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Developing P.P.P Model of Place Attachment for Evaluating Residential Environment (Cases Study: Open Space of Iranzamin and Ekbatan Apartment Buildings)

[1]*Shiva Yaghmaeian*, [2*]*Farah Habib*

[1]*PhD. Candidate, Department Of Architecture, Science and Research Branch, Islamic Azad University, Tehran, Iran.*
[2] *Professor, Department Of Architecture, Science and Research Branch, Islamic Azad University, Tehran, Iran.*

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ABSTRACT: Since the quality of apartment buildings is noted, the way of increasing attachment and discovering its effective variables is challenging subjects for researchers in this field. Person, place and process (P.P.P) model of place attachment as the most precise model of them, evaluate attachment to three parts of person, place and process. What is going to be studied in this research is to evaluate attachment of residents to the open space of such buildings. Then, identifying the effective variables and suggesting practical solutions to improve quality of such environment are the subsequent goals of this research. This is a practical research with correlational cases study method.used for Ekbatan and Iran Zamin apartment buildings and SPSS is used to analyze data. The findings show that in both cases, attachment is in high degree while physical and social attachment in Iranzamin apartment building is more than Ekbatan. In addition physical attachment is more than social attachment in both cases. The results show that in personal dimensions, designers should pay attention to the expectations and variety of needs for different ages of residents. In place dimensions, type of territories, accessibility and flexibility of spaces in designing open spaces are the key points for designers. In addition, the way these types of buildings are managed is so important in the process of place attachment that shows it is needed for their managers to have some special skills to respond to the mobility character of place attachment.

Keywords: *Apartment Buildings, Attachment, Open Space, P.P.P model, Place.*

INTRODUCTION

The quality of residential environment was noticed in the first Habitat assembly in 1976 as a result of crisis in various aspects of urban life such as environmental, social, physical and economical aspects (Azizi & Rahmani, 2004). Residential environment quality plays an important role in residents' attachment, personal and social identity and contribution to various aspects of place activities.

One of the solutions to increase quality of the residential environment is conducting research based on post occupy evaluations of residential environment. They can indicate guidelines for designers toward desirable environment.

In the recent studies of perceived residential environment quality, place attachment is one of the dimensions that should be regarded as an effective ones (Fornara et al., 2010). The literature review of place attachment indicates that attachment is an important concept by various dimensions and considering them in design process could affect the quality of residential environment efficiently.

The environmental quality of high-rise residential buildings should be noticed too. High-rise residential buildings are the response to the population increase in the modern era and were imported products in Iranian architecture. Thus, it is necessary for Iranian researchers and designers to indigenize them to improve residents' attachment to qualify residential environment.

Evaluation of residents' attachment to the open space of such buildings after occupation, based on P.P.P model of attachment is the main goal of this research. Though this research is going

*Corresponding Author Email: *f.habib@srbiau.ac.ir*

to respond to these two major questions:
1- How do personal dimensions of P.P.P model- such as age, gender, residence length and education- affect Iranian attachment to the open space of high-rise apartment buildings?
2- What are the most effective physical variables of the open space of high-rise apartment buildings to the residents' attachment?
The case studies are Iranzamin and Ekbatan apartment buildings as two prosperous ones for different stratums in Tehran.

Literature Review

Place attachment: The various definitions of place attachment are the main problems for researchers in this field as many of them mentioned (Hernandez et al., 2007; Jorgensen & Stedman, 2001; Knez, 2005). Place attachment is a positive effect between special place and people. Generally place attachment is studied in two approaches: phenomenological and physiological ones. In phenomenological approach, place and place attachment are not two different concepts while place attachment is a kind of place experience. Tuan declares that place attachment is shaped gradually by getting to know to the place accompanied by memories of smell, communal activities and friendly relationship which take place during residents' life (Tuan, 1977). Place experience in seven levels is described from outside to inside (Relph, 1976) so place attachment is taking place in the more inside levels of place experience. Simon introduces place attachment as one dimension of live place and place experience and in the generative approach describes place attachment into six process of place (Place interaction, Place identity, Place creation, Place intensification, place realization, Place release) (Seamon, 2012). In an appropriate place, all these six processes are available while dealing with each other in a complicate and unpredictable manner (Seamon, 2014). In a physiological approach, place attachment is divided to various dimensions which the most important ones are mentioned in Table 1.

