



The Social Sustainability Principles of Residential Complex

Esmail Zarghami^{1*} and Shahram Pourdeihimi²

1- Department of Head of Architectural, Faculty of Architecture and Urbanism, Shahid Rajaei Teacher Training University

2- Department of Architecture, Faculty of Architecture and Urbanism, Shahid Beheshti University.

Abstract

Over the last decades of the twentieth century and early in twenty-first, sustainability has been one of the most prominent discussions in different fields, especially in the field of architecture and urban spaces. It can be balanced through putting the 3 elements economy, environmental and society together. The economic aspect is typically respected because of financial and profit reasons by capitalists, although it is often overly noticed and some problems may arise from that. Environmental subjects also have standards and are noticed differently according to each society. But the social aspect of development is neglected. In the present paper, social sustainability bases including equity justice, aesthetic value, comfort, welfare, children safety and growth, social identity and other similar issues are to be considered. For this purpose, the social sustainability of residential complexes is surveyed by Iranian specialists and social scientists, to record and combine their valuable academic and professional experiences on the one hand, and their experiences of living in a residential complex on the other. Then, through analyzing the resulting ideas, the factors effective on the sustainability bases of residential complexes are extracted. This is a geodesic research of an exploratory geodesic type which is performed on the basis of analysis, description and extraction of questionnaire outcomes and discovery of sustainability bases and relations among them, according to social scientists, in order to determine theoretical sustainability bases of residential complexes. In the next step, through comparing it with external evidence, it would be possible to identify scientific principles and architectural solutions. This purpose will be accomplished through regional research and organizing a questionnaire for such complexes. These matters will come under consideration later.

Keywords: Residential complex, Socially sustainable, Comfort, Order, Play, Identity.

اصول پایداری اجتماعی مجتمع‌های مسکونی از دید جامعه صاحب‌نظران و متخصصان ایرانی

اسماعیل زرغامی^۱، شهرام پوردییمی^۲
۱- گروه معماری، دانشکده معماری و شهرسازی، دانشگاه تربیت دبیر شهید رجایی
۲- گروه معماری، دانشکده معماری و شهرسازی، دانشگاه شهید بهشتی

چکیده

در دهه‌های پایانی قرن بیستم و شروع قرن بیست و یکم، پایداری از مباحث مطرح در کلیه عرصه‌ها و بخصوص در عرصه فضاهای شهری و معماری است. آن‌چه که در این زمینه مغفول مانده، وجه اجتماعی توسعه پایدار می‌باشد. در پژوهش و مقاله حاضر اصول پایداری مجتمع‌های مسکونی از بعد اجتماعی شامل عدالت، زیباشناسی، راحتی، آسایش، امنیت و رشد کودکان، هویت اجتماعی و سایر مسایل مشابه مورد بررسی قرار می‌گیرد. در این راستا پایداری اجتماعی مجتمع‌های مسکونی از نظر جامعه متخصصین و صاحب‌نظران ایرانی تحت بررسی قرار گرفته است تا با تلفیق تجربیات و نظریات ارزشمند تخصصی و تجزیه و تحلیل آن‌ها، عوامل مؤثر در اصول پایداری مجتمع‌های مسکونی استخراج گردد. روش تحقیق به کار گرفته شده، روش پیمایشی از نوع پیمایشی اکتشافی است که بر مبنای تحلیل، توصیف و استخراج نتایج حاصل از پرسشنامه‌ها و کشف اصول پایداری و روابط بین این اصول از دید جامعه صاحب‌نظران انجام گرفته تا در نهایت، اصول نظری پایداری مجتمع‌های مسکونی تعیین گردد. در مرحله بعد، با مقایسه آن با واقعیت خارجی، اصول عملی و راه کارهای معماری به دست می‌آید.

کلمات کلیدی: مجتمع مسکونی، پایداری اجتماعی، آسایش، نظم، بازی، هویت.

* Corresponding author. E-mail Address: ezarghami@srutu.edu

Introduction

Home is the origin and destination of humans' everyday life. They leave it to get to work and do social activities and return to it after their daily activities. The house is a place which we return to after experiencing different aspects of our surrounding world. It is so important for human that it can be designated as the center of individual's world (Norberg-Schultz, 1993). Therefore, home is supposed to fulfill the expectation of being "the center of individual's world", in its interior area and exterior prospect.

Today, by the reason of life constraints or single dimensional vision and economic requirements, most of humane, social, regional and cultural values have been overlooked. "A human house is located in residential blocks behind several uniform windows, similar to others' windows; Not only for guests, but also for residents, it is difficult to recognize it from outside" (Pakzad, 2008).

By means of such programming and planning, especially because of stereotyped accumulation, humans live together in masses instead forming positive and purposeful social groups. A mass of individuals would be formed, resulting in throng, clutter and turbulence. In this situation, residents leave the social life to provide the least safety and comfort by staying at home and it is at this point that social deprivation begins.

Children suffer the most from that situation: "The only place for a child, either to play and skip or to relax and study is bed. All common housing rules create only a limited space for children and force them to be continuously involved in parents' discussions and in unpleasant interactions this is not acceptable" (Mumford, 1938). It will result in damage to the basis and health of families, individuals and the whole society.

This would also result in damage to family interrelationships and weakening them in such an inappropriate atmosphere and respect will be replaced by disrespect. With weakening of these relationships,

addiction and other social deviancies begin to exist and affect the society in depth. Regarding the described turmoil, it is of particular importance to trace the sustainability bases of a residential complex in this essay, so that we can obtain a sustainable form of development.

Definition of Sustainability

Sustainable planning is a kind of planning which aims to satisfy today's needs without damaging the future generations and resources. In this planning, economic and social sustainability must be emphasized according to energy consumption and environmental effect of buildings and cities (Rogers, 1383).

Therefore, an appropriate house seems to be essential to provide social coherence, personal welfare and individual independence. If housing doesn't follow a sustainable pattern, no society will be able to reach sustainable development. Social sustainability in a residential complex is a situation in which residents are satisfied with living in their habitat and enjoy being with their neighbors; all the living conditions are so as to increase social interaction though passing of time and the majority of residents become attached to their living place. In this case, they unconsciously try to preserve its well-being and sustainability, and cooperate to maintain and improve the present situation.

As a result the period of profiting from the sustainable residential complexes would be more and the fiscal valuation of their units would also be higher in the same circumstances. Social sustainability maximizes the profiting rate of residential complexes.

Materials and Methods

This research is classified as an applied research which aims to develop planning knowledge in living spaces in order to raise residential complex sustainability in general and discover the bases of sustainability through undertaking library studies, interviews, organizing questionnaire and analyzing and interpreting the results.

In particular for this purpose, a series of relevant texts containing library and documentary information relating to the subject of residential complex sustainability and relevant standards thereof, were considered. After classifying and interpreting these, a series of standard principles were extracted.

