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Enhancing The Sense of Place in The Open Spaces of Residential Complexes by Relying on The Evaluation of Physical Environmental Components Case Study: Sazman Ab Neighbourhood' Residential Complexes

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ABSTRACT

In modern houses, spatial and structural relationships and lifestyle have led to changes in the morphology and meaning of housing. The main objective of this research is to evaluate the effective physical.environmental components in open spaces to enhance the sense of place in residential complexes in the middle context of Mashhad. The combined approach of this research is initially based on theoretical foundations and a conceptual model has been extracted. Then, the components of the research model are divided into two categories: quantitative and qualitative. At first,qualitative data was collected based on the direct observation method, and then a comparative qualitative analysis was performed according to the six components of the research. In the quantitative part, based on the results of qualitative analysis from two dimensions,the effective factors on enhancing the sense of place have been investigated: Confirmatory factor analysis and hierarchical analysis. In the first part, the viewpoints of citizens have been analyzed based on five main factors including form, location, furniture and equipment,landscape,location and natural elements of the complex with Lavaan software. The second part, which is related to the review of the experts' questionnaire, the Delphi technique,has also been analyzed with the help of the AHP ranking method and Expert Choice software. Finally in order to increase the sense of belonging to the place in the Sazman Ab complex, some strategies such as Spatial connection and coherence between different spaces of the residential complex, Observance of privacy in the residential space interior design in order to increase the sense of belonging to the place, Using materials and nostalgic elements of identity to create memories and stimulate residents to interact more and feel belonging to the place and Designing flexible and multifunctional spaces can be devoted.

Keywords: Sense of Place, Open Space, Middle Context, Residential Complex, Natural Environment.

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1.Introduction

By finding the originality of man in space design, studying his understanding and relationship with his surroundings is the first step of design studies. The relationship between man and place has different dimensions, depending on the attitude of man and the quality of the space. One aspect of this relationship arises from man and his physical and psychological dimensions, if a single space is not considered the same for different people [4]. The concept of place is one of the basic concepts in urban planning, the most important difference between it and space is its non.abstraction. The nature of place is formed in opposition to the concept of abstract space, and in other words, place is a space with a meaning that is formed in the context of the physical environment over time and as a result of a strong or temporary emotional relationship between a specific person or group [33].

In modern houses, population density, changes in per capita land, spatial and structural relationships, changes in daily activities and lifestyle have led to changes in the morphology and meaning of housing. Modern houses are designed in the form of apartments and residential complexes; The needs of modern life have led designers to physically or semantically remove some social elements in housing, such as yards. But today, changes in the type of relationships between humans and the environment cause a decrease in the sense of belonging to the place, changes in the spatial form, incompatibility with the needs, repetition and lack of memorable events, the destruction of spatial credibility, and as a result, the creation of forms and green and ecological architecture; Meanwhile, urban courtyards have been replaced by traditional courtyards to bridge this gap [37].

The lack of precise and specific definition of design criteria and the role of open spaces in residential complexes has somehow made designers and architects unable to familiarize themselves with the issues and effective factors in designing high.quality residential environments [11]. This is while the design criteria of the open space of the residential complex should have a physical.spatial structure so that the residents can achieve a much higher sense of place. Reaching the level of "presence in the place" which is taken from the actual behavior and performance of people, will occur when the body of the open space finds a special space with elements, combination and organization to lead to the formation of a deep experience in the place and as a result, they should see their body and soul in the open space of their residence and reach the level of presence in the place. And one of the consequences of that will be peace, familiarity, passion and memory, connection, security, liveliness of the residential space and permanence of living in that space, rooting and finally "being inside the place" [15]. As the spiritual capital of Iran, the city of Mashhad plays an identity.making role among other cities of Iran, but most of its modern constructions are blindly traditional from the European post.modern or disaggregation of volumes and displays of gigantic structures, which has caused the lack of identity in the architecture of this city today [24]. Following the beginning of urban renewal developments and following the commuting of the engineering community with Europe, the spatial configuration of the contemporary house in Mashhad city gradually changed. Although from the beginning, the face of the city changed rapidly, but the residential spaces slowly and slowly changed from an introverted face to an extroverted one [2].

The main objective of this research is to evaluate the environmental.physical components of open spaces in order to enhance and strengthen the sense of place in the public spaces of residential complexes in the middle context of Mashhad, within the Sazman Ab' neighborhood of the Mashhad.

2. Research Background

The studies and researches carried out in the field of place and sense of place are mainly done as a factor related to the various components that shape the space. Most of these studies include different types of quantitative and qualitative methods that examine different definitions of place and interactive relationships between people and places, and from different scales, from individual buildings and spaces to localities and have been even the boundaries of the city and its variable regions (Montazer.al.hoje, 1395).

Some of these researches have sought to introduce a new model around the evaluation of the sense of place and have explained these models, their methodology and their validation.

A large number of these studies have examined and used quantitative methods to evaluate the location and its variables in different spaces and contexts and their relationship with physical or behavioral variables [25].
Mazoumi (1389) has studied the presentation of indicators and criteria for evaluating the quality of the perceptions and subjective ideas of citizens in urban residential neighborhoods. Mehdi Montazer.al.hoje (1395) investigation of two samples from the center of neighborhoods of Yazd city, one in the historical context and the other in the new context of the city were studied. Kiafar (1399) has evaluated the variables affecting the creation and shaping of open spaces of residential complexes where the residents have an emotional level of "presence in the place".
Despite the considerable researches and studies in the field of examining the concepts and evaluating the variables of the sense of place, some of which were mentioned, what is important in this research is the investigation of the sense of place to the middle context. These contexts as a transition from the old contexts to the new contexts have two.way values that the values hidden in these contexts can be used in the design of new context residential complexes.

3. Theoretical Foundation

3.1. Sense of Place

The term ‘sense of place’, derived from geography, is the same as ‘place attachment’, which is often used by environmental psychologists in studies of place [7]
The sense of place, as one of the most important qualitative variables of urban environments and neighborhoods, is a connection between man and place, and gives personality and identity to the place. Paying attention to this concept in new residential areas without historical record is aimed at providing multiple qualities such as identity, vitality, memorableness, creating a sense of belonging, place attachment, etc. [25].
In the past, urban neighborhoods were the basis for the formation of centers in their hearts as places with identity and meaning that had a high ability to establish interaction between humans and the environment and humans with humans. Today, the structure of the neighborhood and the identity of the neighborhood have been lost in the multitude of modern buildings, the people living in the neighborhoods of contemporary metropolises are not familiar with the atmosphere of their neighborhood and consider themselves separate from it, and in their mental image, the neighborhood is considered a part of the city [27].

3.2. Factors that Shape the Sense of Place

One of the most well.known theories explaining place and its components can be mentioned the model proposed by Canter, which is known as the “place” model. From Canter’s point of view, the urban environment as a place consists of three interwoven dimensions of body (physical dimension), activity and imagination. According to Canter, based on the degree of a person's desire (satisfaction) to be in a specific place and his goals for being there, there is a classification system that divides people's descriptions into two groups: "evaluative" and "pleasure/satisfaction". The difference between the concept of satisfaction and evaluation about any place depends on the personal prioritization and preferences of the person who judges or describes that place [14].

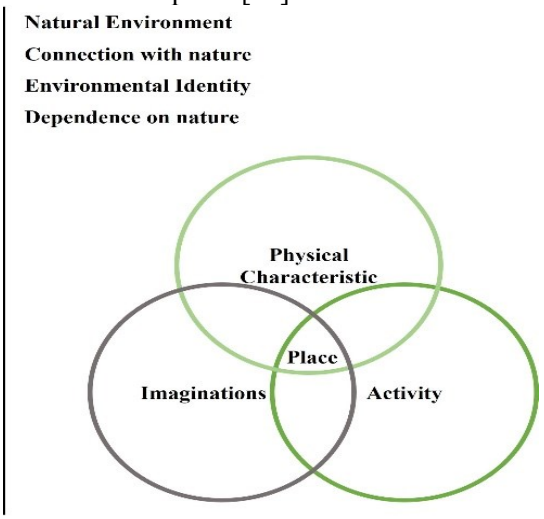


Figure 1: Canter’ sense of place model [3]

In the model presented in urban places by Pontero Montgomery, the factors: 1.mental image, 2.activity, 3.form, the main elements that make up the place are presented. By placing the concept of mental image instead of meaning, which Ralph considers to be the most influential factor in shaping the structure of a place, factors such as memory, symbolism, legibility and visibility, sensory experiences, perception and psychological communication give special value to a place [15].