The Models of Place Attachment: Place attachment in psychological approach has various components. Generally psychologist's viewpoints can be categorized in three groups (Hernández et al., 2015). Several researchers consider place attachment as a one-dimensional concept related at the same level,with concepts such as place identity or place dependence (Devine-Wright, 2010; Fornara et al., 2010; Giuliani et al., 2003; Hernandez et al., 2007; Lewica, 2010; Scannell & Gifford, 2010). Other proposals consider it a multidimensional construct that incorporates a number of different factors: two, three, or five. For example, Williams and Vaske define place attachment as a superordinate concept with two dimensions: place dependence and place identity (Williams & Vaske,

Table 1: The most important definitions of place attachment in physiological approach.

theoretician	theory
Riger & Lavrakas	Place attachment has two dimensions: physical and social dimensions (Riger & Lavrakas,1981)
Stokols & Shumaker	Place attachment is a positive bond between residential place and person which residential satisfaction and place attachment are two aspects of it (Stokols & Shumaker, 1981).
Low & Altman	Place attachment is a complex phenomenon that incorporates several aspects of people and place bonding that involves patterns of: •attachment (affect, cognition and practice) •place that varies in scale, specificity and tangibility. Different actors (individuals, groups and cultures). •Different social relationships (individuals, groups and cultures). •Temporal space (linear, cyclical) (Low & Altman, 1992).
Hidalgo & Hernandez	Place attachment is a positive bond between a special place and a person which the person has the tendency to stay close to that place (Hidalgo & Hernandez, 2001).
Scannell & Gifford	Place attachment is a meaningful relationship between place and person (Scannell & Gifford, 2010)
Lewicka	Place attachment implies "anchoring" of emotions in the object of attachment, feeling of belonging, willingness to stay close, and wish to return when away (Lewicka, 2014)

2003). Finally, other authors consider place attachment as a subordinate concept or a dimension of a more general concept For example, for Lalli, place attachment is a component of urban-related identity (Lalli, 1992) and Jorgensen and Stedman propose place attachment, place dependence, and place identity as dimensions of sense of place (Jorgensen & Stedman, 2006)

P.P.P Model of place attachment: Scannel and Gifford (2010) provided P.P.P Model of place attachment which is the most complete one in the psychological approach and the main researchers in this field have approved it (Hernández et al., 2015; Lewica, 2011). They defined place attachment as a bond between person and meaningful environment (Scannell & Gifford, 2010). Person, place and process are three dimensions of attachment in their model (Fig.1).

In personal dimension, place attachment occurs at both the individual and group levels. At the individual level, it involves the personal connections one has to a place. For example, place attachment is stronger for settings that evoke personal memories. Similarly, places become meaningful from personally important experiences, such as realizations, milestones and experiences of personal growth. At the group level, attachment is comprised of the symbolic meanings of a place that are shared among members such as cultural and religious events.

In the psychological process dimension of place attachment, there are three components affect, cognition, and behavior.

Person–place bonding undoubtedly involves an emotional connection to a particular place for example Tuan named it ‘‘topophilia’’. Person–place bonds also include cognitive elements. The memories, beliefs, meaning, and knowledge that individuals associate with their central settings make them personally important.

The third aspect of the psychological process dimension of place attachment is the behavioral level, in which attachment is expressed through actions. Like interpersonal attachment, place attachment is typified by proximity-maintaining behaviors and is ‘‘a positive, affective bond between an individual and a specific place, the main characteristic of which is to maintain closeness to such a place’’

The most important dimension of place attachment is the place itself and has typically been divided into two levels: social and physical place attachment (Scannell & Gifford, 2010).

