---	SOCIAL_ACTIVITIES	.138	.134	1.032	.302
HIGH_COMPLEXITY	<---	NATURE_APPRECIATION	.135	.245	.551	.582
HIGH_COMPLEXITY	<---	PASSIVE_NATURE_ACTIVITIES	-.028	.181	-.153	.879

[1]Constructs are represented by: HIGH COMPLEXITY = complexity, ACTIVITY= social activity, passive nature activities, and nature appreciation,[2] These based from the standardized estimate values; *** p<.005

The result of SEM model (examining effect of activity dimensions on natural elements with moderate complexity) in Fig. 2 and Table 8 showed significant effect of social activity on moderate complexity (r = .33, R^2 = 0.10, p = .01<0.05). It proves that vegetation with moderate complexity likely offers a friendly environment for social meetings such as family gathering. However, there was not enough evidence to prove that it is appropriate environment for individual passive and nature related activities.

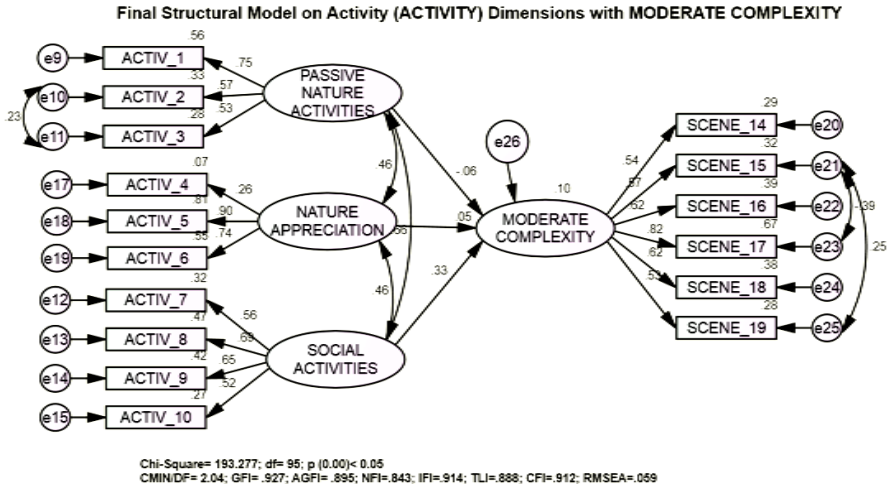

Fig. 2 CFA model on moderate complexity items

Table 8 Estimates of regression weights or significant estimates for moderate complexity

Items – Constructs[1]			Estimate	S.E.	C.R.	P[2]
MODERATE_COMPLEXITY	<---	SOCIAL_ACTIVITIES	.356	.138	2.576	.010
MODERATE_COMPLEXITY	<---	NATURE_APPRECIATION	.127	.217	.585	.558
MODERATE_COMPLEXITY	<---	PASSIVE_NATURE_ACTIVITIES	-.113	.241	-.470	.639

[1]Constructs are represented by: MODERATE COMPLEXITY = complexity, ACTIVITY= social activity, passive nature activities, and nature appreciation,[2] These based from the standardized estimate values; p<.005

From the SEM model in Fig. 3 and Table 9, it was found that natural elements with low complexity significantly contribute on people's involvement with social activities (r = 0.25, R^2 = 0.07, p = 0.024) whilst they had opposite effect on passive nature activities (r = -.24, R^2 = 0.07, p = 0.024). However, low complex vegetation area did not have significant correlation with nature appreciation (r= 0.09, p= 0.295).

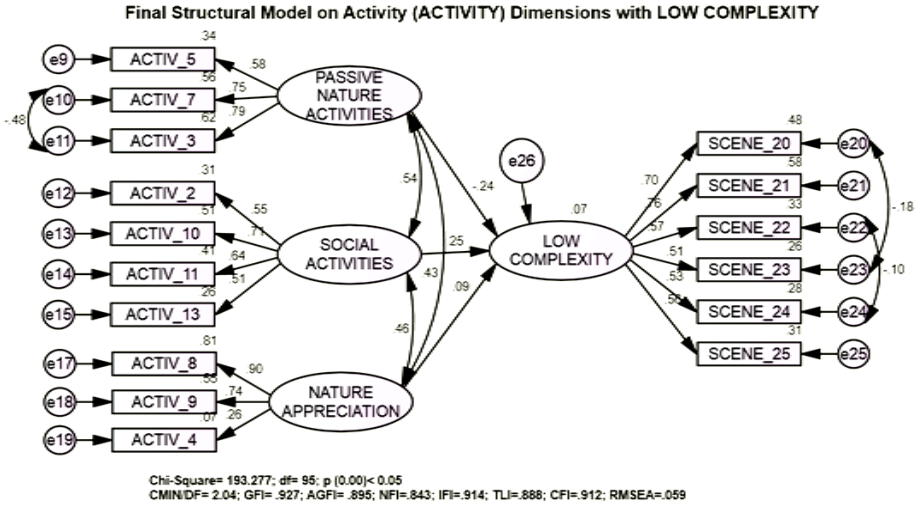

Fig. 3 CFA model on low complexity items

Table 9 Estimates of regression weights or significant estimates for low complexity

