



Investigating Housing Indicators in Built Environment (Based on Human Needs)

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Abstract: Architectural design in the modern era requires an understanding of human environments. Investigating the elements that make human beings, in the form of identity and social spaces, become an integral part of that body is a valuable point of interest in architectural designs. Housing has always provided human shelter. In contemporary architecture, housing, due to physical nature and presentation of spaces qualitatively, has attracted the attention of architects and experts alike, because, in addition to the nature of space, it has neglected to understand the behavior and reaching the human spirit. Addressing these factors can move the design of residential architecture toward the desirability and growth of built spaces. Residential spaces are shaped in three categories of open and semi-open spaces. Understanding human needs based on this category and providing a sustainable model for living in that body requires the architectural design to understand this field. **Research Criteria:** In this study, identifying the effective components and impact of residential complexes on human relationships such as 1) recognizing the factors affecting satisfaction, 2) examining the satisfaction level of an environment, 3) discovering the relationship between satisfaction with an environment and its impact on people's relationships are the important factors to consider. **Methods:** In this study, a qualitative research method and diagrams related to data analysis and descriptive and analytical structure, the characteristics of built housing were used. Next, based on field observations, the questionnaire in the residential area will be analyzed using SPSS 21 to investigate the goals of the built body. Finally, with the correlation analysis method, the data will be summarized and the results presented. **Research Results:** It seems that by considering the desirability indices in built environments, we will reach the appropriate housing and physical components for humans. Considering the findings and meeting human needs in residential areas dependent on the recognition of environmental capabilities including activity, visual, physical and spiritual and physical comfort, these factors in the physical form of residential complex improve the quality of housing and physical environment based on meeting human needs.

Keywords: Housing quality, Architectural design, Human needs, Man-built environment.

INTRODUCTION

According to the hierarchy of human needs (Abraham Maslow, 1943–1954), attention to man in line with his goals of attaining a decent life in housing design is an important element in architecture. Sustainable spaces for the contemporary man is a challenge created by the minds of space designers, the body in the human related field in which the individual dominates the environment and can make the body desirable for life and make use of the potentials and capabilities of the environment for the modern man. Beyond communicating with the

world around us, humans are invited to interact with natural, artifacts environments, relationships with society and self. Creating cheap, simple, healthy and sustainable human environments is a clear policy for the solution of 21st-century problems. “It is time to rediscover the human dimension in urban planning and architectural design, all over the world this is a challenge that needs to be addressed (Gehl, 2013: 229).” Human understanding of the place where they live and develop requires visual understanding and vision, theorists such as Rapoport and Yan Gel have studied the nature of the human environment and have presented theories about the human body, human scale in the environment, man-made housing, and so on. Accordingly, understanding the human needs in residential architecture design can optimize the space for the users to achieve the desired level. According to John Lang's theory, providing environmental capabilities with a view to understanding and analyzing human activities in residential areas will make the design of the housing as desirable as possible. Based on the models presented for the definition of human needs, we can address human needs and scales based on time and place. Understanding the ideas of the human schools guides architects to the idea that each person has a territory and needs that will be met in the environment.

For the sake of quantity and quality, the living environment depends on the principles are necessary to incorporate them into the design of the architecture , and the human being who will live in this environment if one of these principles is respected, he/she understands the sense of belonging and gone on to an ideal life in a desirable environment. In this article, as a case study, we will examine the principles of desirable housing¹ characteristics in the context of built environments and by applying these principles in contemporary residential complexes, they are going to be addressed through field observation, interviews, and questionnaire. The data were evaluated by the Likert scale and investigated and compared with correlation analysis. The results are presented as analytical and comparative tables between independent and dependent variables.

Method

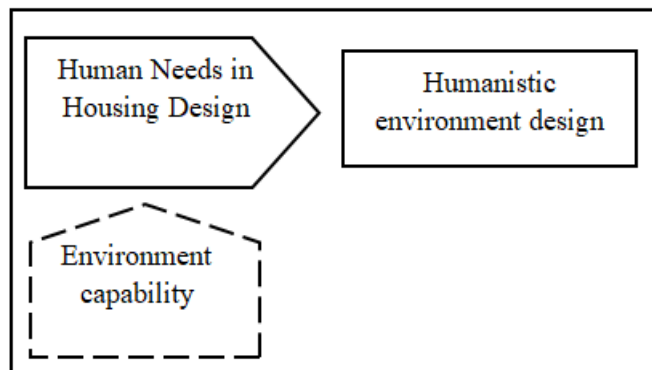
In the present study, with regard to the main formulated question, in order to collect and measure variables, firstly the content analysis method was used to examine the content of resources. Then, in the next step, data analysis and answering the research question will be done using the survey method and SPSS software.