The variables for the evaluation of apartment building’s open space quality: Apartment building’s open space as a communal space for residents can play an important role in attachment. Jalili and his collaborators believe that the quality of apartment building’s open space and the activities which take place are in direct relation with each other (Jalili et al., 2012). The amount of activities and their quality would affect residents’ attachment as Altman and Low describe that continues activities in residential environment will result in residents’ attachment (Low & Altman, 1992). Jan Gehl believes physical planning is significant to develop physical activities and their quality in the open space between buildings. He defines three types of activities between buildings: necessary activities, optional activities, and social activities. Necessary activities include those that are more or less compulsory such as going to school or to work. Because the activities in this group are necessary, their incidence is influenced only slightly by the physical framework. These activities will take place throughout the year, under nearly all conditions, and are more or less independent of the exterior environment. In optional activities, there is a wish to do so and if time and place make it possible, such as taking a walk to get a breath of fresh air. These activities are especially dependent on exterior physical conditions. Social activities are all activities that depend on the presence of others in public spaces. Social activities include children at play, greetings and conversations, communal activities of various kinds. Social activities are indirectly supported whenever necessary and optional activities are given better conditions in public spaces (Gehl, 2011).

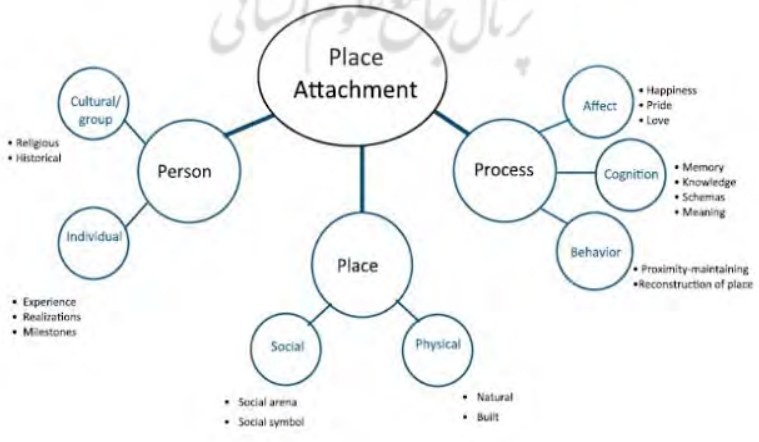

Fig.1: The three partite model of place attachment. (Source: Scannell & Gifford, 2010)

Jalili and his colleagues introduce variables such as flexibility, legibly and the beauty of the open Space as a responsible environment in apartment buildings. In a flexible open space, environment has the ability to change by the change of residents' needs so if the open space is designed just for specific activity, it could hardly respond to the other kind of activities. A legible open space can be realized better by their users. The indicators of legible open space are: easy orientation, clear borders and visual accessibility (Jalili et al., 2012).

The variables for the evaluation of apartment building's open space quality based on P.P.P model of attachment:

Based on physical and social dimensions of attachment as first classifications by Riger and Lavrakas in 1981, and P.P.P model, the personal variables-based on attachment theories are defined by age, gender, education, type of house ownership and residence length (Lewica, 2011) and in place dimension, place components described as activities, physical setting and meanings (Relph, 1976). The types of activities in place are divided to essential, optional and social ones (Gehl, 2011) and the variable of physical setting are considered as accessibility, furniture, comfort, natural elements such as green space, facilities such as playground and sport fields, astatic. The meanings of place are described by happiness, pride, memory, identity etc. Finally, place attachment will be expressed in effect, cognition, and behavior as a dimension of psychological process. In addition, time duration, place management and place safety will affect attachment during place life (The categories of questions are available in appendix1). As a result, developing model of place attachment for evaluating residential open space is described in Fig. 2.

MATERIAL AND METHODS

Case study: The first case study is Iranzamin apartment building located in Shahrake- Gharb of Tehran in a land which is 12500 square meters in area while the building area is 3370 square meters. It is a twenty nine-story building which is almost 90 meters in height. Its open space is located in the south side of the building with variety of facilities such as playground, bicycle track, volleyball and tennis courts and several pergolas so that the environment of residential complex has variety of facilities that could be appropriate for the research. In addition, the open space is exclusively for the Iranzamin's residents in the south side of the building have separate access from the entrance of the complex that may affect the results (Fig. 3).