As a next step, a group of active experts, were interviewed and discussed about the field of research, theorizing, programming and planning of a residential complex and the results of that extracted, and previous texts were evaluated and combined.

In this way, important issues and common dependant and independent variables among experts, texts and writers' experiences were extracted and the contents of the questionnaire were formed. Then, on the basis of those questionnaires, the experts' and specialists' questionnaires were organized.

Questionnaire Organizing

These questions contain two explanatory and forty multiple-choice questions which are mainly aimed at evaluating variables for the sustainability bases of residential complex and discovering the rate of their validity or priority, from the proficient community's point of view (university professors and lecturers in Architecture, Urbanism, Behavioral Sciences and Sociology).

Content of Questions

The first question targeted the relationship between the number of units per a residential complex and the security of it. In the second one, the relationship between the number of a complex of units and social interactions and also the sustenance of social relations is measured.

Multiple-Choice Questions Contexts

Each of the multi-choice questions has five choices, designed to measure the effect of a diverse body variables on the social sustainability of residential complexes.

The body of variables brought into question here

are as follows.

- The quantity and quality of the interior areas, including main spaces and service spaces, in terms of sustainability.
- The quantity and quality of joint exterior spaces (grassy areas, play areas etc.) in the rate of the complex' sustainability.
- The quantity and quality of common interior spaces (parking, store rooms, installations and etc.) in sustainability terms.
- Body identity and exterior splendor of the complex (views and external factors) in the rate of sustainability.
- The quality and extension of entrance spaces (entryway, transom, lobby etc.) in terms of sustainability.
- Quantity and quality of availabilities of footpaths and roadways, relevant to the residential complex' sustainability.
- Quantity of physical phenomena such as transmission of annoying sounds, lighting, ventilation, view and prospect in sustainability terms.
- The rate of flexibility of spaces in the residential complex' sustainability.
- The rate of safety, with involvement of a concierge or not, in terms of sustainability.
- The quantity of social relations and neighbors' interactions in terms of their sustainability rating.

At the end, the tests are asked to add unstated items which seem to be effective in residential complex sustainability. These questionnaires were distributed among 160 people. 116 questionnaires were completed and returned. The multiple-choice questions' choices were graded and rated as follows.

Very high <input type="checkbox"/>	High <input type="checkbox"/>	Average <input type="checkbox"/>	Little <input type="checkbox"/>	Very little <input type="checkbox"/>
------------------------------------	-------------------------------	----------------------------------	---------------------------------	--------------------------------------

From "very high" to "very little", a rating of 5 to 1 was given, respectively.

Reliability Statistics

Cronbach's Alpha	N of Items
.904	34

Analyzing the Strategies

Ascertaining the Liability of the Questionnaire

Before analyzing the results, the reliability of the questionnaires was examined. The aim for this examination was to show the rate of accuracy and malfunctioning of the questionnaire. Evaluating the reliability of this research was done with the SPSS V16 computer program and the result comes after calculation of the Difficulty Index, Discriminative Index, Loop Method, eliminating nine questions and evaluating the 31 remaining questions. By eliminating any inappropriate questions, the test reliability index is estimated $\alpha=0.912$.

This shows that the test is an appropriate test to analyze factors, compared to the minimum amount of α ($\alpha=0.7$).

Explanatory Questions Results

To examine, analyze and observe these questions, first all the answers were extracted. Meanwhile it was observed that the majority of tests, instead of stating a specific and fixed number represented a spectrum, that is, they gave maximal or minimal rating as their reply. According to the type of answers and also the possibility of analyzing, total answers were divided into four sorts with specific ranges. The percentages of each range was determined and charted in a bar graph as following.

The questionnaires results represented that according to the majority of experts, a residential complex or a building block, including 2 to 12 residential units, would be the most suitable one for providing safety and social interaction sustenance. 87.3 percent of experts agreed on the first question and 85.5 percent on the second one.

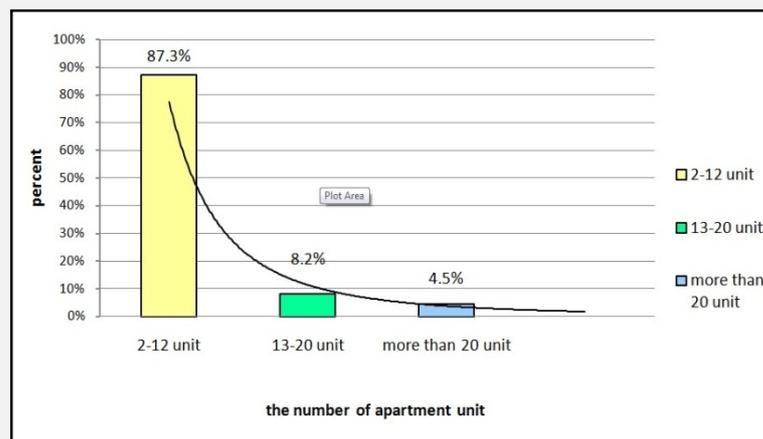


Figure 1 - Roller-bearing graph of the relationship between the numbers of apartment units with safety (source: author).

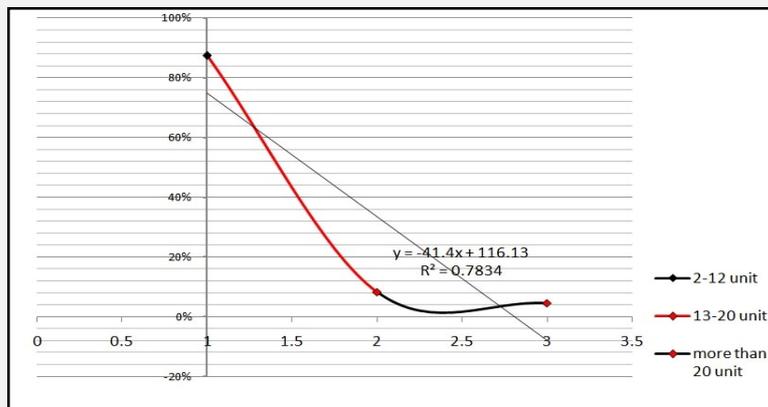


Figure 2 - Curved graph of the relationship between the numbers of units with safety (source: author).

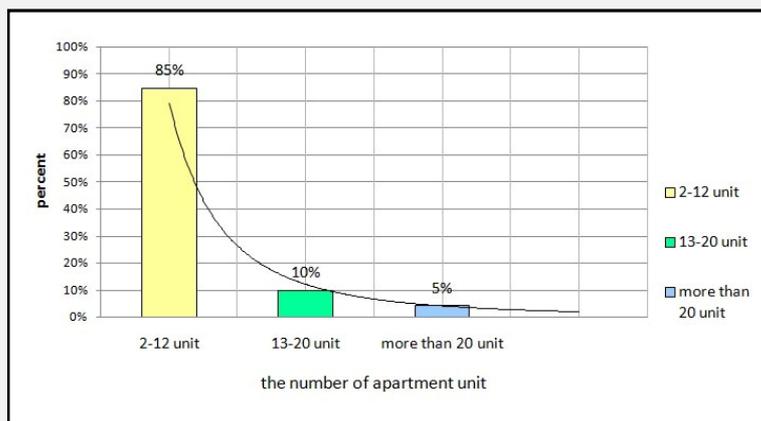


Figure 3 - Roller-bearing graph of the numbers of units with social interactions (source: author).