Research questions

- What are the desirable housing design solutions given the human needs and the quality of the environment to achieve the desired pattern?
- Is it possible to provide a desirable model of housing by recognizing human needs?

Theoretical framework and method of research

The design of residential architecture achieved to an identity place based on the environmental factor (environmental capability), the location components (context and its defined components), as well as the considering basic human needs. Diagram 1 illustrates the achievement of these goals.



¹ Qualitative characteristics of desirable housing: desirable form of housing, robustness, security, safety, accessibility, open spaces, facilities and infrastructure, proximity to compatible uses, housing privacy (Nazemi, 2012: 8).

Diagram 1: Design based on the capability of the environment taking into account human needs, Source: Authors

“Receiving messages sent by the environment depends on their perception. You can find someone who can get all the information in the real class without any shortcomings. On the one hand, people's perception capacity has limitations and on the other hand, perception conditions play an important role in receiving environmental messages (Qassemi, 2001, 47).”

Given the scope of this study, which studies human needs in a residential complex environment, we will categorize these factors in the housing quality improvement index.

“No architectural work can be designed without paying attention to the environment, because the environment is also very influential on architecture. In this discussion, the environment means all the natural or man-made elements that the architectural work creates next to it, these factors and their relationships are discussed. Components of the environment are climate, humidity, and physical manifestations of nature such as the plains, mountains, rivers, or man-made factors such as urban spaces, buildings, and streets (Alexander and Chermayeff, 1997, 13).”

For this purpose, human needs can be first categorized in residential environments through documentary studies and applied theories. Then, through survey observations, questionnaire and interviews with residents, in the field of case study, environmental potentials and its factors were identified and studied. In the next step, the results of these observations were evaluated by Likert scale and analyzed by correlation method.

Literature review

Analyzing residential spaces based on a human scale in residential complexes can play an important role in architectural design, increasing the life span and satisfaction of residents from their homes that include the relationship between man and the environment. The impact of residential complexes on human relationships including: 1) understanding the factors affecting satisfaction, 2) investigating satisfaction with an environment, 3) discovering the relationship between satisfaction with an environment and its impact on people's relationships.

Housing associated with quality and desirability

In the way that the environment constructs human beings, worldviews (value concepts) are important and for these environments, which are valuable places for designers, planning presented from the point of view of fundamental and scientific principles of conceptual design. The concept of quality forms beyond the theoretical foundations of human cognition and the physical environment and two domains of internal and external communication can be put alongside these theoretical foundations to provide a built environment in the domain of its values. In addition to the physical location, the concept of housing encompasses the entire residential environment, which includes all the services and facilities necessary for family well-being and employment, education and health plans. In fact, the general concept of housing is not a residential unit but includes the whole residential environment. In other words, housing is more than just a physical refuge and includes all the necessary public services and facilities for human well-being and it should provide the user with a relatively long and secure tenure. Understanding the relationship between sustainable development and urbanization and its components, including housing and its various categories, is a key issue (Bahraini, 2012, 12).

The environmental capabilities of contemporary housing have been reduced and transformed into an unholy space that will take away whatever man needs from mildness. Field research by asking individuals in physical environments can help architectural designers to provide spaces with environmental capabilities to enhance the quality of residential space and human values in housing (Diagram 2).

“The behavioral patterns of a human group that are the product of the cultural - social characteristics of society determine how people use a space and are highly influential in the design of the environment” (Lynch, 2011, 8).

- Based on the quality of satisfaction with residential environments, the following characteristics can be used for architectural design:

- Softness and flexibility of form and masses.
- Standard proportions and scales according to desirability criteria.
- Texture and choice of materials.
- Light and color induce new designs away from the homogeneity of any home with another
- Improve comfort level and provide new spaces in residential architecture.