The second case study is Ekbatan is a planned town in Western Tehran, Iran. It is located approximately five kilometers West of central Tehran. It has 15,500 units on an area of 2,208,570 square meters. It has three separate sets of buildings called phases. Each phase has independent buildings categorized as a block. There are frequent green fields between the buildings in Ekbatan. The landscape is designed in a way to combine nature and modern living together; a concept, due to environmental concerns, is being explored more in architectural practices. The specific open space of this complex without any particular territory in a way of entrancing complex, made it suitable as the second case study of this research (Fig. 4).

Method: At the first stage based on theoretical studies and interviewing by residents, the most important variables were found and then 200 questionnaires were filled by the residents of two case studies. Next, its validation had been studied. At the second stage, the final version of questionnaire was distributed and filled by the residents in order to evaluate their

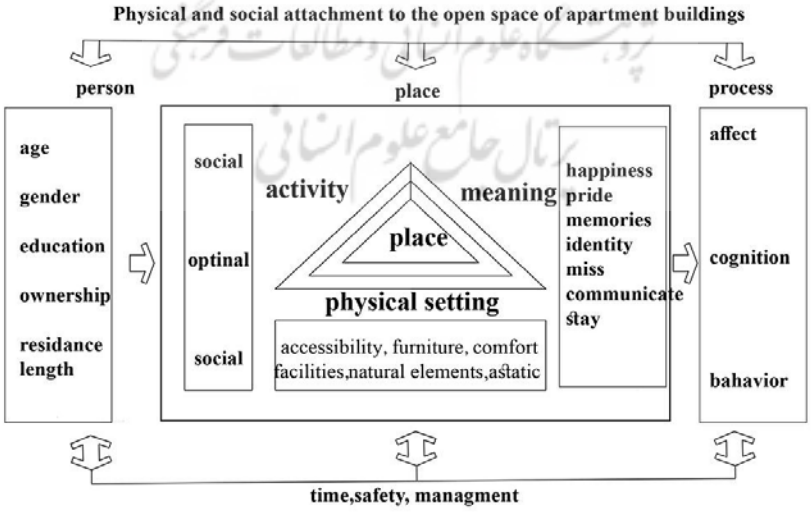

Fig. 2: Developing model of place attachment for evaluating residential open space.

Fig.3: Iranzamin.

Fig.4: Ekbatan.

Table 2: Qualitative factor analysis.

Indexes	KMO	Bartlette	Degree of liberation	significance
	0.81	2712.73	1081	0.0001

attachme¬nt to the open space of case studies. In addition, by using correlational methods, the relation of effective variables and the amount of attachment were considered.

Sample size: In order to identify the sample size, Morgan sample size was used. 274 residents in Iranzamin and 374 in Ekbatan filled the questionnaire. Random and stratified sampling was employed. In this way, the variety of ages, educations and gender were randomly selected.

Research tools: The questionnaire was based on 89 questions. The Likert scale was from very little (one score) to too much (four score). Cronbach's alpha was used to evaluate reliability of research tool. It shows the number more than 0.7 that is acceptable for the tool. Several methods were used to evaluate validity of questionnaire. The face validity of questionnaire was proved by the supervisor and two psychologists and the exploratory factor analysis was used to evaluate construct validity of the questionnaire.

In Table 2, the amount of KMO, Bartlette and its significance have been reported. The KMO index is 0.81 which is acceptable and shows that the first sample size (200 residents) was acceptable for qualitative factor analysis. Bartlette is reported 2712.73 which is significant for P≤0.01. It shows that the gathered data is appropriate for factor analysis. Solidarity matrix shows that KMO index is more than 0.7 for each question which is sufficient for them.