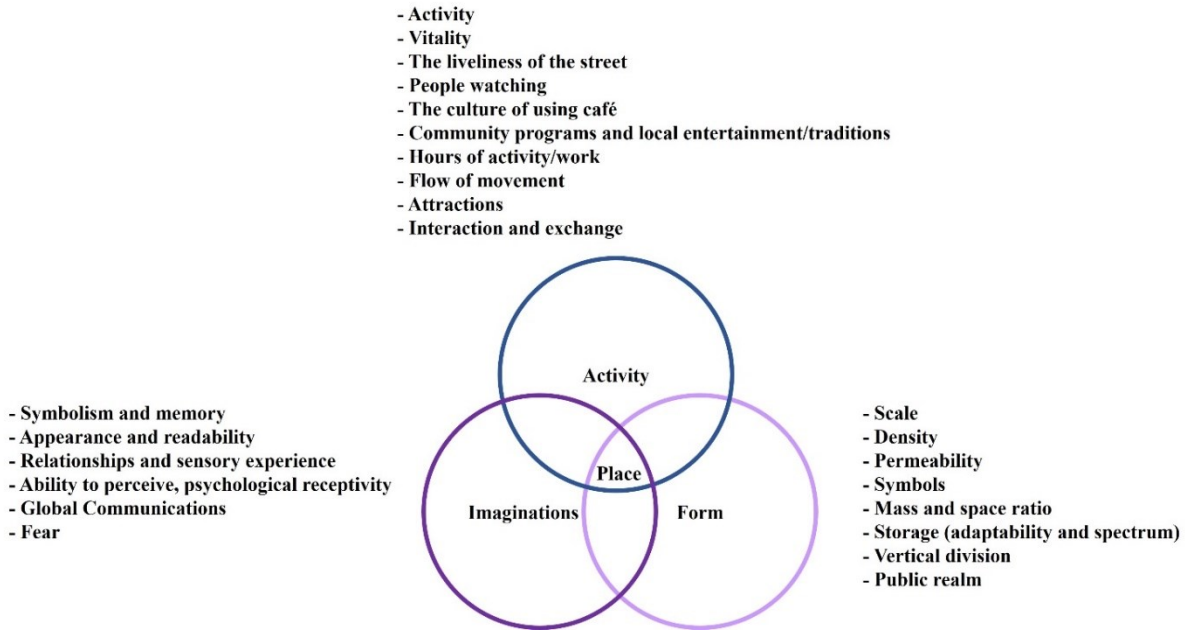


Figure 2: Montgomery' model of effective factors in the construction of urban places [15]

The term 'sense of place' has been used inconsistently also by scholars from various fields. The first group is researchers who use this concept to define physical aspects of a place, characteristics of the built environment or topography of a place, that are considered capable of providing certain experiences so that they have the potential of evoking a sense of place. This can be seen in urban design's concern with place.making, such as the relationship between sense of place and authenticity or its relationship with new developments [30].The need to do adaptive re.use or the physical quality of a city (see Carmona et al., 2003; Montgomery, 1998). The second group views sense of place as a subjective perspective of places that give meaning ([8], [35]).

The concepts of sense of place refer to the process of forming place.people bonding. Spirit of place implies that place.people bonding can be created. Place is more than an abstract location; it is completely made up of concrete things that have materiality, substance, shape, texture, and color (Shinbira, 2012).

According to the content of the foreword, it seems that the common factors and components that make up the sense of place are:

3.3. Human and social dimensions: According to Yan Zhu (1995), the semantic structures of space and the built environment play a role in creating sets of special qualities and creating a sense of place. And the sense of place depends on the attitudes, worldviews, individual characteristics and connection of people with the place such as the name of the place, stories related to the place, experiences of the place and spiritual links with the place. Meaning can be derived from the activity and built form that exists in the place [22].

3.4. Environmental and physical dimensions: This dimention based on the location.behavior theory in environmental psychology, categorizes the environment into two important factors, activity and body. It defines the prevailing activities in the environment based on social factors, general actions and interactions of humans and evaluates the body along with the variables of form and organization of components, the most important factors in the formation of the sense of belonging to the environment. Physical elements create a sense of belonging through the creation of environmental differentiation, and the connection between inside and outside in spaces. On the other hand, physical elements

are effective in creating a sense of belonging through integration and the ability to meet human needs in a place[17]. Lynch believes that the two.way communication between the environment and the observer causes images to be recorded in people's minds, and in this way, he introduces the factors of the city's appearance that are effective in legibility and sense of place: nodes, edges, signs and neighborhoods. Neighborhood landmarks as nodes or signs play an important role in this identity, these index points also identify and address all points, which means a person's ability to find the path or the path's ability to show itself, which is called orientation [23].

A sense of security and a sense of belonging are dependent components that the presence of each one promotes the other. This view was first expressed by Canter (1971). The sense of place and sense of belonging makes a person consider himself a part of the place and consider that space as one with himself and have a sense of belonging to that space, therefore, he feels safe being in that space, and because he considers himself to belong to it, he does not feel threatened.

On the other hand, Steele knows that the most important physical factor in the perception and sense of belonging is the size of the place, proportion, human scale, texture, sound, visual variety, etc. [13]. Panter considers the criteria for measuring physical factors to be urban landscape, landscape, permeability, construction form and urban furniture [10]. According to Fritz Steele, the most important physical factors influencing the perception and sense of place are the size of the place, degree of enclosure, contrast, scale, proportion, human scale, distance, texture, color, smell, sound, and visual variety [31].

According to Salvesen, the sense of place is created by the interaction of three elements of location, view and individual tension, each of which alone is not enough to create a sense of place. Various factors such as boredom, the uniformity of buildings and the emergence of the digital age are considered a threat to the sense of place [29]. According to him, physical personality, property, authenticity, residents and welfare facilities, nature such as water, plants, sky, sun and private and collective spaces; They are the constituent parts of the place, which are effective in creating a sense of place. The context, the existence of services and facilities, the location of the place in the urban context and the way of connection with the surroundings and many other characteristics are among the things that have been mentioned in physical studies [9],[21].

Based on the above, in table 1 and figure 1, the following components and indicators have been classified and analyzed according to the different physical dimensions that have been discussed by domestic and foreign experts, considering the centrality of residential open space in the research:

- Form (shape and form of open spaces, proportions and confinement, human scale, readability).
- Landscape (landscape and view, visual diversity, night security, visual signs).
- Furniture (urban furniture and equipment, diversity, lighting at night).
- Location (position of open space in relation to the whole complex, interaction with the context, accesses and permeability, quality of open paths).
- Spatial organization (organization of open spaces, hierarchy, staging).
- Natural elements of the complex (the amount of use of natural elements, climate facilities).

As an attitude concept, according to Jorgensen & Stedman (2001), sense of place has three dimensions with attitude domain. The first dimension is place identity, which has cognitive components. Cognition involves the construction of, and bonding to, place meaning as well as cognitions that facilitate closeness to a place (Scannell & Gifford, 2010b). Place identity provides an opportunity for individuals to develop and translate self.meaning when being integrated into a place (Cuba & Hummon, 1993). The second dimension is place attachment, which has affective components. Emotional interaction with place points to attachment to place [1]. The third dimension is place dependence, which has conative components. The conative components include reports of behavioral intentions and behavioral commitments, but not actual behavior [18]. Place dependence is characterized by desire to act as a result of evaluating the function or quality of a place setting. “Place dependence refers to the

suitability of a setting for seeking satisfaction in the pursuit of some personalized interest or goal" [28]

3.5. Typology of open residential space

From the beginning of the 20th century, two opposing views of "Le Corbusier" residential units and the neighborhood unit or neighborhood proposed by "Clarence Perry" were proposed for the neighborhood unit, which had important physical and social effects on the formation of the neighborhood and the design of residential complexes after them. Le Corbusier designed the residential unit of Marseille, including 330 residential units in a 17.story building in a large green environment with shops, kindergartens and other public facilities inside. Clarence Perry proposed the model at the "neighborhood unit" level as a socio.physical environment for the development of urban residential areas. Perry defined four main elements for such an environment, including an elementary school, a small park or playground, small shops, and a mix of buildings, streets, and public services with safe pedestrian access [12].