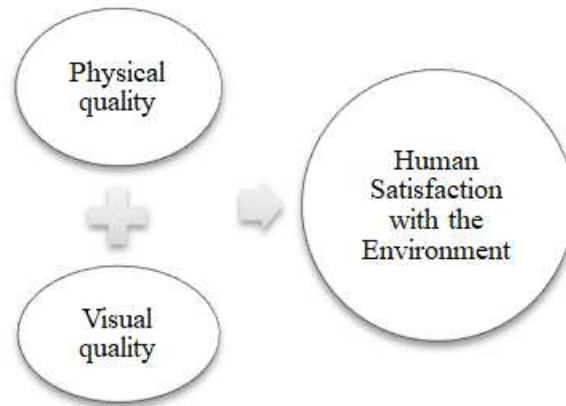


Diagram 2: The relationship between human satisfaction with the environment, Source: Authors

▪ **Visual qualities affecting desirable residential environments includes:**

1. **Sequences:** It is a common feature in landscape of urban environment. Each street consists of a sequence of different sections, but only some of them are clearly defined by the aesthetic reactions of the mind. Elements of diversity and wonder are very important (because of the uniformity) in straight streets surrounded by streets of common style, height, and materials.
2. **Wonder:** An important property that is underestimated. This property is felt when official streets open to unexpected spaces, for example, when on the side roads or in the corridors, panoramas or buildings are revealed, and sometimes associated with unexpected noise or activity.
3. **Contrast:** It is a meaningful concept in urban landscapes that lead to create a great variety of shapes, textures, spatial connections and even colors. Contrasts can be at the scale of an urban neighborhood, street or square, building or urban elements.
4. **Scale:** It is usually understood as the relationship between the building (in whole or in part) and human existence; elements shaped by the suitable human dimensions, elements are associated with the human scale. Conversely, the memorial scale is used to create distinctive and important key vertical buildings (Chapman, 2007, 180).

When one can communicate with the physical environment around him, the sense of belonging flourishes to a place within him and this sense has the meaning of constant symbols in the positive relation of the individual to the body and to the memorable space that has influenced human life. This word can be understood as one's sense of satisfaction with the body, good memories of a particular place, or mental and visual perceptions that have established effective communication in terms of identity and needs.

Human-scale environment (Environment in human scale)

The environment in human scale has always been the subject of theorists such as John Lang (design model based on human needs), Counter (location components), John Panther (sense of place), as well as the theories and texts of Yan Gul and Francis Thibalds on environment and human scales are some of the applications that can be used in the field of human cognition in the environment. The human needs-based design model assumes that the use of place components is created in accordance with the needs of society and people and will take on a functional role.

“The urban residential environment is as a place consists of three intertwined dimensions of body, activity, and imagination. The attractiveness and efficiency of the Counter model give the designers an adaptation to provide a variety of narratives. For example, John Panther's "sense of place" model implies the triplicity of the components involved in the creation of sense of place that can understand the subsidiary narratives of the Counter model. According to John Counter's model, the three components of body, activity, and meaning are involved in the creation of sense of place, which is remarkably similar to the three proposed components of Counter (Golkar, 2000, 31).”

Based on John Lang's model for architectural design, the presentation of spaces with humanscale is another component that can be designed based on the principles of that environment is the ideal bed for a human being. Therefore, based on the conducted studies and using the aforementioned models and components, it provides a suitable approach to arrive at a comprehensive and principles case of contemporary humanity. Investigating and understanding human needs in the physical environment based on Maslow's pyramid can be the primary solution to improve the quality of housing in the built environment (Diagram 2).

▪ **The classification of environmental human factors that are effective in the design of collections consists of three major scales:**

1. In exterior linkage scale of residential complexes with adjacent environments; at this scale, the most important issues are the continuation and physical-social connection of the collections to the surrounding environment and the creation of local identity.
2. In the scale of the psychological relationships of collections and communications outside residential units; at this scale, balancing of privacy and social interaction, how to feel safe, pedestrian orientation and accessibility, ride access and considering appropriate stops are the design issues.
3. In the scale of residential units; at this scale, the relationships and ratios of housing interiors spaces and their harmony with the culture and habits of the inhabitants are of the design issues to be considered (Eanifar, 2000: 110-117). In addition, climate and energy saving at all these scales, from the orientation of buildings and the design of complex sites to the neighborhood scale of residential units, are important factors. By recognizing human needs, environmental values lead us to understand residential areas and can then identify residential spaces, cognitive and aesthetic need (such as the desire to know and desire for beauty) (Diagram 2).