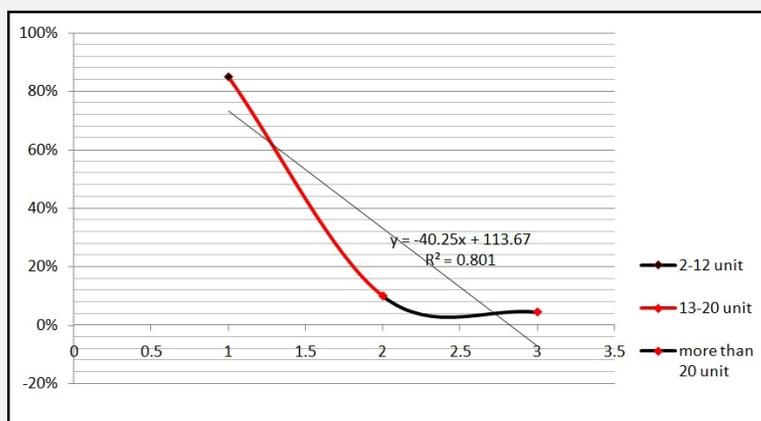


Figure 4 - Curved graph of the number of units with social interaction (source: author).

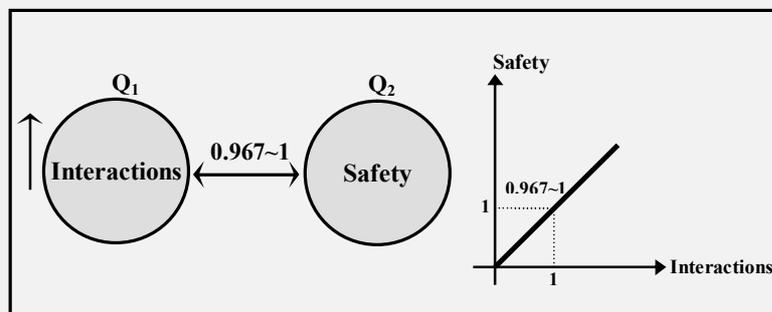


Figure 5 - Linear model of the two variables of safety and social interactions (source: author).

Considering these results, it was apparent that the relationship between safety and social interactions is a direct one.

The above graph (Fig 5) shows that the fewer the interactions, the less safety we have and vice versa. It should be noted that there is a direct relationship between increasing the social interactions and increasing the number of complex units (from 2-12 in each block). However, when the number of units is increased to more than 12 in each complex, the social relations decrease. In all probability this happens because with an unconsidered increase in complex units in each block, the social groups of that block including neighbors and households, lose their identity and turn into a mass of adjacent people.

It is concluded that body programming and planning affect the rate of social interactions and safety in residential complexes. A residential complex resident must be able to control the open areas in a living space and protect them against intruders. Therefore, a defensible area is the one which facilitates recognizing and controlling all the activities for residents (Lang, 1987).

Colman has noted that the greater the number of

floors, units, blocks, corridors and the escape corridors, we will have a more serious state of affairs (Coleman, 1978). The number of units in a neighboring unit is better to be high enough to create a social group and avoid that the place becomes crowded and, as Anthony Giddens uses the term "crowd", this should not occur in a residential complex. In his book *Sociology* (Giddens, 2006) he has mentioned these two phrases as follows:

- Social groups consist of a group of people that gather together and have regular interactions.
- A crowd is used for a group of people who are in one place in a specific time but have no certain relationship with each other.

In this case, it becomes necessary to consider the extent of identification, clearness and number of residential units of a block, in order to increase social interactions and safety. According to the above data, existing rules in Tehran and other similar cities municipalities (inside or out of the country) have proved to be inefficient with regard to residential complex programming, especially the programming of residential lands, with an extension space of more than 600m² and with a capacity of apartment buildings containing more than 12 units.

It must be noted that, under present rules, the number of each complex or block unit is subject to the area width, density of the area, and the number of parking spaces provided. For example, in Tehran as in other similar cities, it is possible to construct a 20 unit residential complex, with the infrastructure of 150m² for each unit, only on land with a 1000m² area and the property measurements of 50×20. It is also possible to construct a 30 unit complex with an infrastructure of 100m² for each unit or a 40 unit complex with the infrastructure of 72m² for each unit, both on the same land. It is apparent that present rules exert no control over the number of residential units to provide safety or increase social interactions required or for the sustainability of these residential complexes. Another controlling factor must be introduced to increase social interactions, safety and social sustainability in residential complex.

Multiple-Choice Questions Results

Determining the Basic Variables for Sustainability of Residential Complexes

To determine the basic variables of a residential complex's sustainability, the factor analysis method is practiced. Its purpose is to make a general structure or pattern among variables. Through analysis, it became possible to specify the thematic classifications of variables, under the title of effective factors for the sustainability of residential complexes. Each factor consists of variety of variables, according to its extension and importance. By examining extracted results of multiple-choice questions and analyzing them, four concepts became specified. Their statistical computations and factors are as following.

Results

The First Factor: physical tranquility inside the house

One of the most important perceived conceptions of the expert's questionnaire is an aspect called "physical tranquility inside the house". It should be mentioned that this factor, according to the question in the questionnaire and from the point of view about the high importance of this by the most of the people

involved, was ranked as the most important of all the factors. These results are shown in Fig.6.

N	Component			
	First Factor	Second factor	Third Factor	Forth Factor
q7	.881	-.007	.019	.180
q8	.860	-.034	.177	.117
q9	.849	-.049	.126	.157
q10	.848	.200	.029	.165
q6	.831	-.078	.154	.090
q5	.826	.076	.129	.174
q4	.751	.122	-.070	-.180
q3	.589	-.120	.189	.019
q30	.532	-.274	.295	.073
q17	-.052	.854	.297	.063
q18	.124	.851	.039	-.017
q19	.020	.834	-.075	-.045
q27	.329	.002	.827	.081
q26	.269	.034	.800	.139
q21	-.113	.464	.673	-.142
q22	-.020	.525	.608	-.106
q25	.045	-.063	.088	.903
q40	.278	-.083	-.116	.644
q13	.319	.114	.117	.636
q1	.011	.100	-.055	-.013
q2	.292	.070	.006	.064
q24	.117	.254	.099	.317
q12	.118	.041	-.047	.159
q16	.225	.141	.082	.085
q34	.148	.012	.089	.004
q29	.375	.190	.180	.026
q14	.142	-.105	-.084	.579
q28	.482	.010	.475	.005
q23	.012	.091	-.136	.257
q39	.120	.134	-.009	.468
q15	.080	.353	-.379	.280

COMPUTE f1 = ((q3 + q4 + q5 + q6 + q7 + q8 + q9 + q10 + q30)/9) * 20.