By reviewing these two models in contemporary cities, it is noteworthy that the "neighborhood unit" of Perry is formed based on looking at past experience, while Le Corbusier's vertical neighborhood is based on future human behavior. Of course, many criticisms have been made to both models for the planning solution of residential complexes.

Alexander suggests in the model of the collection of houses that: "Place the houses together in such a way that they form irregular but distinct groups of 8 to 12 houses around a piece of land and common paths. Place the residential groups together so that everyone can walk between them; without feeling that he violated privacy" (Alexander, 1387). The Italian researcher "Kambi" has divided the houses with courtyards into the following types based on the location of the courtyard and empty and full spaces.

Although different types are used for the location of open and closed spaces in complexes, some of these types are more common than others, which are [5]:

- Single or point blocks.
- Row or linear arrangement.
- Environmental layout.
- Mixed arrangement or superblocks.
- Concentrated blocks.

4. Case Study

The middle fabric of Mashhad city, which has expanded and formed towards the west of the city after the 1930s, has different residential types, which mostly include villas and apartments with modern architecture. From the point of view of collective housing and residential complexes, the area of the current Sazman Ab and Ershad boulevard has a special identity compared to other parts of the middle and early new context. The residential complex of high.rise apartments as the first experience of high.rise housing, and the residential complex of 600 units, inspired by Iranian courtyards, became the first example of an apartment garden in the city of Mashhad. After the revolution, many residential complexes have been formed around these two: 512 residential complexes, Khayyam, National Bank and Firuzeh.

What has made this area distinctive from other parts of Mashhad include:

- Creating a hub of residential complexes and collective housing due to the existence of different types of residential complexes.
- Diversity and pluralization of collective housing.
- The wide variety of open spaces in residential complexes, whether from a physical point of view or a functional point of view, etc.

Conceptual Model

sense of place may enhance human capacity to adapt and respond to change by motivating conserva.tion and pro.environmental behaviours that promote long.term stewardship and transitions towards sustainability[34]. Steele (1981) mentions that the main dimension of the sense of place are Place size, degree of enclosure, contrast, human scale, proportions, distance, texture, color, smell, sound, visual variety(31). Lewicka (2011:213) notes, "For many years, interest in social dimensions of place attachment has been stronger than interest in its physical dimensions." Sense of place has been viewed mostly as a social construction, a product of shared behavioral and cultural processes, rather than the result of perceptual and cognitive

processes rooted in physical characteristics of settings (e.g., Greider and Garkovich 1994). Montegary points out that the other dimension of sense of place can be mentioned as form which is described as Scale, density, permeability, signs, mass and space ratio, adaptability, vertical division, public realms [26].

Although each person's sense of place is fundamentally unique, this variation is patterned, rather than random, where different types of people, experiences, and environments will lead to systematic differences in meanings, attachment, and behavior. The subjectivity of meanings is crucial for engaging transformation and stewardship, and sense of place tools enable researchers to ask comparative questions that examine variation. Sources of variation (i.e., based on characteristics of people or place) are important to understand to connect sense of place to systems perspectives (Stedman 2016). In this regard, Schultz (2010) mentions Tangible factors as the other dimension of sense of belonging

A great deal of the sense of place literature implicitly assumes (or explicitly asserts) that greater place attachment leads to pro.environmental behavior. While the truism that "we fight for the places we are attached to" is generically plausible, the relationship is not so simple. People do not simply engage in places they are attached to; their particular forms of engagement rest on place meanings they hold dear and perceive as threatened (Vorkinn and Riese 2001, Kyle et al. 2004). In this regard Kiafar (2020) mentions Spatial.physical components as the other dimension of sense of place are such as contrast, materials, texture, visual balance, repetition and order, geometry of mass and space (size, proportions, scale), symbols and signs, volume of open space, composition of open space (arrangement) [29]. Taher (2019) also suggests that Texture, materials, facades and decorations, proportions and contrast, influence and flexibility, visual clarity, background and establishment, physical diversity and diversity of activities can be in objective variable dimension[39].

From the point of view of collective housing and residential complexes, the current Sazman Ab' boulevard area has a special identity compared to other parts of the middle and early new context.

Table 1: Explanation of the physical components of the sense of place from the point of view of experts

	Expert	Dimension	component and indicator
1	Steele (1981)	Physical dimension	Place size, degree of enclosure, contrast, human scale, proportions, distance, texture, color, smell, sound, visual variety [38].
2	Panter (1991)	Physical structure	Urban landscape, landscape, permeability, form of construction and urban furniture [31].
3	Montegary (1998)	Form	Scale, density, permeability, signs, mass and space ratio, adaptability, vertical division, public realms [26].
4	Bonaiuto (1999)	Physical dimension	Background, context, services and facilities, location in the urban context and how to communicate with the surroundings [9].
5	Salvesen (2002)	Physical dimension	Landscape, location, natural elements, public and private space [29].
6	Lewicka (2010)	Physical factors	Type of residence, size and scale, security, public realm [22].
7	Schultz (2010)	Tangible factors	Materials, shape, color, texture, degree of enclosure, smell, sound, visual variety, human scale, size of place, proportions

1	Kashi (2013)	Physical factors		Continuity and continuity: form and size, relationships and arrangement, symbolism and urban landscape, location, services and facilities, natural factors, texture and decorations, color and light, landscape [19]. Visual diversity [19]. Psychological and psychological: confinement, being a secret species, reducing movement time [19]. Multi.sensory: smell, sound, touch and visual variety [19].
2	Behzadfar (2013)	Physical factors		Size, scale of texture components, decorations, color, smell and sound, temperature, visual variety, permeability, relationships and arrangement, degree of confinement [4].
3	Heidari (2014)	Physical factors		Form (texture, decorations, shape and size) [16]. Organization of components and layout relationships [16].
4	Mirgholami (2016)	Physical factors		Proportions, form and size, arrangement relations, degree of confinement, human scale, color and distances.
5	Qanbaran (2018)	Physical factors		Context: climate, landscape, topography, interaction with the context and neighbors, access to the place [32].
			Artificially constructed environment	Physical elements: site area, rhythm and visual balance, transparency, flooring and furniture, permeability, proportions, sound and smell, materials, shape and texture, color [32]. Spatial organization: organization of components, hierarchy, arena, readability, enclosure, moderation of open space; access [32].
6	Samadpour (2018)	Physical.Environmental factors		Environmental quality: natural space quality, artificial space quality, physical quality [35]. Environmental well.being: environmental flexibility, accessibility and permeability, physical diversity, responsive environment [35]. Place identity: coherence and historical continuity, following the cultural context, differentiation and spatial personality [35].
7	Taher (2019)	objective variables (Physical factors)		Texture, materials, facades and decorations, proportions and contrast, influence and flexibility, visual clarity, background and establishment, physical diversity and diversity of activities [39].
8	Kiafar (2020)	Spatial.physical components		Functional indicator of open space: supply, mix of activities, linking [20].

Natural indicator of open space: water, light, plant, slope, wind [20].

Form indicator of open space: contrast, materials, texture, visual balance, repetition and order, geometry of mass and space (size, proportions, scale), symbols and signs, volume of open space, composition of open space (arrangement) [20].

Location indicator: the position of the open space, the position of the open space in the whole complex and relative to the entrance and exit, the position of the open space to the street arena [20].

Landscape indicator: flooring, pile height, pile form, furniture, landscape [20].