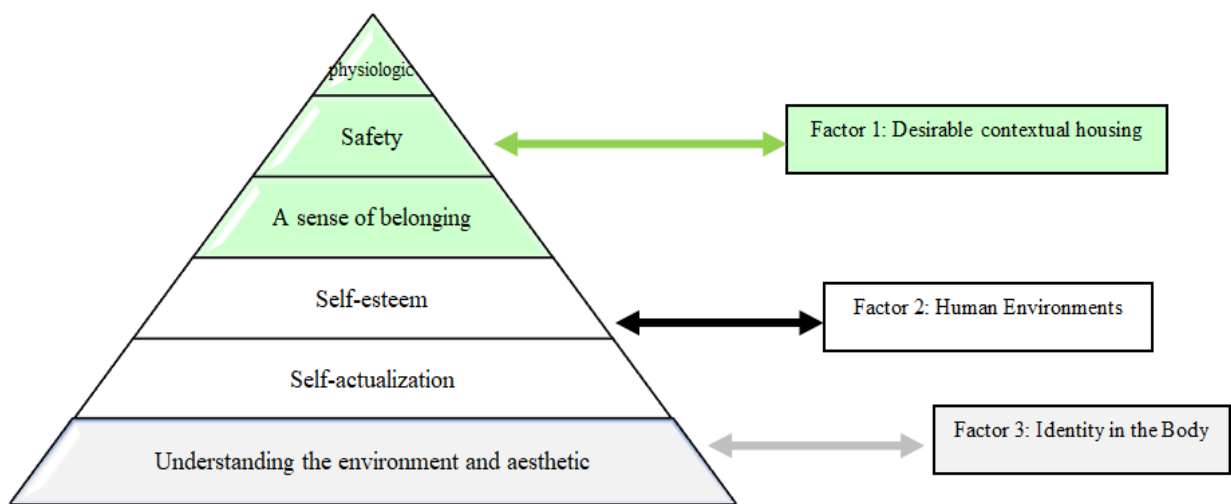


Diagram 2: Needs hierarchy from Maslow's view, analysis based on physical quality factors in human environments (according to Maslow's human needs pyramid), Source: Authors

Making the relationship between the environment and the human privacy (Table 1) depends on the presence of functional elements in space; living in residential areas with the capability of human identity development can be effective in attracting people to the environment and the future of the place.

Table 1: Factors affecting human physical factors according to humans in the environment, Source: Authors

Environment	Human Needs (Maslow)	Physical factors
Aesthetics and environmental absorption factors	Cognitive and aesthetic	Environmental
Use of open spaces at all times and atmospheric conditions	Self-actualization	Diversity and compatibility
Create space with different applications	A sense of belonging	Vitality
The proportion of responsiveness to people who use the space is commensurate	Physiologic	Density
Separation of pedestrian spaces (seniors, games, walking) with bicycle and vehicle crossings	Safety	Safety
Ability to monitor semi-private spaces on public and semi-public spaces to control and prevent crime	Self-esteem	Security
Creating behavioral elements next to complexes	Recognition	Availability

“Environmental quality can be defined as an essential part of the broader concept (quality of life); it combines basic qualities like health and safety with aspects such as comfort and charm. In general, environmental quality not only refers to environmental elements and values contained therein but also includes other variables such as security, human and social relationships and physical attributes (Rafieian et al., 2010, 30)”.

Space, time, and place are the three elements that humans live with them. The success of an architectural design shapes the basic shackles of man and his identity and does not separate man from his soul and bring him to the challenge of comfort besides peace (Diagram 3).