EXECUTE.

COMPUTE f2 = ((q17 + q18 + q19)/3) * 20.

EXECUTE.

COMPUTE f3 = ((q21 + q22 + q26 + q27)/4) * 20.

EXECUTE.

COMPUTE f4 = ((q13 + q25 + q40)/3) * 20.

EXECUTE.

CORRELATIONS/VARIABLES=a b f1 f2 f3 f4

Fig 6- the table of determining factors (Author)

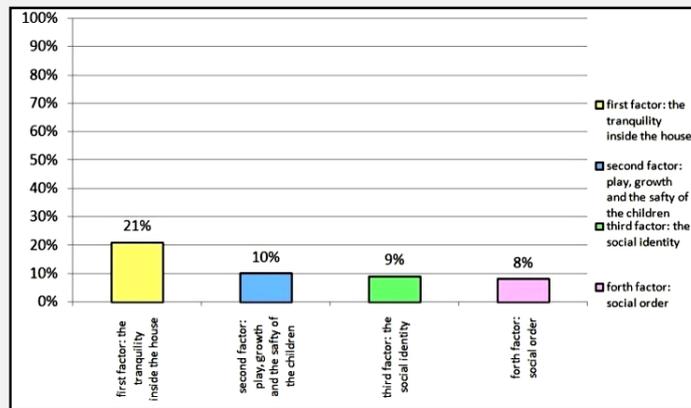


Figure 7 - Roller bearing graph showing the factors (source: author).

First factor conception - physical comfort inside the house is considered as the most important factor, according to the experts. That is, in their opinion,

people place a high emphasis on the quality and quantity of the interior design. Thus, by increasing the interior comfort, the social sustainability rises.

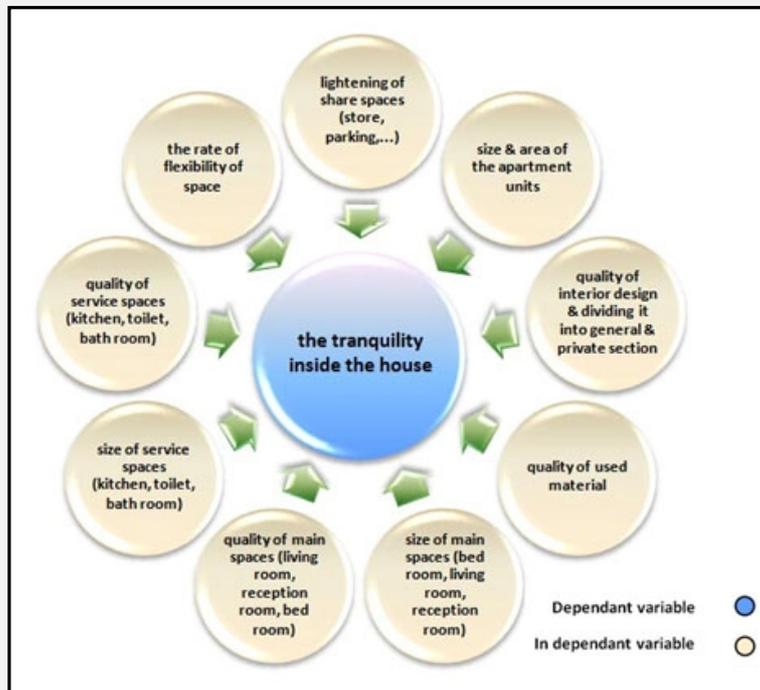


Figure 8 – Graphic presentation of the first factor (source: author).

Residential complex sustainability is mostly affected by the comfort inside the house. This comfort functions as an intermediary variable and affects sustainability. The comfort, itself, is affected by variables such as the size and quality of the main living spaces (living room, reception room and bedrooms), quantity and quality of the service spaces (kitchen, toilet and bathroom), flexibility of the interior design, lighting of interior and exterior spaces, the size and total size and area of interior space, the quality of used material inside and outside of the house and, finally, the quality of interior design and dividing it into general and private sections.

It is obvious that fluctuation of variables results in increasing or decreasing the interior comfort. So it is important to pay attention to the effective factor of social sustainability besides studying the house itself and The following chart is a sample of the research findings and is aimed to discover the minimum area needed for a dwelling unit. It seems important for tranquility and meeting the spiritual and physical needs of the family members.

Reducing the size of bedrooms in new houses and installing wardrobes, beds and other equipment (computers etc.) creates a cramped area from which most of the people escape. In this case they tend to stay in the living room or reception room for studying or performing routine works which is unsustainable. The fact is that "each family member requires a time, a place, for himself/herself" (Rasekhinezhad, 2007). Otherwise, there exist different behaviors and expectations in the same place and at the same time which ends in family problems and causes disturbance to their comfort.

The lack of sufficient kitchen space is one of the common problems of modern houses. Many cases show that women are more vulnerable than others at home. That is because they spend most of their time in the kitchen where inappropriate proportions or undesirable quality, such as the design in public view (exterior design), cause disturbance to the woman's comfort at home.

functional space	1-2 person	3-4 person	5-6 person	7-8 person
Main living room space	12	12	15	18
Multipurpose space	9	12	12	12
Multipurpose space	-	-	12	12
Multipurpose space	-	-	-	12
Reception room space	-	15	15	15
kitchen	3.6	5	6.5	8
Bath room	2.1	2.1	2.1	2.1
WC	1.5	2	2	4
Instrument of bedroom space	0.8	0.8	0.8	1.6
Corridor	3-4	5-6	6-8	8-10
Total	33	55-56	74-76	96-98
M ² /person	16.5	10-14	10-13	10-12

Figure 9 - Suggested areas for the minimum spaces of an Iranian house on the basis of human density (Rasekhinezhad, 2007).

The other reason for problems in modern houses is elimination of specific spaces for messy and subsidiary activities inside the house. Lack of storage for wet coats, muddy shoes, detergents and of store rooms and service spaces as a whole, renders living rooms and bedrooms into an unhealthy atmosphere.

In addition, inappropriate design of interior areas including isolated (unused) areas, the lack of an entrance area and family privacy, and the possibility of viewing the inside of the house by the public, are the main factors that create unsustainable and lack of interior spaces for family members.