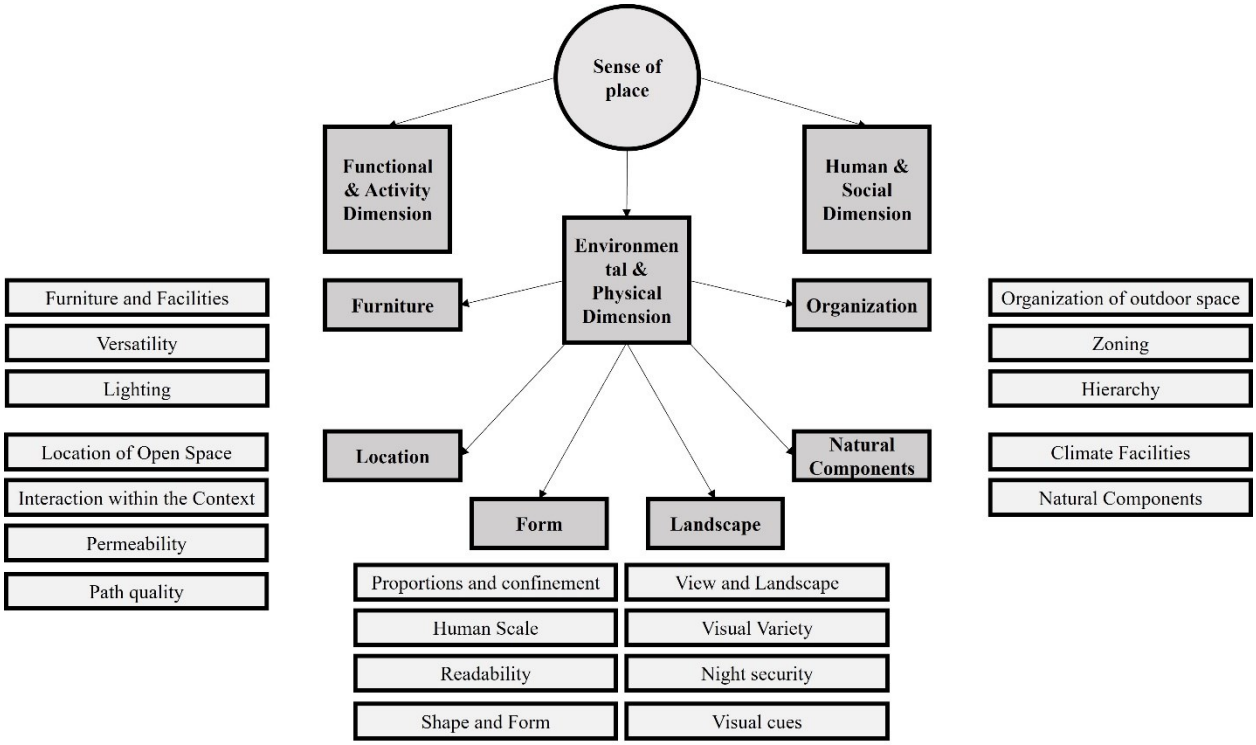


Diagram 1: Conceptual model of research

5. Research Method

The research method in this study is descriptive.analytical with a practical development objective and has a mixed nature. This approach is a kind of methodology to collect, analyze and combine qualitative and quantitative data that will be used to better explain the research topic. In the combined approach, the conceptual and structural model of the research is extracted based on the theoretical foundations and context of the research case (Diagram 1,2). Then, the components of the research model are divided into two categories: quantitative and qualitative (Table 3). For qualitative analysis, three residential complexes in Mashhad Sazman Ab' neighborhood (600 units, 512 units, and Firuzeh) were directly observed and documents were checked, and necessary videos and photos were prepared from all the samples. This observation was repeated on different days of the week and at different hours. After collecting the desired data, the analysis was done in 6 sections: form, location, urban furniture and

equipment, landscape, spatial organization and the amount of use of natural elements (with the subcategories specified in Table 4) for all case samples. In the quantitative dimension, the factors affecting the promotion of the sense of place in the public open spaces of residential complexes (Sazman Ab' neighborhood) have been investigated: First, from the citizens' point of view (people's opinions about the state of their residence have been questioned on various issues), second from the experts' point of view (the main factors affecting people's sense of place have been measured). The analysis methods in the quantitative section are: confirmatory factor analysis and hierarchical analysis method. The analysis of the first phase of confirmation has examined the information related to citizens. In this method, five main factors including form, location, furniture and equipment, landscape, location and natural elements of the complex are considered. Each of these factors also includes sub.factors that have been discussed in the confirmatory analysis. This section helps the researcher in determining the views of the citizens. The two mentioned methods have been analyzed with the help of Lavaan software package. The second part, which is related to the review and analysis of the experts' questionnaire, has also been analyzed with the help of AHP ranking method and Expert Choice software. In this section, the aim is to rank the factors and sub.factors that have been effective from the point of view of experts on improving the sense of place in public open spaces. The diagram shows the general structure of the research method.

Table 3: Classification of research components qualitatively and quantitatively

	Components	Qualitative	Quantitative
1.1	The shape of open spaces	*	
1.2	Proportions and confinement	*	
1.3	Human scale	*	*
1.4	Readablity		*
2.1	The location of the open space in relation to the whole complex	*	
2.2	Interaction with the surrounding context and urban landscape	*	
2.3	Access and penetration	*	*
2.4	The quality of the open paths of the complex	*	*
3.1	Urban furniture and equipment		*
3.2	Versatility		*
3.3	Lighting at night	*	*
4.1	Landscape	*	*
4.2	Visual diversity	*	*
4.3	Night security		*
4.4	Visual cues		*
5.1	Organization of open spaces	*	
5.2	Hierarchy	*	
5.3	Zoning	*	
6.1	The amount of use of natural elements	*	*
6.2	Climate facilities	*	*

6. Findings and Discussion

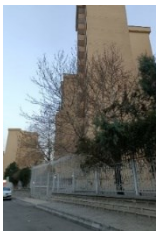
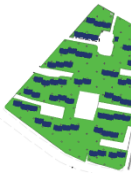
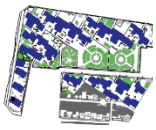
In the first part, qualitative analysis has been done. The open space of three residential complexes of 600 units, 512 units and Firoozeh in the middle of Mashhad were analyzed separately and presented in Table 4. Direct observation of these samples along with document and plan review and film and photo preparation are the main part of qualitative analysis. Considering the focus of the research on the evaluation of physical.environmental components, the evaluation and analysis was done in six sections.

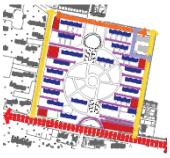
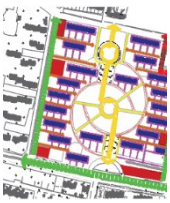
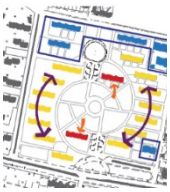
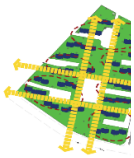
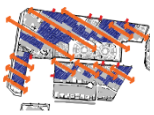
Form (shape and form of open spaces . proportions and confinement . human scale), Location (position of the open space in relation to the entire complex . rider access . access, permeability and pedestrian quality in the open space . interaction with the surrounding context), Urban furniture and equipment (quality and variety of urban furniture and equipment . lighting at night), Landscape (public appearance and view and landscape . public appearance from a physical point of view . visual diversity), Spatial organization (organization of
public and semi.public open spaces – zoning of public and semi.public open spaces . hierarchy of public and semi.public open spaces), The amount of use of natural elements (the amount of use of natural elements . climatic comfort).

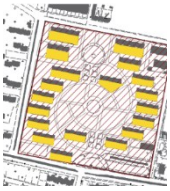
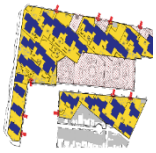
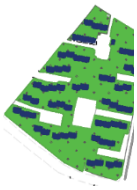
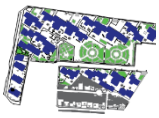
According to the results and findings of the qualitative analysis, a questionnaire was designed for the residents of these three residential complexes and distributed among 344 residents. The quantitative analysis of these questionnaires is a confirmation of the researcher's qualitative analysis process.