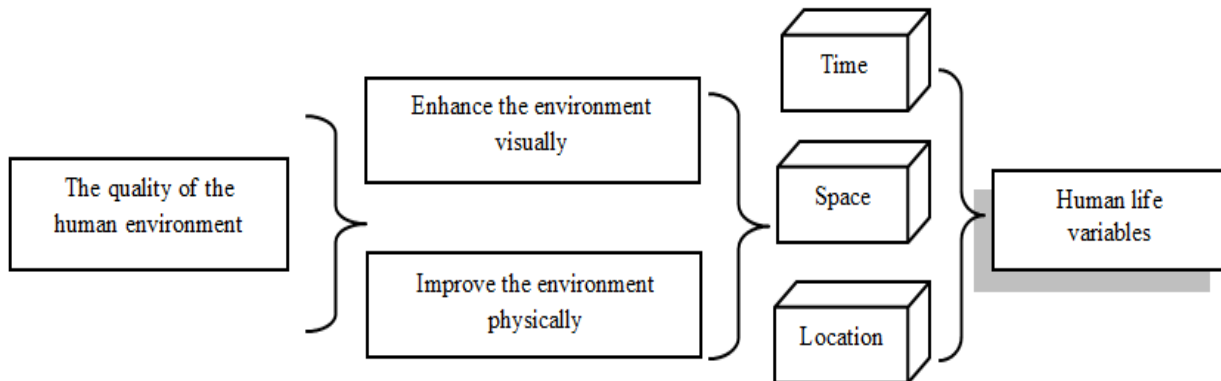


Diagram 3: Analysis of human needs to achieve desirable built environment, Source: Authors

“The quality of the residential environment from the point of view of physical design approaches is mainly due to the consideration of the intellectual/cultural/behavioral patterns of the residents, as well as the physical/environmental criteria at different stages of policymaking, design, and implementation of citizens' residence environments. In this context, examining the residents' mental states and considering environmental perception components are the main issues of quality of living environment, in the following, with a number of physical design theories, the key metrics for achieving the desirable quality of residential environments are investigated and highlighted” (Van Kamp, 2003, 5–18).

In the above study, human needs were considered based on the environment and the capability of human environments was raised. Using Table 2, the human scale paradigm, by integrating desirability in housing and observing environmental and identity factors can provide a plan based on the principles of building human environments, which is the theoretical basis of physical planning.

Table 2: Analysis of the quality of desirable housing based on identity and human, Source: Authors

Components	Strength	Weakness	Opportunity	Threat
Quality of housing	Specific form Green spaces	No use of paint	Providing a new space for desirability Recognize the growing human needs of the future	Local overdevelopment Lack of optimal density Lack of identical spaces
Place identity	Visions and mental image	The lack of place spirit The loss of past urban identity Lack of indicator elements in a residential neighborhood	Possibility of elements (water, plants, etc.) Providing past home walls in maintaining values	Loss of space Landscapes blocked by residential blocks
Human environment	Sustainable Development	Destruction of the natural environment for human benefit	Providing a variety of applications	Variability of density Alignment of space systems

In the following, a case study will be conducted to investigate the various factors that contribute to the creation of an environment based on human needs.

Case Study

A detailed case study can analyze and investigate the various theories in this field.

Introduction of Case Study

Depending on the effective factors mentioned above, the case study will be investigated.

Phase 1 of Ekbatan Town, Tehran

Ekbatan Town, located in north of Karaj Road and 5 km of Tehran Azadi Square and is part of district 6 of region 5, according to the Tehran Municipal Physical Division. It is a relatively discrete district of the entire structure of the region whose only geographical location has caused it to merge with other districts of the region. This district has no functional or visual similarity to other districts and has the predominant residential and dormitory functions due to the occupancy of four residential of Kooy-e-Bimeh complexes and the settlements of Ekbatan, Shahid Fakouri, and Apadana. Phase 1 of Ekbatan Town consists of 10 blocks divided by Shahid Dastgerdi Stadium (PAS) and Railway Stadium into two parts of 4 and 6 blocks.

Table 3: Characteristics of the constituent blocks of Ekbatan Town, Source: Authors

Type of apartments	Block
2 bedroom apartments	A
1 and 3 bedroom apartments	B
3 bedroom apartments	C
2 and 3 bedroom apartments	D

According to the observations, the complex was selected on the assumption of ability to be built environment and thus the provision of desirable residential spaces.

Phase 1 of Ekbatan Town: This phase with area of approximately 5,940 m² and occupancy level of approximately 35% included 19 residential blocks, 3 markets, and 4 schools. Its inhabitants also include the middle, upper-middle and affluent classes according to the purchase and rent price of the units. According to the observations of this phase, humans live in these residential spaces and adapt to the created environmental opportunities and reach effective environmental capacities according to the need and access to public spaces. The physical structure of the town has made people feel secure and the place has a regular structure. The default in choosing this complex is the capability of the environment for a humanistic residential body (<http://shahrak-ekbatan.ir> 2014).