Data analysis: Descriptive and inferential statistics methods were used for analyzing data. Statistical Tables and charts show report average, standard deviation, kurtosis, minimum and maximum score for each variable of research. Frequency Table's reports are based on characteristics of sample analysis. SPSS software is used for investigating data. Kolmogorov – Smirnov, Spearman test, Pearson Correlation Coefficient, Mann–Whitney, Kruskal–Wallis and Friedman test have been used and path analysis was done through multiple regressions.

RESULTS AND DISCUSSION

The physical and social attachment to the Iranzamin's open space is higher than Ekbatan (Table 3). The amount of Z in Mann–Whitney shows that these differences are significant in the level of P≤ 0.01.

In the psychological process of attachment, totally residents of Iranzamin show higher percent of affective, cognitive, and behavioral attachment (chart 1). However, the way of expressing is different from each other.

In the psychological process of attachment, the way of expressing attachment in the affective process, residents of Ekbatan show more affect than Iranzamin's residents. One reason is that the design of Iranzamin's open space is not in agreement with residents' expectations. Although in the behavioral process, the residents of Iranzamin have no tension

Table 3: Mann–Whitney (The statistical significance of attachment to the open space of for each apartment building).

Variables	groups	average	z	Significance level
Physical attachment to the open space	Ekbatan	5.29	7.58	0.0001
	Iranzamin	6.24		
social attachment to the open space	Ekbatan	5.17	6.58	0.0001
	Iranzamin	5.98		

to move to another one because of their pride of living in such buildings as one of the best ones in Tehran. In the cognitive process of attachment, there is no significant difference between them.

The results show that psychological processes of attachment based on P.P.P model are not essentially sequential, as a person might have more behavioral attachment to a place than cognitive one.

Personal variables: Data analysis shows that in both cases gender had different effects on the attachment to the open space, as women in Iranzamin had significant more attachment than men. One of the most important reasons is for the shape of territory of iranzamin's open space. Its open space is semi-private in territory so women feel more comfortable and safe than women in Ekbatan.

Type of house ownership in both apartment buildings had no effect on attachment, while attachment for residents in Iranzamin who lives less than three years is more than the others. This could be a sign of weak social relationship which should have taken place during residence length. It could increase social and physical attachment to the residential environment. In addition, it could be the effect of living in high-rise buildings that residents have less ownership to the semi-private space but do not contribute to the activities that took place in apartment buildings.

Education had different effects on the levels of attachment in both apartment buildings. The residents with less level of education had more attachment to the open space in both cases. It shows that they spend more time in the open space as a result of their career and more spare time or the amount of their income.

The effect of age was reported varied in Ekbatan. The most level of attachment has been reported for ones who had more than 50 years old and the less one belonged to the residents aged between 31 to 49 years old. One of the most important reasons along with more spare time is the appropriate accessibility to the open space of Ekbatan for ones who are more than 50. In contrast, the residents of Iranzamin in this ages had the less attachment to the open space as a result of improper accessibility, and lack of facilities according to their needs. Most levels of attachment were seen for the residents who were 17 to 30 years old in Iranzamin as a result of varied facilities according to their needs (Table 4).

In short, residence length as an important one in place attachment in most research plays no significant role in both cases, though age and education were reported as effective ones. Not considering to the residents' expectations in designing open space of Iranzamin makes it useless despite spending much money.

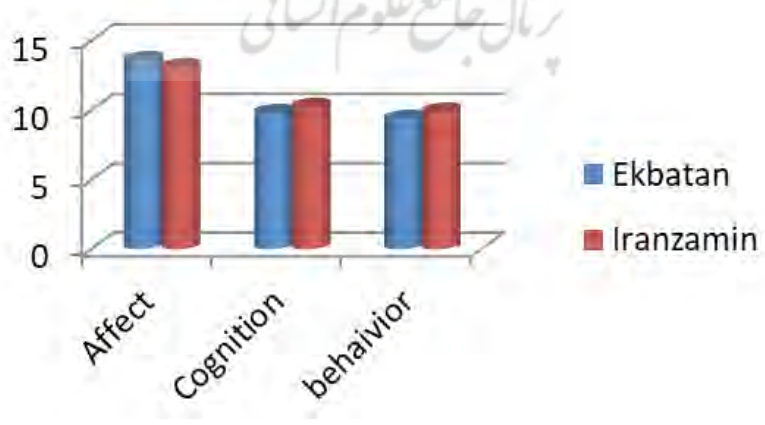

Fig. 5: The average scores for the psychological process of attachment.