Some researchers believe that, on the basis of statistics in Iran, the families questioned regard the house as a group of closed, semi closed and open spaces (Haaeri, 1382). Also they care about the private and general spaces of the home and they believe in the idea that the kitchen should be big enough to accommodate a variety of appliances in it. On the whole, Haaeri believes that the following points should be taken account of in residential units:

- The yards (courtyards) should be independent and fenced.
- The house's interior should not be visible from outside.
- A covered corridor should act as a fore-entrance space in the house.
- The drawing room should be divided from the living spaces (private spaces) of the house.
- The necessary spaces and facilities for entertaining the guests should be foreseen.
- Every space should be open to daylight.
- There should be a direct access between the kitchen and the dining room and the sitting room.
- Every space should be easily ventilated (Haaeri, 1382).

The Second Factor: availability of open air play and multipurpose areas for children

The other result of questionnaire is the conception

gained from questions that examined whether there existed an adequate and useful children's play area.

These questions also examine whether the play area can be controlled by parents or not. The third issue to check is the existence of a grassy area and its quality. These notions are designed and asked in questions 17, 18 and 19 and considered as the second effective factor in the sustainability of a residential complex, under the title of "the availability of open air play and multipurpose areas for children".

According to previous research and from the viewpoint of experts in architecture, urbanism and the behavioral sciences, the second factor affecting the sustainability of residential complexes, is the existence of a children's play areas and possibility of playing in them and also the creation of other or multipurpose areas for all of the residents, including children. This factor variance is rated 10%.

It is concluded that after providing for the interior comfort of a house, children's play, entertainment and recreation and also children's growth and safety is of great importance for families. Therefore, this conception functions as the second essential variable which affects sustainability of residential complexes.

Of course this variable, like the first one, is a relative variable and plays the role of an intermediary while variables like the proportion and the quality of play area, the quality of multipurpose areas and the quality of open spaces and grassy areas in terms of being appropriate for play, are considered as independent variables. Thus the sustainability level of a residential complex is increased through providing a play area to satisfy children and assure their parents of children's healthy entertainment, growth and safety.

One of the most important factors in children's growth is their contact with open spaces or nature, which provides the possibility of improving in their skills and health. In addition, the quality of this open area in which children's comfort and relaxation are supported, affects their play and activities. In this case, children's safety arises from parents' precise supervision and the possibility of overlooking children

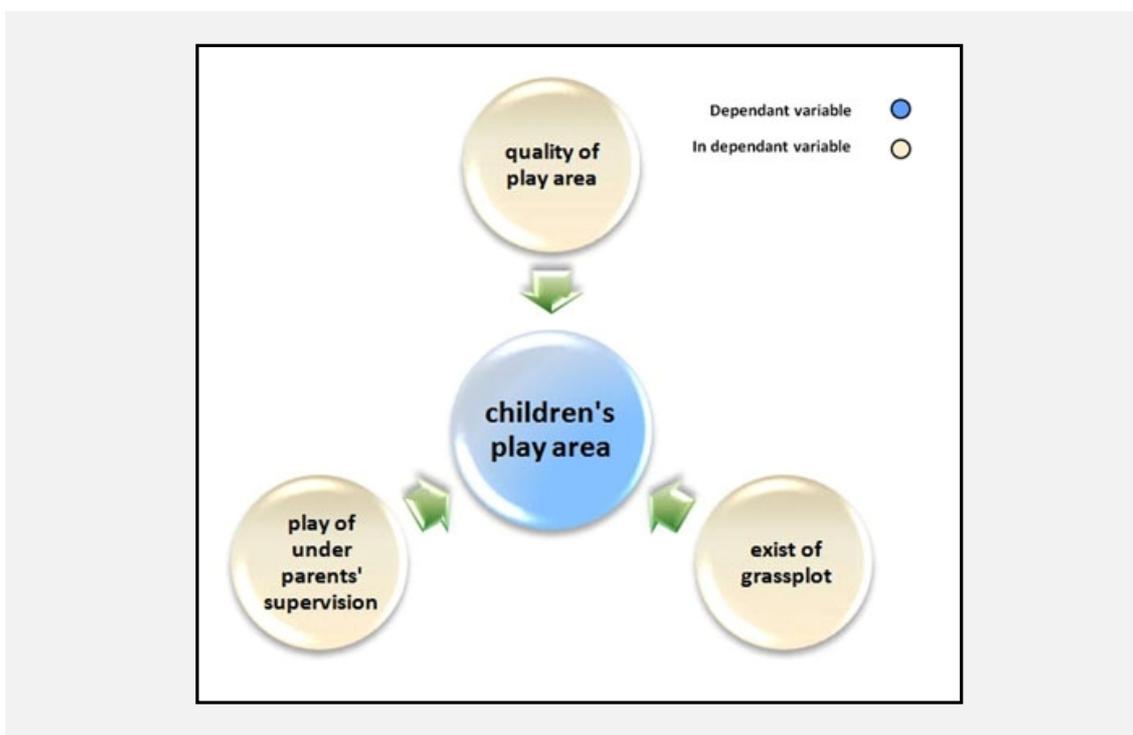


Figure 10 - The relationship between independent and dependant variables (second factor) (Source: author).

watching them in the central areas from inside the house. Given the importance for spaces available for play, and the importance of open public spaces and grassy areas to residential complex sustainability, it is essential to project the preparation of the required facilities through programming and designing the above spaces.

The physical and spatial requirements to develop the intermediary variable positions (as perceived from the content of relevant questions) are as below:

First, during planning of the residential complex, it is necessary to consider the recreation and play areas as the main spaces and essential parts of the project, and their location and establishment should be planned in such a way that children and play areas are under their parents' supervision. The quality of play areas, in terms of creating a possible exciting place to play which is safe and protective, must be observed in the design process.

In the next step, the Play areas and grassy plots should be planned in such a way that they allow for the possibility of play. Other areas such as parking spaces especially temporary parking and parking

spaces for guests and also other possible all purpose areas, must be planned for several operations or at least two operations and the second operation must be to allow for children's play and recreation.

The Third Factor: social identity

This factor is introduced as "social identity" with a variance of 9%. According to experts, sustainability is highly related to social identity, complex area identity and resident similarity. It must be noted that by similarity, we do not mean financial, professional or educational similarities.

From the psychologist's point of view, people's social identity is concerned with their social rank and one's social rank is marked by his/her residence. Therefore one's living place, the residential unit and the social identity forms her/his social rank. Besides social similarity, the quality of the entrance, hallway and main lobby also affects the residence's identity and, thus, the social identity of the residents. Social identity, according to features and circumstances of each place, has its own specific effects.