Understanding the effective factors in the built environment

In order to identify factors affecting the built environment and to attract people to reside in such a body, in the first step, by compiling a questionnaire from residents of Phase 2 Ekbatan, questions about human and environmental variables and factors in increasing the inviting environment were asked. The questions in this questionnaire were arranged so that residents could write their opinion and select options. In the next step, the responses and their analysis were collected based on the realization of the factors and their more complete classification. According to the obtained results from the questionnaires and the literature review, the most important factors for constructing a humanistic environment in a residential body and according to the observations can be said: architectural design for interactions in this complex fits the relatively good standard, reinforcing public walls and providing collective opportunities in the inter-block spaces can solve part of the social interaction challenge of this housing (Diagram 4).

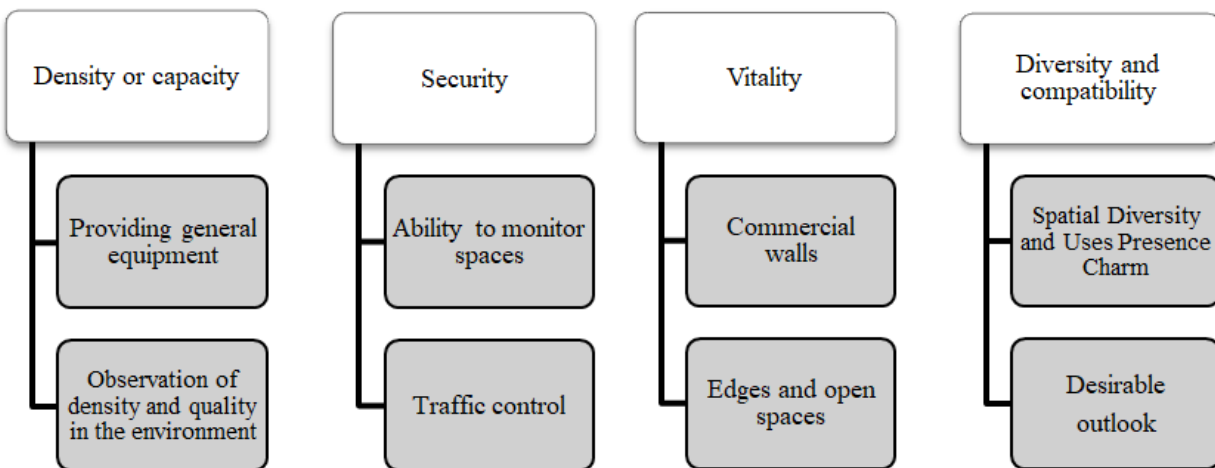


Diagram 4: Study of qualitative indicators of housing in Ekbatan Town, Source: Authors

Extracts and suggestions

After extracting data from questionnaire forms and calculating weighted average by Likert scale, each of the factors was evaluated in the case study and their results are presented in Table 4. During a visit to various stages of the complex and a random questionnaire among the residents of the residential complexes, according to the Likert scale, it has evaluated its factors from very low to very high or very bad to very good and for this purpose, the questions were provided to residents in a form consistent with this scale, although the sample of questionnaire is attached.

According to the results of the above evaluation, residential environments with human scales have safe, segregated, and diverse spaces. In this evaluation (Table 5), according to the questionnaires answered by residents, Ekbatan town has some strengths of the human environment and according to the analysis and evaluation of the responses, it can be said that environmental capability has decreased over time. The Likert

scale is categorized into five categories, from very low to very high. Based on the mathematical mean of this scale, the interval width is calculated as $4.5 \div 0.8$. These intervals are shown in Table 5 and the data are analyzed on this scale.

In Table below, questionnaires were evaluated using the weighted average of the Likert scale.

Table 4: Evaluation of the variables according to the Likert scale of answering research questions, Source: Authors

Variables evaluation range	Very high/very good	High/good	Medium	Low/bad	Very low/very bad
Qualitative/Quantitative/Priority	First priority	Second priority	Third priority	Fourth priority	Fifth priority
Scale weight	5	4	3	2	1
Average weight	4.21-5	3.41-4.2	2.61-3.4	1.81-2.6	1-1.8

Table 5: Evaluation of questionnaire data according to the Likert method (results for phase 1 of Ekbatan complex), Source: Authors