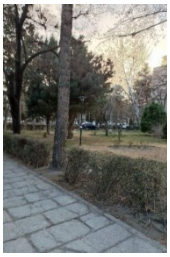
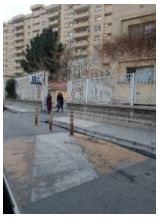
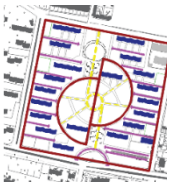
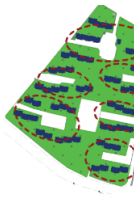
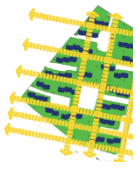
Table 4: Qualitative analysis of residential complexes

		600 units complex	512 units complex	Firoozeh Complex
Landscape	Public appearance and landscape	. The high role of green space and old trees of the complex in the mental image of the audience.  . The horizon of vision is not closed and the permeability of the walls . Wide space in the area and used as a local park. . Blocks are not visible.	. Massive green space and considering the complex as a green spot.  . Peaceful footpaths. . Blocks are not visible.	. The extensiveness and introversion of the complex has caused the formation of an unclear mental image.  . The complex is prominent from the surrounding streets due to the high height of the blocks. . The presence of different perspectives due to the rotation of the blocks. . Limited green space. . The existence of the physical fence and the introversion of the public appearance of complex limits it to the walls and outside views.

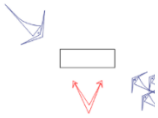
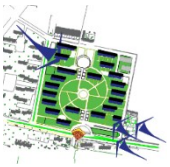
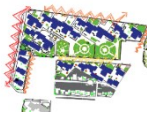
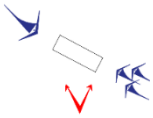
	General appearance from a functional physical point of view	Characterization of the residential character of the complex from the form, facade, etc. of the blocks and the surrounding space. . Mass system under the influence of space (small amount of visibility to blocks and visibility control). . The absence of an active urban body due to the distance of the blocks from the edges.		Characterization of the residential character of the complex from the form, facade, etc. of the blocks and the surrounding space. . Mass system under the influence of space (small amount of visibility to blocks and visibility control). . The absence of an active urban body due to the distance of the blocks from the edges.		Characterization of the residential character of the complex from the form, facade and height of the blocks. . Involvement of the physical appearance of the complex at the edges and height of the blocks due to the physical fence and prohibition of entry and exit.	
	Visual diversity	. Predicting the space of pause and organized movement with different identity. . Existence of memorable spaces. . Correct location of water fountain and children's play area. . Combination of straight and fluid forms.		. The presence of various green frames.		. Lack of green space and monotony of the environment. . Uniformity of facades in the whole complex. . Using symmetrical and regular shapes in public space. . Creating a slight variation in the perspectives due to the rotation of the blocks.	
Location	The location of the open space in relation to the whole complex	. Centralized public green space surrounded by blocks. . Green space around the blocks. . Organized green routes with clear circulation.		. The form conforms to the checkerboard system. . Dispersion of masses based on neighborhood units. . Public green space between the checkered grid.		. Public space completely separated from the blocks between phase 3 and 4. . Undefined spaces between blocks.	

Spatial organization	Rider access	. Riding access to the vicinity of the blocks. . Different rider entrances, respecting the access hierarchy, independent from the parking entrances. . The formation of linear parking lots on the access road. . Locating parking lots on the side of the surrounding streets.		. Provision of independent parking for each neighborhood unit. . Independent entrance for each neighborhood unit that ends in the parking lot. . Open space parking.		. Separation of rider and pedestrian movement. . No vehicular traffic on the site of the complex. . Formation of parking lot in minus one. . Rider access to the nearest stair service of each block. . Covered parking.	
	Accessibility, permeability and quality of outdoor footpaths	. Lack of fence and permeability at the edges. . Creating defined green paths in interaction with the surrounding sidewalks. . The main pedestrian route with cross.neighborhood appeal. . Shape, identity and various uses of footpaths. . Readable plan.		. Permeable edges without fence. . Longitudinal and transverse routes with similar quality. . Creating different qualities of vision in the movement sequences of paths with green vegetation.		. It has a fence on the edges and entry and exit restrictions. . Formation of movement surfaces instead of movement paths. . Non.separation of pause and movement spaces.	
	Interaction with the surrounding context	. Dissolving in the context of the area. . Existence of service functions at the neighborhood scale. . Visual and physical connection with the surrounding sidewalks. . Continuity of visual vision and resolution without borders.	 	. Continuity of visual vision and resolution without borders. . Connection of internal routes with surrounding green sidewalks.		. Physical and to some extent visual separation from surrounding uses. . The formation of the neighborhood center outside the four phases at the extra.neighborhood scale.	
	Organization of public and semi.public open spaces	The formation of organized spaces due to the existence of the initial design concept that includes: . centripetal form. . Masses of the cochlear system. . Masses outside the cochlear system.		. Use of irregular grid and prediction of neighborhood units.	 	. The formation of incoherent spaces under the influence of the rotation of blocks.	

Form	Arranging public and semi.public open spaces	. The trans.neighborhood role of the complex open space and considering almost all the open space (except the space in front of the blocks) as public open space. . Not defining semi.public and semi.private spaces in the open space. . The pilot building and the lack of private space in the blocks.		. Public open space including the central space, children's play, paths and green spaces around it. . Defining the semi.public space with the formation of neighborhood units. . Building pilots and lack of private space.		. Defining the public space between phases 3 and 4 and the central commercial mass. . The formation of semi.public spaces in the movement levels between the blocks. . Not building a pilot space and defining a semi.private space. . Consideration of semi.private open space in elevation, in some blocks.	
	Hierarchy of public and semi.public open spaces	. Lack of semi.public and semi.private space and non.observance of hierarchy.		. Prediction of semi.public space (neighborhood units) in public to private hierarchy.		. Respecting the hierarchy and definition of public spaces, semi.public, semi.private.	
	The shape of open spaces	. Governance of green space. . Centripetal form with green space in the center. . Following the spiral form of the design concept. . Filling the space between the blocks with green space.		. Governance of green space. . The form conforms to the irregular checkerboard. . Neighborhood units surrounded by greenery.		. Poverty of green space. . The space affected by the system of position and orientation of the masses. . The formation of irregular open square and rectangular surfaces that are just filling the space between the blocks. . The formation of triangular spaces on the edge of the site.	

Proportions and confinement	. Lack of physical and visual fence regarding entry and exit control. . Dissolving in the city space and using it as a local park. . Visibility has been controlled only by keeping the blocks away from the edges and vegetation. . Adhering to the land and superstructure and height of 4 or 5 floor blocks.		. No physical fence. . Free access on foot from the edges. . Free rider access on the east side. . The access of the rider is limited on the west side. . Distance blocks from the edges. . Adhering to the land and superstructure and the maximum height of 6 floors.		. Introverted open space. . The presence of guards and physical fences to control entry and exit. . Surrounding open spaces by tall blocks. . Emphasizing the introversion of the open space with the way the blocks are placed. . The dominance of mass over space.	 
Human scale	. Compliance with human proportions in the design of the height and facade of the blocks. . Proper height of masses and lack of showiness. . Adhering to the human scale in the design of footpaths. . Proper ratio of mass and space.		. Compliance with human proportions in the design of the height and facade of the blocks. . Proper ratio of mass and space.		. Lack of suitable green space to control the view and break the height of the blocks. . The high height of the blocks. . Non.compliance with the land and superstructure. . The uniformity of the views and the lack of openings in some views.	
Readablity	. The existence of a geometric system and a regular and legible general form. . Defined pause and movement spaces. . Creating diversity in the paths (different width, character of the path, furniture, signs, vegetation, combination of straight and curved path).		. Reduced readability due to the use of the spiral form of the neighboring units of the checkerboard grid. . Uniformity of footpaths. . Failure to pay attention to the behavioral pattern in the design of routes.	 	. Lack of initial concept in green space design. . Lack of defined outdoor functions. . Uniformity of spaces and lack of variety. . Failure to correctly grasp the blocks due to their high height.	