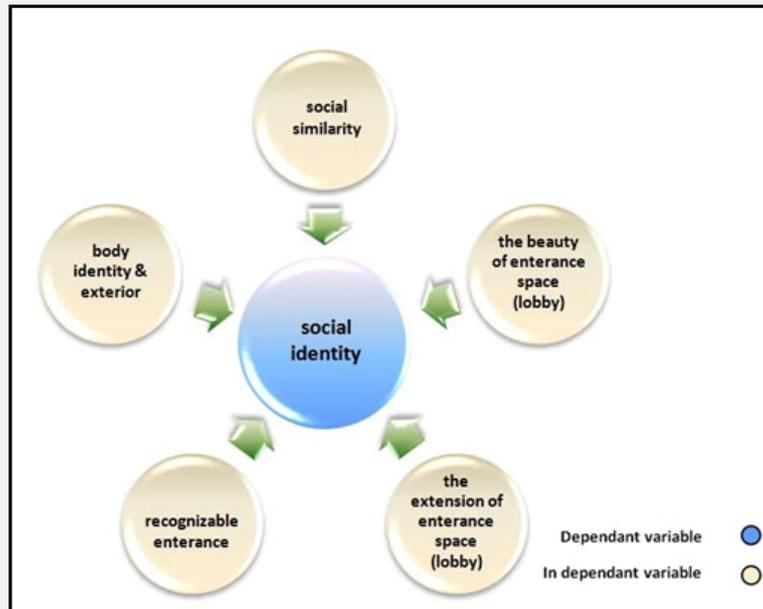


Figure 11 - The relationship of independent and dependant variables (third factor)
(Source: author).

Rapoport believes that "home" isn't the result of physical forces or every other abstract reasons, But it arises from an extent arrange of cultural-social factors. The residence formation is changeable through regional circumstances, structural technology and availability of materials. But these are not called the initial forces. He names them as the modifying factor or secondary forces (Memariyan, 2005).

Centripetal Family

In the modern era, the old standards are affected and changed by the present features. Thus, social relations lose their value (dignity) and people distance themselves from others. Thus, private life tends to become separated from social life. The conclusion would be the family's separation from the society and a movement towards a solitary life (centralism).

Not only the family must compensate for all public life short comings, but it also becomes the only place for personal experiences and emotional relationships (Pourdehimi, 1382). The fact is that the family system in our country is the centripetal or introverted system which results in giving greater attention to the family

members' internal comfort and children's safety and health than to communication and other factors.

As the research on examining the bases of residential complex sustainability show, the most effective factors in social sustainability in a residential complex are rated as follows.

- First: comfort inside the house.
- Second: satisfying children's requirements and enjoyment in terms of play and recreation.
- Third: social identity and interest.

In this way it follows the same lines as the characteristics and desires of the family.

The Fourth Factor: social order

The last factor extracted from the questionnaire is the factor understood from questions 25, 40, 13, called social order, with a variance of 8%. A considerable percentage of residential complex sustainability is pertinent to social order in complex and public areas. The order, itself, arises from the proper operation of service and subsidiary spaces like parking, store rooms, heating and cooling installations and the sanitation of these spaces.

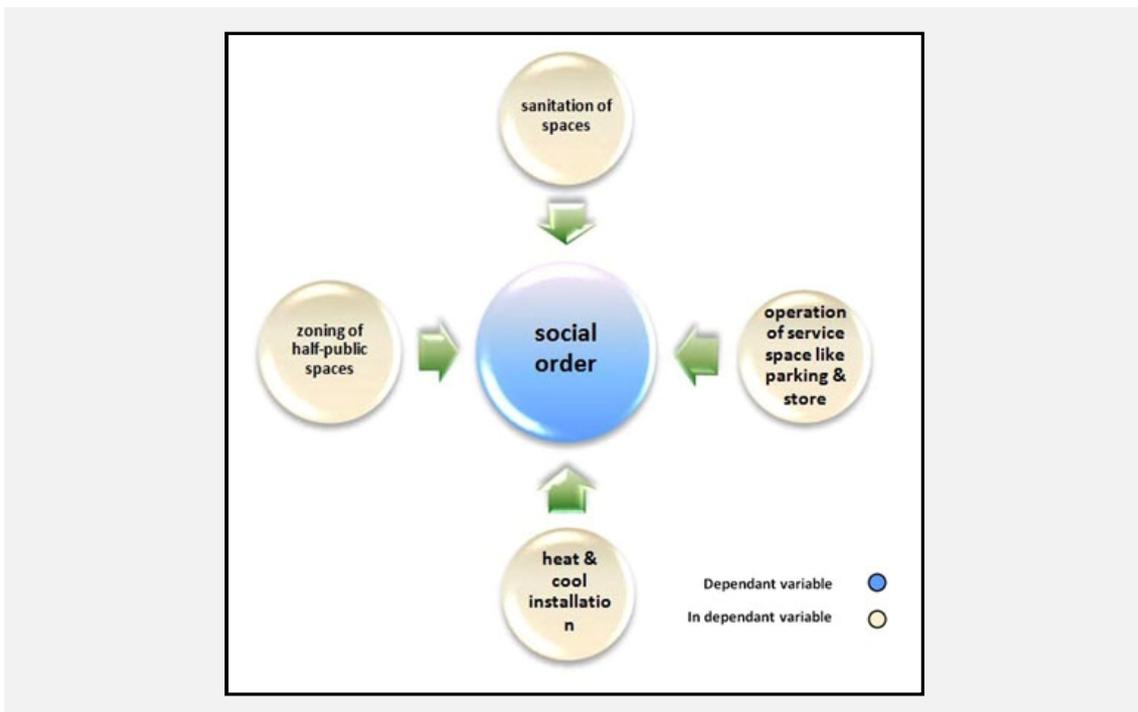


Figure 12 - Graphical diagram of the fourth factor (Source: author).

The housing regulations, construction techniques and the house's requirements should be in such a way that the house can be used any time and by any culture of its dwellers (Sherwood, 1978).

The factors which establish this order, such as possession of a parking space, store room and other service and subsidiary spaces for each unit, in a specific location, create a discipline both in the complex' outline and the residents' relationships. This results in a reduction of tensions and conflicts arising from uncertainty or parking in other residents' spaces and thus leads to the resident's spiritual comfort and protects excellent relations and satisfaction with neighbors. Moreover, the appropriate operation of installation systems and cleanliness of common areas is of great importance to provide residents' comfort and, consequently, the social sustainability caused by good order.

It must be noted that Abraham Maslow's theory (Lang, 1987) concerning the hierarchy of human needs, which has been proved in western societies and in the field of psychology, is emphasized in this research and our findings in Iranian communities and

in the field of architecture. Basic human physical requirements which arise from hunger, thirst etc. are given priority in residential complex in the following way:

- First: Through physical requirements, related to interior spaces and basic requirements such as bed rooms, kitchen, services etc.
- Second: safety in residential complex that is the safety of those members who are mostly vulnerable to danger children, safety in play and parents' spiritual comfort.
- Third: social identity or the necessity to be accepted in public in a residential complex which stems from the social similarity of residents and neighbors' interactions.
- Fourth: self-esteem and reliability, which come out of the third factor.
- Fifth: self-realization and potential ability.