Questionnaire results	Overall average		Average		Factors investigated in favorable human environment and housing	
	Likert scale	Weight	Likert scale	Weight		
- Indoors low spatial diversity -Lack of yards and private patios -Limited spatial resolution	Very high	5	medium	4.21-5	Spatial diversity of indoors	Affordable housing
					Separation of public and private spaces	
					Patio and courtyard spaces	
-Absence of attractive elements in the external environment -Medium vegetable cover -Security has been relatively common in public spaces -Lack of noise pollution	High	4	Good	3.41-4.2	The presence of people in the open environment	environmental
					Vegetation	
					Desirable architectural elements and landscape	
					Security in open spaces	
-Need for general equipment -Lack of cozy spaces for interaction -Lack of diverse uses besides the block -Events limited to outdoor spaces	medium	3	medium	2.61-3.4	Monitoring people in the surrounding areas	Man
					Access to service spaces	
					Social interactions	
-Separate pedestrian and cab spaces -Lack of optimum density -Lack of identity elements in view	Low	2	Bad	1.8-2.6	free time	Identity and location
	Very low	1	Very bad	1-1.8	Density	
					Architectural Identity Elements	

The capability of residential environments will lead to the personal and social development of humans. Therefore, understanding the environmental factors of contemporary and future human beings as the goal of designing the places where human beings spend most of their lives with regard to these elements and the positive responses from the environment.

Table 6 examines the factors affecting the ability of the environment to be man-build residential spaces by comparing the obtained data from correlation analysis and qualitative level dependence.

Table 6: Correlations between environmental factors affecting built residential spaces, Source: Authors

Independent variables	Identity elements	Access to service spaces	Desirable perspective	Security	Presence of people in the environment	Separation of spaces	Spatial diversity
Correlation with human dependent variable	0.56	0.52	0.28	0.36	0.25	0.39	0.16

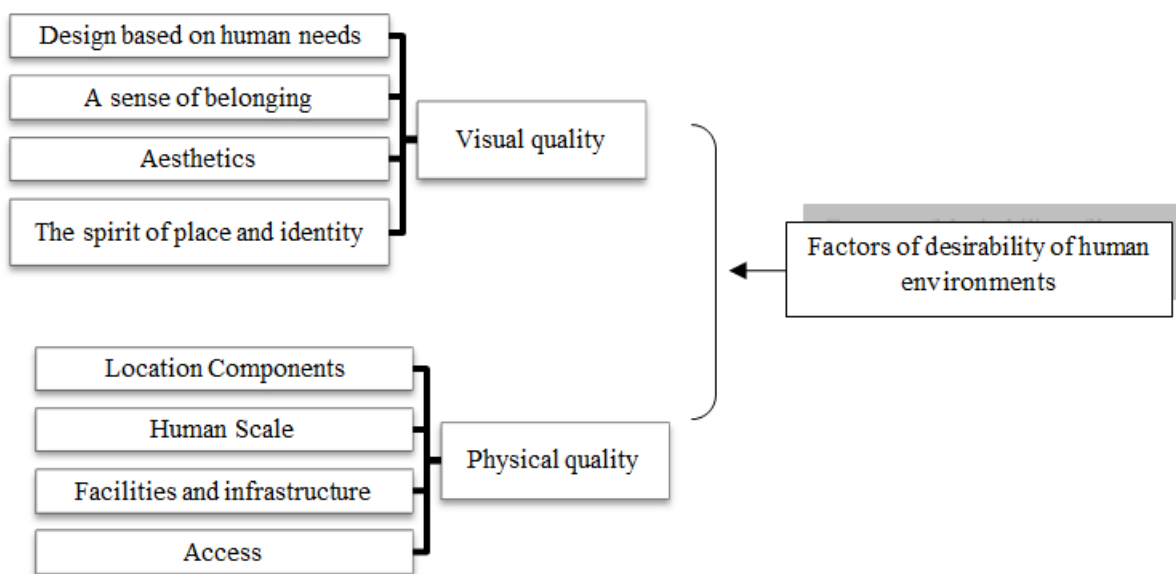


Diagram 6: Human Environment (Housing) Desirability Factors, Source: Authors

Therefore, the presence of humans in the environment becomes a positive thing with the understanding of people and the way spaces and places are presented. According to the percentages of correlation table, environment and its effect on human and its identity was influenced by the desirable landscape and spatial diversity which was obtained by examining these factors in phase 1 of Ekbatan town. In fact, these qualitative features are from the perspective of the resident and their analysis or negative response or low percentage is largely due to the lack of good quality (Diagram 6) in the environment, weaknesses or threats that humans face.