Urban furniture and equipment	Quality and variety of urban furniture and equipment	. Only the main footpath has been renovated (benches, paving stones, sports equipment). . The new baby's play equipment and its floor have been replaced with somewhat safer flooring. . Active water fountain and its suitable atmosphere. . Lack of attention to space for games and group activities.  	. Urban furniture is worn and related to the year of manufacture. . Worn and destroyed pavements. . Renovating the children's playground equipment and not paying attention to other conditions (non.standard flooring and lighting). . Lack of attention to furniture and space for young people to play. . Incorrect placement of sports equipment.   	. Proper furniture and equipment compared to the previous two complexes due to less age. . Existence of private management and supervision of complex situation. . The existence of bench pavilions and suitable equipment for children's space, drinking fountains, Ping.Pong tables and equipment for collective games in the collective space.  
Lighting at night		. Proper lighting on the main road, monument and fountain. . Unfavorable conditions of other routes and corners of blocks. . Inappropriate height of lighting equipment due to vegetation.	. Adverse conditions of lighting equipment. . Improper distance and incorrect placement of lighting equipment in dense green space that blinds the vision.	. Proper lighting and visibility at night. . Private management and its supervision of lighting equipment lack of green space and visibility.
The amount of use of natural elements	The amount of use of natural elements	. Dominant green space. . High age of vegetation and trees. . Active and dynamic fountain. 	. Dense vegetation. . High age of green space. 	. Lack of green space. . Use of limited parterre. . Inactive fountain. 

Climatic comfort	. Placing parking lots on the edge of the site. . No vehicular traffic in the central open space. . Locating public space in the center. . The presence of green space between the vehicular path and the central open space. . Conflict of open space around the blocks with noise pollution caused by vehicular traffic. . Orientation of the blocks based on the optimal solar and acceptable wind. . Appropriate ratio of land and superstructure. . The spiral arrangement of the plans in the role of a central open space windbreaker. . The north.south direction of the main walking path.	   	. Placement of parking lots in neighboring units. . No vehicular traffic in the central open space. . Locating public space in the center. . The presence of green space between the vehicular path and the central open space. . Conflict of open space around the blocks with noise pollution caused by vehicular traffic. . Orientation of the blocks based on the optimal solar and acceptable wind. . Appropriate ratio of land and superstructure.	   	. Elimination of noise pollution caused by vehicle traffic on the site by placing the parking lot in minus 1. . Attaching blocks to the edges under the influence of noise pollution caused by the surrounding streets, especially on the west side. . Orientation of blocks based on favorable wind and acceptable solar. . Appropriate ratio of land and superstructure and creating the “Nassar” (windy) spaces. . Benefiting from proper light in the public open space due to the setback of phase 3 buildings and being in the wind shadow of the blocks.	   

Quantitative Analysis

This section is devoted to providing descriptive indicators of the research variables and introducing each of the obvious and hidden variables as well as the sub.factors of each.

- **Demographic information**

In the following, the demographic information related to the citizens who commented on the factors affecting the promotion of the sense of place is presented (Table 5).

Approximately the number of men and women in the study was equal. Regarding the education of these people, it can be seen that most people have a diploma or bachelor's degree. The jobs of different people have been in the fields of freelance, cultural, housewives or retirees. In terms of the type of residential house ownership of these people, more than 75% of the people owned a private house and about 25% were tenants. The average age of the respondents was 49.71±11.4 and the length of residence of the people in their neighborhood was 8.92±14.09.

Analysis of citizenship questionnaire results (confirmatory factor analysis method)

In this section, with the help of confirmatory factor analysis method, we seek to present a model of factors and sub.factors effective on enhancing the sense of place. For this purpose, the measurement model for each construct has been processed and the subfactors with appropriate factor loadings have been identified. In fact, sub.factors can be considered appropriate if they have a factor load of more than 0.3. After determining these sub.factors, the overall suitability of the model is checked in terms of reliability, validity and also the suitability indicators of the model. In this way, at this stage, the general model of factors affecting the promotion of the sense of place will be identified.

In the confirmatory factor analysis method, first, the relationship measurement models are fitted to each of the constructs, and the suitability of factor loadings and model fit indices are checked. In fact, in this way, the effective factors in each structure and the appropriateness of the structures are determined.

The analysis steps are:

1. Drawing the measurement model and examining the appropriateness of factor loading (It is expected that factor loadings in the items of each structure will be more than 0.3).
2. Checking the reliability and convergent validity of the measurement model (with the help of CR and AVE indicators).
3. Examining goodness of fit indicators for measurement models.

After drawing measurement models and estimating factor loadings, the results of fitting the studied models are as follows. It should be noted that items with a factor load value of less than 0.3 are considered inappropriate. Of course, there were no inappropriate cases in this analysis. The results are presented in each of the three studied neighborhoods.

Table 5: Demographic information

Variable name	Variable levels	Abundance	Frequency
Sex	Woman	193	56.4
	Man	149	43.6
Education	Diploma	139	40.6
	Under Diploma	19	5.6
	Bachelor	145	42.4
	Upper Bachelor	39	11.4
Job	Freelancer	54	15.8
	Retired	54	15.8

	Cultural	31	9.1
	Employee	130	38
	Housewife	73	21.3
Type of ownership	Property	258	75.4
	Rental	84	24.6

Table 6: Factor analysis of 600 units' complex

Name of main Factor	Name of sub.factor	Standardized factor load	Test statistics	P.amount
Location	Access and permeability	0.621	31.173	<0.001
	Quality of outdoor footpaths	0.553	21.926	<0.001
Landscape	Vision and landscape, physical symptoms	0.594	32.825	<0.001
	Visual diversity	0.544	43.78	<0.001
	Night security	0.624	46.71	<0.001
Form	Human scale	0.649	27.761	<0.001
	Readability	0.614	28.612	<0.001
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	0.561	35.273	<0.001
	Lighting at night	0.624	19.315	<0.001
Natural elements	The amount of use of natural elements	0.687	34.431	<0.001
	The presence of natural comfort facilities	0.621	32.8	<0.001

Table 7: Factor analysis of 512 units' complex

Name of main Factor	Name of sub.factor	Standardized factor load	Test statistics	P.amount
Location	Access and permeability	0.657	34.688	<0.001
	Quality of outdoor footpaths	0.715	24.525	<0.001
Landscape	Vision and landscape, physical symptoms	0.724	40.825	<0.001
	Visual diversity	0.692	54.956	<0.001
	Night security	0.584	28.365	<0.001

Form	Human scale	0.729	17.767	<0.001
	Readability	0.684	23.98	<0.001
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	0.621	25.241	<0.001
	Lighting at night	0.574	28.365	<0.001
Natural elements	The amount of use of natural elements	0.712	24.439	<0.001
	The presence of natural comfort facilities	0.689	21.812	<0.001

Table 8: Factor analysis of Firoozeh' complex

Name of main Factor	Name of sub.factor	Standardized factor load	Test statistics	P.amount
Location	Access and permeability	0.547	32.678	<0.001
	Quality of outdoor footpaths	0.613	25.926	<0.001
Landscape	Vision and landscape, physical symptoms	0.624	38.125	<0.001
	Visual diversity	0.664	56.71	<0.001
	Night security	0.657	56.71	<0.001
Form	Human scale	0.579	19.747	<0.001
	Readability	0.594	28.18	<0.001
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	0.651	15.243	<0.001
	Lighting at night	0.684	18.365	<0.001
Natural elements	The amount of use of natural elements	0.599	21.39	<0.001
	The presence of natural comfort facilities	0.589	26.88	<0.001

According to the results of fitting the measurement models presented in Tables 6, 7, 8, in all the studied sections, the desired sub.factors have desirable values and the constructs have finally been confirmed. Table 9, 10, 11 shows the sub.factors identified as the final model in connection with the identification of factors affecting the main factors affecting the promotion of the sense of place from the citizens' point of view.