Items – Constructs[1]			Estimate	S.E.	C.R.	P[2]
LOW_COMPLEXITY	<---	SOCIAL_ACTIVITIES	.185	.082	2.251	.024
LOW_COMPLEXITY	<---	NATURE_APPRECIATION	.056	.054	1.048	.295
LOW_COMPLEXITY	<---	PASSIVE_NATURE_ACTIVITIES	-.242	.107	-2.261	.024

[1]Constructs are represented by: LOW COMPLEXITY = complexity, ACTIVITY= social activity, passive nature activities, and nature appreciation, [2] These based from the standardized estimate values; *** p<.005

Perhaps people need more privacy and a tranquil place to enjoy in green environment and watch water features, where environment with less vegetation doesn't provide such setting. In addition, people perhaps need quiet and peaceful place for passive activities which is not provided in more open spaces. The result from SEM model also did not show enough evidence to justify that people appreciate nature environments with low complexity.

5. Findings and Conclusion

The majority of participants is male, married and have high level of education. More than 40 % of them are 19-29 years old and have a moderate income. The result reveals that the participants prefer to involve water related passive activities such as sitting around water features and watching them. It supports the conclusion of previous studies, which argue passive activities are the most preferred activities in urban parks (Gobster, 2001& Hami, 2009). People were interested to involve directly with natural elements such as water. It seems that vegetated areas and water features make users to feel at peace and serenity in parks. The result showed that walking, sitting, admiring nature, and watching vegetation scenes are the activities done mostly in urban parks. It can be said that people seek water features' entertainment and nature involvement in urban parks those attract more people to visit parks.

The study also showed correlation between people's opinion for usability and natural elements visual complexity. The SEM models revealed positive effect of activities on moderate visual complexity and negative effect of activity on vegetation with low complexity. Park usability is important because a decline in the park usage which leads to the increase of facing an undesirable behaviors such as the presence of drug users and vandals.

It was argued that facilities of parks for both structured such as sport fields and unstructured physical activity such as paths play an important role in encouraging park visitors (McCormack et al., 2010). Another study suggested that people visits parks with walking paths and trails more often than the parks including sport facilities (Reed et al., 2008). Water-related activities encourage people to visit park but water amenities may permit parks to be used for longer period (Ries et al., 2008).

The study proved that spatial configuration of natural elements correlates with urban park usability in Tabriz. Spatial quality of vegetation contributes in the improvement of public's social skills however, vegetation with high complexity detracted social activities in park environment. Therefore, proper vegetation design can increase societal sustainability. The study emphasized the importance of vegetation arrangement and configuration with regards to improving people social life. Moreover, people activities in urban parks should be designed and planned in relationship to natural elements spatial configuration.

References

[1] Brown G. A Theory of urban park geography, Journal of Leisure Research, 2008, No. 4, Vol. 40, pp. 589-607.

[2] Blunch NJ. Introduction to Structural Equation Modeling Using Spss and Amos, Los Angles, SAGE, 2008.

[3] Byrne Barbara M. Stractural Equation Modeling with Amos (Second Ed.), New Yourk, Taylor and Francis Group, 2010.

[4] Chiesura Anna. The role of urban parks for the sustainable city, Landscape and Urban Planning, 2004, No. 1, Vol. 68, pp. 129-38.

[5] Daniel TC. Whither Scenic Beauty? Visual landscape quality assessment in the 21st century, Landscape and Urban Planning, 2001, Nos. 1-4, Vol. 54, pp. 267-81.

[6] Garofalo J, Laub J. The fear of crime: broadening our perspective, Victimology, 1978, No. 3-4, Vol. 3, pp. 242-53.

[7] Gau JM, TC Pratt. Broken windows or window dressing? citizens'(in) ability to tell the difference between disorder and crime, Criminology & Public Policy, 2008, No. 2, Vol. 7, pp. 163-94.

[8] Gehl J. Life between Buildings: Using Public Space, New York, Van Nostrand Reinhold, 1987.

[9] Gibson JJ. The Ecological Approach to Visual Perception, Boston, M.A, 1979.

[10] Gobster P. Visions of nature; conflict and compatibility in urban park restoration, Urban Planning, 2001, Vol. 56, pp. 35-51.

[11] Goličnik B, Catharine Ward Thompson. Emerging relationships between design and use of urban park spaces, Landscape and Urban Planning, 2010, No. 1, Vol. 94, pp. 38-53.