▪ **Permeability status of territories (private, semi-private and public)**

The clarity of the spatial organization and the boundaries of the private, semi-private (semi-public) and public territories reduces permeability (access), increases social surveillance and crime prevention. “Oscar Newman put forward his ideas about the care and use of the environment and the protection of the physical environment in four regions (Salehi, 2008: 185).

▪ **His four areas are:**

1. Public environment: It is an open area and has many uses.
2. Semi-public environment: It is an open area, but the use is limited.

3. Semi-Private environment: This is an area where few people go there and are primarily residential and used by building occupants (e.g. apartment corridors).
4. Private environment: This is a special area for residents (e.g. inside an apartment).

It can also be mentioned to relationships between social fields and areas of private and semi-private life, including balconies and rooftops, which can be investigated voluntary and social activities in these areas by reinforcing these walls.

✓ **The scope of social spaces in inter-building spaces can be divided into three groups: (Figure 1)**

1. Semi-private spaces: urban balconies and terraces or roofs of buildings that are under the control of one or more units, which have a clear border with other areas.
2. Semi-public spaces: these spaces are intermediate spaces between blocks or buildings and can contain architectural elements, trees and plants, and any kind of environmental element that makes it alive. In fact, in semi-public environments can investigate the spoken, listening, meeting and having fun interactions.
3. Public spaces: These spaces are actually located outside the buildings, and visually and socially, they often become places for shopping and sports.

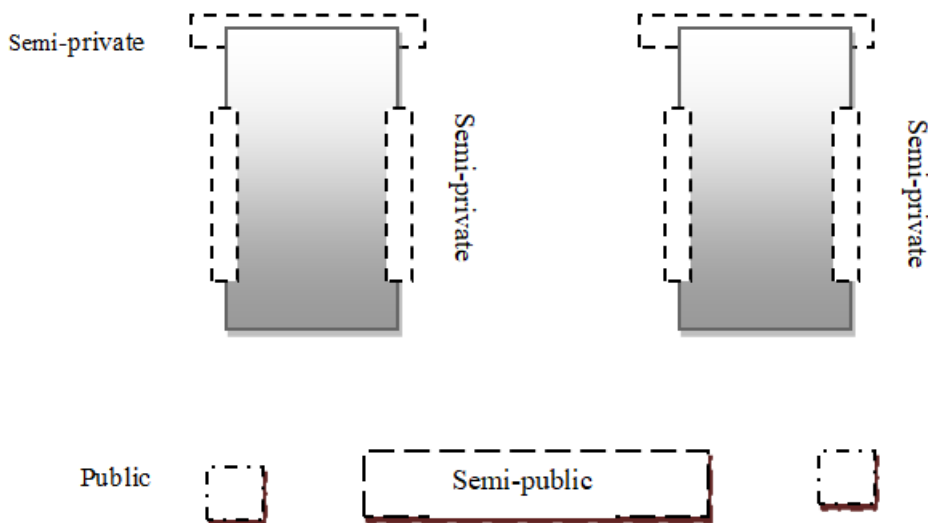


Figure 1. Scope of collective activity in residential open spaces (semi-private, semi-public and public spaces),
Source: Authors

Conclusion

In the qualitative phase, the method of the present study was to identify the visual quality of housing based on desirable subjective and visual perceptions and in quantitative step, using questionnaire and field research and also by correlation analysis method, factors were investigated as independent variables that human and capabilities of dependent variable of human needs in body. Analytical tables are provided. According to the findings of the research, the quality improvement of housing based on human needs and favorable housing characteristics and human needs in the environment with respect to Maslow's pyramid can be designed based on housing and users. Variables of human life that can improve the quality of the physical environment visually and physically based on the knowledge of the place, time, space, in this regard, the effective physical factors in the design of residential areas will give architectural designers an idea. Therefore, evaluating the data and obtained variables in analyzes and diagrams led to the explanation of the design quality components. According to the research area (Ekbatan Town, Tehran), the correlation between factors affecting the capability of the

environment for built residential space results such as visual quality, physical quality and framework of independent variables such as body design based on human needs recognition in residential space, the ability of the environment to create the desired access and perspective for life, as a result, the fitness residential environment was designed to human needs and scales and utilized the factors and variables obtained in this study to provide a desirable body for sustainable design.

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