Table 9: Factors affecting the main factors affecting the promotion of the sense of place from the perspective of citizens in the 600 units' complex

Name of main Factor	Name of sub.factor	Standardized factor load	The percentage of the second power of the factorial load
Location	Access and permeability	0.657	43.16
	Quality of outdoor footpaths	0.715	51.42
Landscape	Vision and landscape, physical symptoms	0.724	52.42
	Visual diversity	0.692	47.89
	Night security	0.584	34.17
Form	Human scale	0.729	17.767
	Readability	0.684	23.98
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	0.621	38.44
	Lighting at night	0.574	33.06
Natural elements	The amount of use of natural elements	0.712	51.42
	The presence of natural comfort facilities	0.689	47.70

Table 10: Factors affecting the main factors affecting the promotion of the sense of place from the perspective of citizens in the 512 units' complex

Name of main Factor	Name of sub.factor	Standardized factor load	The percentage of the second power of the factorial load
Location	Access and permeability	0.621	38.44
	Quality of outdoor footpaths	0.553	29.21
Landscape	Vision and landscape, physical symptoms	0.594	34.26
	Visual diversity	0.544	29.25
	Night security	0.624	38.44
Form	Human scale	0.649	40.16
	Readability	0.614	37.14
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	0.561	31.78

	Lighting at night	0.624	38.46
Natural elements	The amount of use of natural elements	0.687	46.28
	The presence of natural comfort facilities	0.621	38.14

Table 11: Factors affecting the main factors affecting the promotion of the sense of place from the perspective of citizens in the Firoozeh complex

Name of main Factor	Name of sub.factor	Standardized factor load	The percentage of the second power of the factorial load
Location	Access and permeability	0.547	29.27
	Quality of outdoor footpaths	0.613	32.16
Landscape	Vision and landscape, physical symptoms	0.624	38.61
	Visual diversity	0.664	43.43
	Night security	0.675	46.15
Form	Human scale	0.579	33.16
	Readability	0.594	34.26
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	0.651	42.96
	Lighting at night	0.684	46.71
Natural elements	The amount of use of natural elements	0.599	34.38
	The presence of natural comfort facilities	0.589	34.26

According to the obtained values about the second power of factor loadings expressed as a percentage, it is also possible to compare the studied indicators with each other in terms of importance. Generally, according to the results in the above tables and based on the percentage of the squared factor loadings, the three studied neighborhoods can be ranked as follows in each subject.

Table 12: Comparison of factor load ratings of residential complexes

Name of main Factor	Name of sub.factor	Neighborhood 600 Units' Complex	512 Units' Complex	Firoozeh Complex
Location	Access and permeability	1	2	3
	Quality of outdoor footpaths	1	3	2

Landscape	Vision and landscape, physical symptoms	1	3	2
	Visual diversity	1	3	2
	Night security	3	2	1
Form	Human scale	1	2	3
	Readability	1	2	3
Urban furniture and equipment	Quality and diversity in urban furniture and equipment	2	3	1
	Lighting at night	3	2	1
Natural elements	The amount of use of natural elements	1	2	3
	The presence of natural comfort facilities	1	2	3

Table 13: In the following, the validity and reliability indicators of the measurement models are reported

Neighborhood	The dependent variable	CR (reliability indicator)	AVE (Convergent validity index)
600 Units' Complex	Location	0.76	0.44
	Landscape	0.74	0.46
	Spatial organization	0.72	0.4
	Form	0.77	0.48
	Urban furniture and equipment	0.75	0.40
	Natural elements	0.82	0.49
512 Units' Complex	Location	0.76	0.4
	Landscape	0.74	0.31
	Spatial organization	0.72	0.39
	Form	0.77	0.4
	Urban furniture and equipment	0.75	0.35
	Natural elements	0.82	0.42
Firoozeh Complex	Location	0.76	0.37
	Landscape	0.74	0.4
	Spatial organization	0.72	0.42

Form	0.77	0.37
Urban furniture and equipment	0.75	0.44
Natural elements	0.82	0.35

In this section, the appropriateness of the designed model has been investigated in terms of reliability and validity (convergent and divergent validity).

Regarding validity, two types of divergent validity and convergent validity are discussed. Convergent validity refers to the AVE indicator, which expresses the correlation between items related to a construct. To confirm the existence of convergent validity, the AVE indicator is expected to be more than 0.4. In the studied constructs, the existence of convergent validity between the items of most constructs is confirmed.

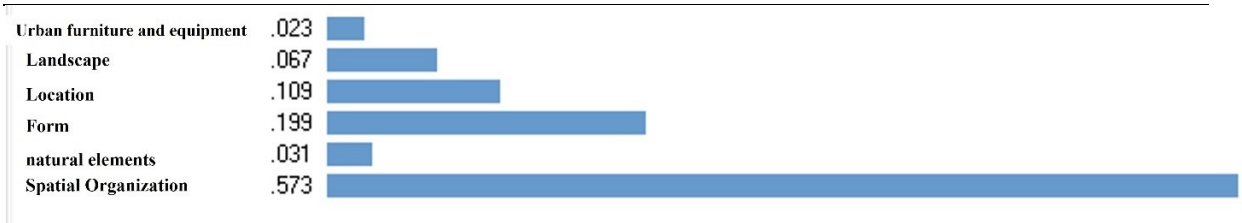
Analysis of expert questionnaire results (AHP hierarchical analysis)

In the questionnaire prepared to study and present **the model of effective factors on improving the sense of place in the public places of residential complexes**, 6 general topics are considered, which are: Form, Location, Urban furniture and equipment, Landscape, Spatial Organization, and Complex' natural elements. In the presented analysis, in addition to the ranking of factors related to each section, 6 general topics have also been compared and examined.

Rating of the reviewed criteria

Table 14: In comparing the examined criteria, the importance of each of these criteria is shown:

Sub.Factor	Final weight	Normal weight	Rank
Spatial Organization	0.573	1	1
Form	0.199	0.347	2
Location	0.109	0.190	3
Landscape	0.067	0.116	4
natural elements	0.031	0.054	5
Urban furniture and equipment	0.023	0.040	6



7. Conclusions

In a research titled "Evaluation of the effect of physical.social components on the sense of place in the open spaces of the residential complex, based on the results of the research, factors such as low density of units, reduction of height on the side with a better view, view of the units to the green space, lighting have a significant effect on improving the sense of place in a residential complex. In a research entitled "Explanation of factors affecting the formation of a sense of social belonging in collections Enclosed residential", based on the results of the research, enclosed residential complexes can be an obstacle to interaction and may add to the problems of creating social networks that provide an opportunity for social and economic activities. In a research titled "The role of physical factors of residential complexes on increasing the feeling of belonging to a place (case example of Shah Balut and Pardisan Gorgan residential complexes)", based on the results of the research, "dimensions and size" and "spatial relationships and arrangement" have the greatest impact on the feeling belong to the place. In a research entitled "Investigating the sense of belonging to a place in residential complexes and the role of nature on it", based on the results of the research, it can be said that the existence of natural spaces in residential complexes goes beyond the per capita provision of green space for the residents, the sense of belonging to the place among the residents There are more residential complexes that have dedicated more space to nature and green space. The results of previous researches mainly point to the importance of improving the quality of the sense of belonging to the place among the residents of residential complexes and focusing more on the physical components of the sense of place. In fact, the innovation of this research compared to previous researches refers to focusing on all the components of increasing the sense of place in the open spaces of residential complexes and examining the effectiveness of each and prioritizing each of the dimensions. In addition, in this research, the author aims to focus on the implementation of the strategies presented in the research findings section by providing practical and executive suggestions.

Based on the theoretical foundations of the research, by transforming traditional houses in the past into contemporary apartments, it has led to many changes in the physical, functional and spatial characteristics of housing architecture and residential environments, especially in metropolitan cities. Since excessive attention to the function in the modern perspective has dimmed many of the perceptual aspects of the housing architecture spaces (including the sense of belonging to the place) in relation to the audience, the lack of attention to several concepts such as attachment to the place and the sense of belonging to the place Due to the dynamics of space, stands out more than ever in today's housing.

Therefore, among the components of the sense of belonging to a place, the physical component and spatial organization have the greatest impact on increasing social interactions among users of open spaces in residential complexes. In order to implement the physical component and dimension of spatial organization to improve the quality of the sense of belonging to the place and social interactions, the design of the spaces should be done in accordance with the behavior patterns of the residents and the capabilities available in the environment, and physical characteristics such as (shape, color, size and texture and scale) should be given importance along with the organization of components.