Table 4: The effect of personal variables on attachment in two case studies.

Personal Variables	Iranzamin	Ekbatan
Gender	Women more than men	ineffective
Ownership	ineffective	ineffective
Residential Length	Less than three years old had more attachment than others	ineffective
Education	Less than diploma old had more attachment than others	Less than diploma old had more attachment than others
Age	17-30 year-old had more attachment than others	More than 50 years old had more attachment than others

Table 5: The factor regression for the predictive variables of attachment to the Ekbatan's open space.

independent variables	B	Beta	t	The significance level
Optional activities	0.31	0.25	4.54	0.0001
Physical setting- facilities	0.70	0.66	18.5	0.0001
Physical setting-comfort	0.24	0.25	7.03	0.0001
safety	0.15	0.09	2.46	0.01

R2=0.55 R=0.74 F= 146.93 F significance level= 0.0001

Table 6: The factor regression for the predictive variables of attachment to the Iranzamin's open space.

independent variables	B	Beta	t	The significance level
Optional activities	0.27	0.25	3.84	0.0001
Social activities	0.16	0.15	2.57	0.01
Physical setting- accessibility	0.34	0.29	5.35	0.0001
Physical setting-furniture	0.11	0.07	1.22	0.22
Physical setting- comfort	0.03	0.02	0.47	0.63
Physical setting-astatic	0.10	0.09	1.57	0.11

The predictive variables on attachment: Multivariate regression was utilized to study scores changes in dependent variables by the use of several independent variables. To apply multivariate regression it is necessary to study the significant relation of each variable to the other one. In this way, the variables come to the multivariate regression equations that have pairwise relation to the attachment of open space. As a result, the other ones have been eliminated.

To compare predictive variables of attachment with the Ekbatan and Iranzamin's open space (Tables 5 & 6), in Iranzamin the most important predictive variables in physical setting were accessibility, and in activities variables of place were optional and social activities. In Ekbatan, the variables of physical setting-facilities and physical setting-comfort and optional activities have been reported on predictive variables for attachment to the open space.

CONCLUSIONS

Living in high-rise apartment buildings has been integrated in our urban life nowadays. Hence, it is crucial for researchers and designers to indigenize appropriate rules to increase life quality of their residents. Considering the dimensions that increase the attachment of residents to the building's environment is one way to achieve that goal.

Therefore, in this research two apartment buildings' open spaces in Tehran were studied and their residents' attachment has been evaluated based on P.P.P model of attachment.

The results show that residents' attachment was in high levels for both of cases while there are significant differences in the effective variables comparing to other countries.

To achieve high level of attachment to the open space of residential complex, designers should notice items below:

1- In personal dimensions, it is important for designers to pay attention to the expectations and variety of needs for different ages of residents in open space before designing it by noticing the residents' demands in the identical residential complex.

2- In place dimensions of attachment to the open space of apartment buildings, accessibility and variety of facilities -based on residents' needs for different ages and their expectations- are the most variables that affect optional and social activities in open space. As inappropriate access to Iranzamin's open space decreases its quality.

Also, designing flexible space that could respond to the residents' needs is essential to achieve high level of attachment in the life of building.

In addition, more private territory would result in more attachment. The use of facilities in open space is indirectly affected by the shape of territories as the more private one will result in more attachment because of its safety and psychological effects, so the level of behavioral attachment will increase in more private open space as it happened for Iranzamin.

3- There are varieties of factors that affect psychological processes of attachment. Designing for all sense, safe, comfort, legible open space and sociable facilities for variety of residents' needs are the most significant ones to achieve goals in increasing attachment.

Regardless of personal and place dimensions of attachment, management and planning programs for maintaining and repairing place and human resources management are effective variables on residents' attachment that needs skilled manager to respond to the mobile character of attachment.

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