Conjunction, order, and elegance in a residential complex, under the title of social order (4th factor) is interpreted as the proper operation of service systems, sanitation and clarity of observance by residents.

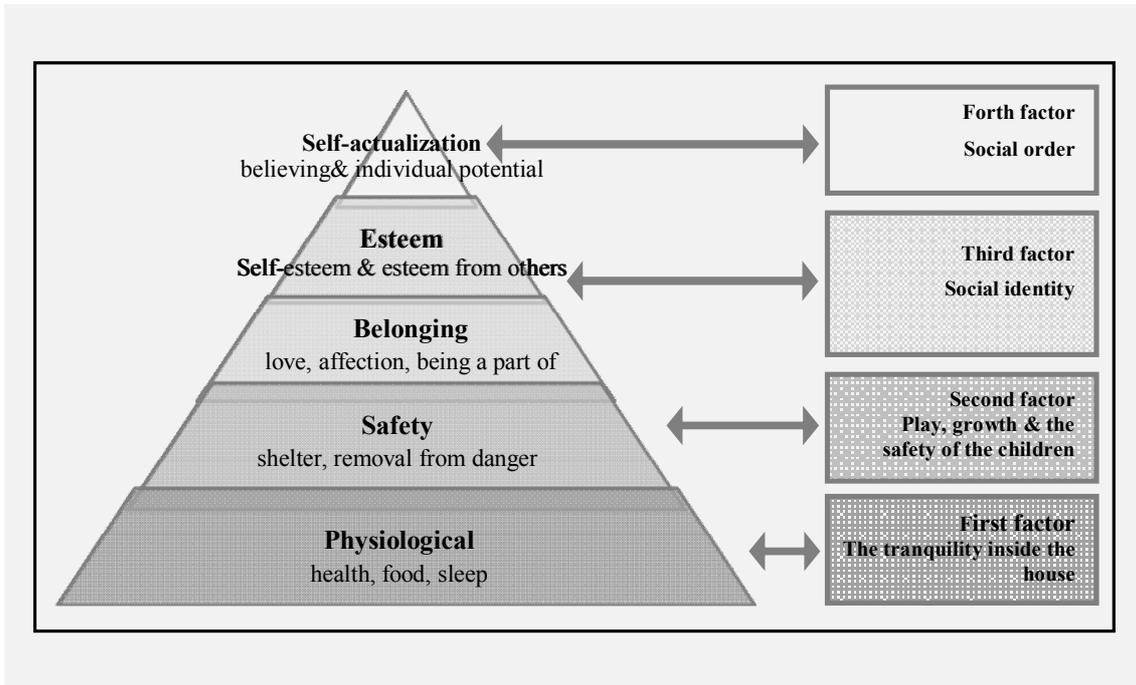


Figure 13 - The hierarchy of the demands from the Maslow's point of view (Source author).

Discussion

Relationship between the Factors of Sustainability

For identifying the relationship between the factors we can use the correlation model. This model determines the direct or reversed relations between the factors and the numeric amount of the relation on each other.

The first, third and fourth factors are directly related. That is, residents' similarity, the rate of interactions and physical comfort inside the house, and social order arising from joint areas, have an impact on each other and each of these three factors also affects social sustainability.

	a	b	f1	f2	f3	f4
a	1 96	.967 .000 94	-.184 .077 93	-.013 .908 88	-.131 .204 96	-.213 .037 96
b	.967 .000 94	1 96	-.180 .084 93	-.032 .770 88	-.143 .166 95	-.198 .053 96
f1	-.184 .077 93	-.180 .084 93	1 110	.064 .520 104	.238 .013 107	.347 .000 110
f2	-.013 .908 88	-.032 .770 88	.064 .520 104	1 107	.428 .000 103	.052 .595 106
f3	-.131 .204 96	-.143 .166 95	.238 .013 107	.428 .000 103	1 111	.140 .142 111
f4	-.213 .037 96	-.198 .053 96	.347 .000 110	.052 .595 106	.140 .142 111	1 114

Figure 14 - The correlation model between the main variables (sustainability factors) (Source author).

There is a direct relationship between the first and fourth factor. That is, the interior comfort which results from the public areas and operational accuracy of common (general) mechanical and electrical installations and vice versa.

In modern architecture, interior and exterior spaces overlap. In other words, contemporary life is not restricted to the interior spaces of a residential complex (Norberg-Schultz, 1971).

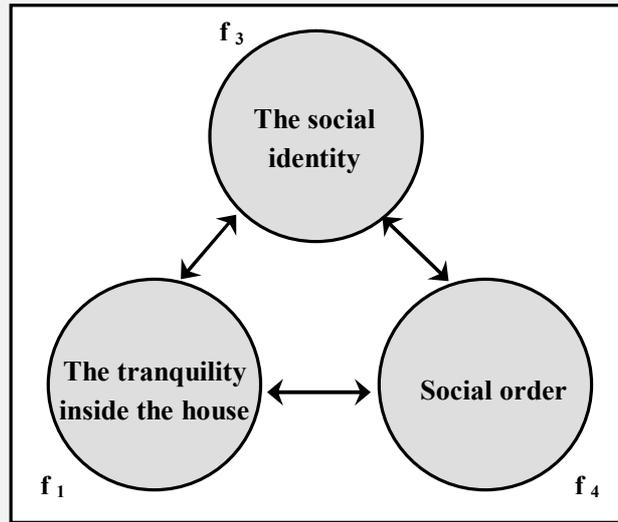


Figure 15 - Graphical model of the relation between the first and the third factor (Source author).

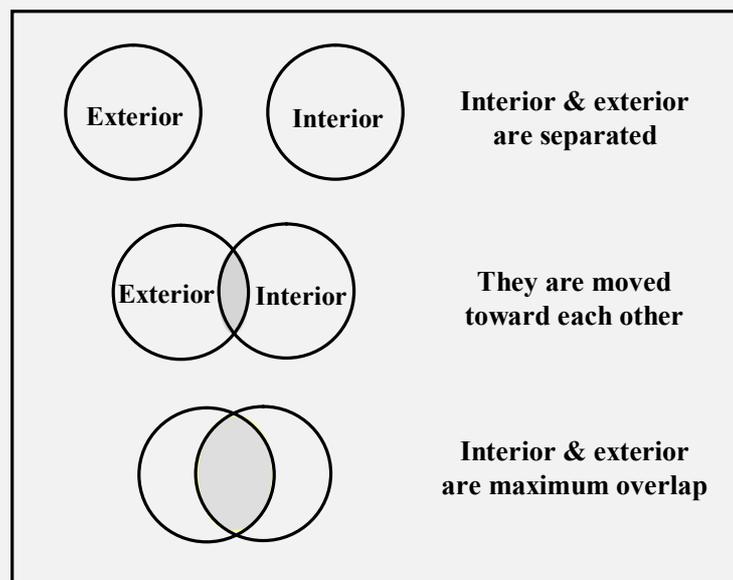


Figure 16 - Relationship between interior and exterior spaces in historical periods (Memariyan, 2005).