Among the components of a sense of belonging to a place, the physical component and after spatial organization have the greatest impact on increasing social interactions among users of open spaces in residential complexes.

In this research, an attempt was made to explain how to improve the sense of place in the middle context of Mashhad (Sazman Ab boulevard) by qualitatively and quantitatively examining the effective natural components in the open space. In the qualitative analysis part, based on observation, the components in three complexes of 600 units' complex, 512 units' complex and Firoozeh complex were checked. In the quantitative part, a confirmatory factor analysis of the components was performed based on the opinions of the residents, and then, from the experts' point of view, the main factors affecting the promotion of people's sense of place were measured in a hierarchical way.

Based on the hierarchical analysis, in the comparison between the effective factors in

enhancing the sense of place in the public places of residential complexes, the most important factor is "spatial organization". After this factor, with a huge difference in the calculated weights, the "form", "position" and "landscape" factors are in the next positions in terms of importance. The lowest level of importance was related to the two factors "natural elements" and "furniture and equipment".

Organization

The site plan of the 600 units' residential complex can be divided into two main parts. A circle in the center of the square containing the circle. These two generally form the complex spatial concept, in one, the major part belongs to the space and in the other, the major part belongs to the mass. The open spaces of the 600.units' residential complex are seen as a kind of local park due to the initial planning in the design, interaction with the surrounding context of the city. Semi.public and semi.private spaces have not been defined coherently and the hierarchy of this complex has not been considered.

The spatial concept of the 512 units' residential complex has been formed based on matching a hypothetical grid on the green space of this complex. The space in front of the blocks is a semi.public space that is limited to the service space (parking).

The spatial concept in the Firoozeh complex has been influenced by the location system and orientation of masses to respond to climate issues. Movement levels between several blocks that can be considered as neighborhood units (semi.public space), pilots in each block are considered as semi.private, semi.open spaces.

Form

The central form of 600 units' complex is such that the concentration of green space is more in the center of the complex, and parts of the green space in which there are no masses are around the central gathering space. It is extroverted in terms of confinement. In such a way that there is no physical and visual fence regarding entry and exit control. Pedestrian access is possible from all sides. In fact, these two complexes have been dissolved in the fabric of the city. The appropriate mass.to.space ratio and the dominance of green space, the tall height of old trees, the presence of various movement sequences in the site and the appropriate design of the openings in the facade bring the scale of the complex closer to the human scale.

Although in the complex of 512 units' complex as in 600 units' complex, we see the predominance of space over mass, but the form is not central and the blocks are spread in the form of neighboring units in the green space. It is extroverted, the same as 600 units' complex. Although the use of a hypothetical checkered grid in the design of the residential complex of 512 units' complex has created a clear and comprehensible plan and has preserved the visual depth of the complex, due to the lack of proper movement circulation, the readability is lower.

In Firoozeh residential complex, it is influenced by the system, the position and direction of the masses, and there is no structure in the direction of the formation of spaces. The way of establishing residential blocks as well as the arrangement of high.rise blocks is also in a way that emphasizes the introversion of the complex. The lack of green spaces designed in the Firoozeh residential complex and the low ratio of these levels to movement levels and the high height of some masses have caused the view of the pedestrian audience in the site to be uncontrolled in height and human scale. The lack of open space concept in the initial design of Firoozeh residential complex and the existence of incoherent structure of the spaces between the blocks, as well as the lack of defined functions in the open space, have reduced legibility.

Location

In the plan of the 600 units' complex, it can be clearly seen that the ratio of the mass to the space of the complex is very low, and it indicates the dominance of the green space over the spatial structure of the complex. It is reminiscent of the environment of a local park, which is responsive on a scale beyond the complex. Vehicular access to the complex is not restricted. The presence of a wide walkway on the southern edge of the 600.unit' complex with a good view into the complex and the rows of trees has turned into a green and active pedestrian path, which attracts more pedestrians on this edge.

In 512 units' residential complex, like 600 units' complex, we see the predominance of

green space over mass, but unlike 600 units' complex, it does not have a centripetal form. In the 512 units' residential complex, the blocks are located next to each other as several neighborhood units. Each neighborhood unit has a separate vehicular access from surrounding arterials. The pedestrian path is based on a fairly regular hypothetical grid system with the same width and quality as pedestrian paths.

In Firoozeh residential complex, we see a completely different access system. In this complex, the entrances for vehicles and pedestrians are completely separated and only from certain points is it possible to enter cars. It is not possible for non.residents to enter the Firoozeh residential complex, and pedestrian entry in each phase takes place from a special place that has a specific entrance and a guard. In this complex, the placement of parking spaces under the ground of the complex has had positive effects on the access and movement system of the complex.

Landscape

What is generally imprinted in the minds of the residents of the area and the general public of the 600 units' complex under the name of the public image of the complex is the vast green space with tall trees and quiet footpaths that cover a number of not so high blocks. In the initial plan, a specific definition has been made for green space, pause space, paths. In this way, various pause spaces with different identities, distinct footpaths with a special atmosphere, along with various vegetation have caused the formation of diverse and memorable spaces in this residential complex.

In the residential complexes of 600 units and 512 units, due to the absence of any ban on the entry of non.residents, lack of guards, massive green spaces, as well as lighting problems, it seems that the internal security of the complex is facing problems. In 512 units' complex, the system of mass and space is influenced by the space, and in most of the viewing perspectives of the observer, the residential blocks are not seen or the amount of visibility to them is very small. Although in this complex, there are no spaces with the power and diversity of the 600.units' residential complex, and the footpaths have the same shape and width, but the diversity of the vegetation and its dominance over the space has created a variety of visual frames.

The vastness of the Firoozeh complex in terms of the level and height variation of the blocks have made it impossible to achieve a general image and a specific mental image of the complex. It emphasizes the inhuman scale of the blocks. Also, regarding the prominentness of the complex in the general view of the city, it can be said that the height of the blocks makes the complex prominent even from the surrounding streets, its exterior shows a residential complex.

Natural elements

The 600 units' residential complex is like such a way that the open space between the blocks, the public open space, the swimming pool and its surroundings, the children's play area, as well as the main footpath, which has a north.south direction, benefit from the optimal light and shading is provided by tall trees and green space.

In the 512 units' complex, with the arrangement of neighboring units around the public open space and children's play, these spaces benefit from sunlight. Placement of public spaces in the middle of the complex and surrounded by blocks minimizes the effect of winter wind in these spaces.

Due to the height of more than 8 floors in most of the buildings of Firoozeh complex, the blocks are designed in such a way that they are favorable in terms of wind and acceptable in terms of sunlight. Although this orientation has provided adequate light and wind in the residential spaces, it has placed the spaces between the blocks in the path of winter winds.

Furniture

In the 512 units' residential complex, despite the relative attention to green spaces and vegetation, the amount of attention and attention to urban furniture, including benches, chairs, drinking fountains, trash cans, etc., has been very limited and lower than usual. The 600 units' residential complex has attracted the attention of residents and non.residents due to the presence of open space planned in the initial design and the existence of attractive sequences on the main pedestrian route and the correct location of this route. Firoozeh complex is in a better condition in terms of outdoor furniture (between phase 3 and 4) than the previous two

complexes due to its younger age and due to the private management and supervision of the residents.

Ultimately, in order to increase the sense of belonging to the place in the Sazman Ab complex, the following strategies can be sugested:

1. Spatial connection and coherence between different spaces of the residential complex
2. Observance of privacy in the residential space interior design in order to increase the sense of belonging to the place.
3. Using materials and nostalgic elements of identity to create memories and stimulate residents to interact more and feel belonging to the place.
4. Designing flexible and multifunctional spaces
5. Paying attention to the tolerable capacity of the surrounding roads while locating residential complexes,
6. Paying attention to access to urban services and facilities in terms of distance, access time and quality of access in order to increase residents' satisfaction.
7. Attentioning to the urban appearance and harmony with the surrounding environment
8. Taking advantage of metaphorical concepts in the environment and as a result, transferring sensory perception to the conceptual perception of residents
9. Taking advantage of hierarchy in the design and simultaneous use of native and traditional architectural symbols and signs

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