[12] Haghshenas E, Jafari M. Preliminary results of site effect assessment in the city of tabriz (iran) using earthquake recordings, Paper presented at the Third Internation Symposium on the Effects of Surface Geology on Seismic Motion, Grenoble, France, 2006.

[13] Hami A. Users' Preferences of Usability of Urban Parks in Tabriz, Iran, Universiti Putra Malaysia, 2009.

[14] Hami A, Suhardi M, Manohar M, shahhosseini H. Users' preferences of usability and sustainability of old urban park in Tabriz, Iran, Australian Journal of Basic and Applied Sciences, 2011, No. 11, Vol. 5, pp. 1899-905.

[15] Hammit WE. Visual and User Preferences for a Bog Environment, University of Michigan, 1978.

[16] Kaplan R, Kaplan S. The Experience of Nature: A Psychological Perspective, New York, Cambridge University Press, 1989.

[17] Kaplan S, Kaplan R, Wendt JS. Rated Preference and Complexity for Natural and Urban Visual Material, Attention, Perception, & Psychophysics, 1972, No. 4, Vol. 12, pp. 354-56.

[18] Kelly JR, Steinkamp MW. Later-life satisfaction: does leisure contribute?, Leisure Science, 1987, Vol. 9, pp. 189-200.

[19] Kuo Frances E, Bacaioca M, Sullivan WC. Transforming inner city landscapes: trees, sense of safety, and preferences, Environment and Behavior, 1998, No. 30, Vol. 1, pp. 28-59.

[20] Leopold LB. Landscape Esthetics: How to Quantify the Scenics of a River Valley, Natural History, 1969, No. 8, Vol. 78, pp. 36-45.

[21] McCormack GR, Rock M, Toohey AM, Hignell D. Characteristics of urban parks associated with park use and physical activity: a review of qualitative research, Health & Place, 2010, No. 4, Vol. 16, pp. 712-26.

[22] Nasar JL, Jones KM. Landscapes of fear and stress, Environment and Behavior, 1997, No. 3, Vol. 29, pp. 291-323.

[23] Nohorly D. Economic Evaluation of El Goli Park in Tabriz, Iran, Tehran University, 1999.

[24] Parsons R, TC Daniel. Good looking: in defense of scenic landscape aesthetics, Landscape and Urban Planning, 2002, No. 1, Vol. 60, pp. 43-56.

[25] Pratt TC. Addicted to Incarceration: Corrections Policy and the Politics of Misinformation in the United States, Thousand Oaks, California, Sage, 2008.

[26] Rapoport A, Hawkes R. The perception of urban complexity, AlP Journal, 1970, Vol. 36, pp. 106-11.

[27] Reed Julian A, Cheryl-Anne Arant, Princess Wells, Katherine Stevens, Sandra Hagen, Holly Harring. A descriptive examination of the most frequently used activity settings in 25 community parks using direct observation, Journal of physical activity & health, 2008, Vol. 5, S183.

[28] Regan CL, SA Horn. To nature or not to nature: associations between environmental preferences, mood states and demographic factors, Journal of Environmental Psychology, 2005, No. 1, Vol. 25, pp. 57-66.

[29] Ries Amy V, Joel Gittelsohn, Carolyn C Voorhees, Kathleen M Roche, Kelly J Clifton, Nan M Astone. The environment and urban adolescents' use of recreational facilities for physical activity: a qualitative study, American Journal of Health Promotion, 2008, No. 1, Vol. 23, pp. 43-50.

[30] Robert L. Thayer Jr, Brain G. Atwood. Plants, complexity, and pleasure in urban and suburban environments, Environmental Psychology and Nonverbal Behavior, 1978, No. 2, Vol. 3.

[31] Sevenant Marjanne, Marc Antrop. Cognitive attributes and aesthetic preferences in assessment and differentiation of landscapes, Journal of Environmental Management, 2009, No. 9, Vol. 90, pp. 2889-2899.
[32] Stamps Arthur E. Mystery, complexity, legibility and coherence: a meta-analysis, Journal of Environmental Psychology, 2004, No. 1, Vol. 24, pp. 1-16.
[33] Suhardi Maulan. A Perceptual Study of Wetlands: Implications for Wetland Restoration in the Urban Areas in Malaysia, Virginia Polytechnic Institute and State University, 2006.
[34] Suhardi Maulan. Seremban Urban Park, Malaysia: A Preference Study, Virginia Polytechnic Institute & State University, 2002.
[35] Thayer RL, BG Atwood. Plants, complexity, and pleasure in urban and suburban environments, Journal of Nonverbal Behavior, 1978, No. 2, Vol. 3, pp. 67-76.
[36] Whyte AGD, FT Baird. Integrated modeling of new zealand's exotic forest industry. Procceding of Regional Science Association. Mtg in Canberra, 1982, pp. 155-67.
[37] Zube EH, JL Sell, JG Taylor. Landscape Perception:Research Application and Theory, landscape planning, 1982, Vol. 9, pp. 1-33.