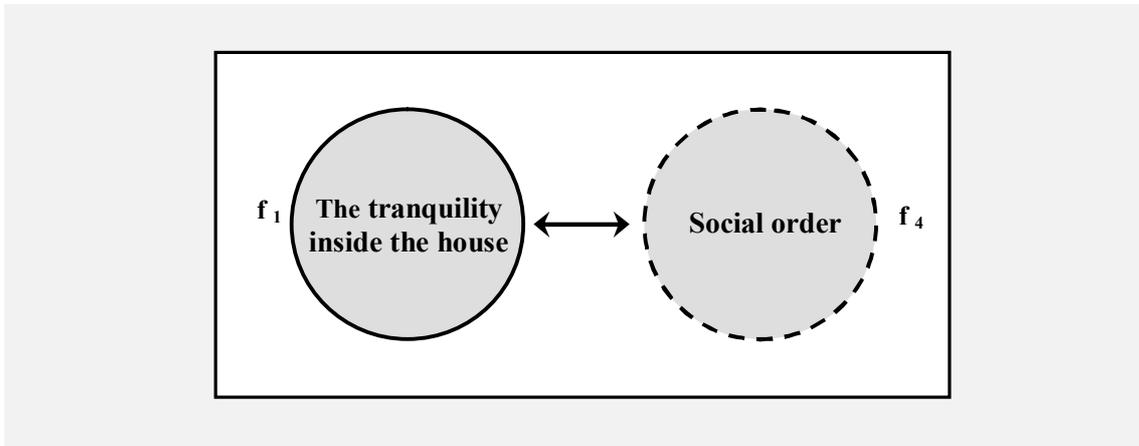


Figure 17 - The relationship between the tranquility inside and social order (Source author).

This diagram shows the relationship between the interior and exterior spaces of residential complex's units, during the process of achieving sustainability, is also affected by social order in exterior spaces.

The second factor is directly related to the third factor. In this diagram, children's comfort and growth is related to play area with a percentage of 89%, and to the resident's social similarity with a percentage of 11%. Without these two, this area remains unused and is not beneficial, because, the sustainability of a child's play area and his playing with peers is affected by the

variety of social rank and social similarity. Perhaps a mother prevents her child from playing with other children who are from different social and cultural classes.

The Derived Regression Coefficient

Regression coefficients are used for defining the relationship between sustainability factors and for defining the rate of each factor with regard to others. These regression coefficients are found in the tables below.

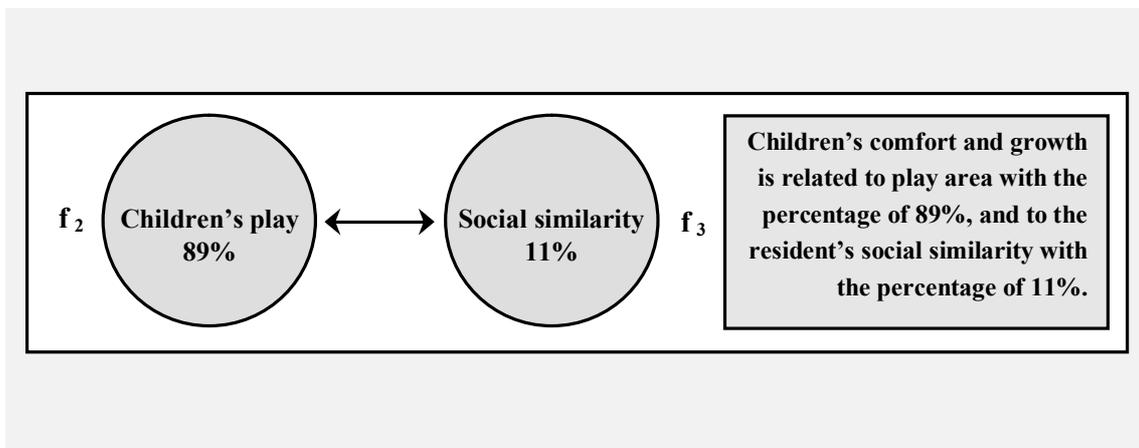


Figure 18 - The relation between the second and the third factor (Source author).

Coefficients (a)

Model	Un standardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
1 (Constant)	21.245	11.800		1.800	.075	
	f4	.624	.143	.433	4.376	.000
2 (Constant)	-2.303	13.693		-2.303	.867	
	f4	.609	.136	.423	.609	.000
	f3	.362	.120	.286	.362	.003

Dependent Variable: f1

Dependent Variable: f2

Figure 19 - The Derived Regression Coefficient (Source author).

Model	Un standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	62.529	6.293	0.358	9.937	0.00
	f3	0.315	0.090	3.491	0.001

The mathematical relation derived from the analyses is as follows:

F ₁ : First factor	$F_1 = 21.245 + 0.624 f_4$	Relation between f ₁ with f ₃ & f ₄
F ₂ : Second factor	$F_1 = 2.303 + 0.609 f_4 + 0.362 f_3$	Relation between f ₁ with f ₄
F ₃ : Third factor		
F ₄ : Forth factor	$F_2 = 62.529 + 0.315 f_3$	Relation between f ₂ with f ₃

Figure 20 - The mathematical relationship derived from the analyzes (Source author)

References

- Coleman, A. (1978). Street for living. Australia: ARRB
- Giddens, A. (2006). Sociology. Cambridge: Polity Press.
- Haaeri, M.R. (1382). Contemporary houses: characteristics and requirements. Abadi, 38: 42-44
- Lang, J. (1987). Creating architectural theory: The role of the behavioral sciences in environmental design. New York: Van Nostrand Reinhold Co.
- Memariyan, G.H. (2005). Theory of architecture. Tehran: Soroush Press.
- Mumford, L. (1938). The Culture of cities. United States of America: Harcourt Brace & Com`pany.
- Norberg-Schultz, C.H. (1971). Existence, space and architecture. New York: Oxford University Press.
- Norberg-Schultz, C.H. (1993). Concept of dwelling. New York: Rizzoli.
- Pakzad, J. (2008). Articles about Urbanism and Architectural concepts. Tehran: Shahidi Press.
- Pourdeihimi, S.H. (1382). Open spaces design in residential complexes. Soffeh, 36: 45-57.
- Rasekhinezhad, M. (2007). The optimum space in home. Theses for receiving PhD degree, Shahid Behshiti University.
- Rogers, R. (1383). Great architectures sustainable design. Husseinmardi, H. Abadi, 42:32-41.
- Sherwood, R. (1978). Modern housing proto type. Cambridge, Mass: Harvard University Press.



