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Affordability Principles in Low-Income Housing Based on Residents` Perspective (Case Study: Babolsar Mehr housing)

M. Ramezanpour[1], A. Nourtaghani[2,*]

[1]*MA Student, School of Architectural Engineering, Golestan University, Golestan, Iran*
[2]*Assistant Professor, School of Architectural Engineering, Golestan University, Golestan, Iran*

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Abstract

This study was done with the aim of identifing and prioritizing the supportive housing affordability indicators based on residents` perspective, this aim is practical and our research method is descriptive-analytical. Regarding the nature of the subject and the indicators studied, the current approach to this research is a survey method that first, by analyzing the content of research carried out in different countries, the affordability indicators of supportive housing are extracted and then based on this Indices, a questionnaire was designed. This questionnaire was distributed in the statistical community. The statistical population is residents of Mehr housing in Babolsar. 340 residents were selected by random cluster sampling from the whole (2300 residents). Data was analyzed through exploratory and confirmatory factor analysis. Exploratory Factor Analysis showed a 8-Factor measurement model that two factors were eliminated due to their low impact. These factors that determine affordability of supportive housing base on residents` perspective, In order of preference, are: Physical comfort, Elderly and disabled people facilitations, 'Green spaces' landscape, Intra-housing characteristics, Open spaces efficiency, and social interactions. The regression method was used to investigate the relationship between these factors, which indicates high dependence (0.85) of physical comfort factor (as dependent variable) and Intra-housing characteristics. In future researches, it is necessary to evaluate the measures of supportive housing affordability indicators in different regions of the country.

Keywords: *Supportive Housing, Affordability indicators, Factor analysis, Regression.*

1. INTRODUCTION

Supportive housing is one of the policies of the governments in order to support the social classes who cannot provide a suitable house with the individual life style by their own income. From the late 19th century until now, different countries had diverse policies for supporting this group, like public and social housing. The social housing development pattern in the 1990s in some European countries for instance Netherlands 36%, Germany 26%, England 24%, Austria 23% and Denmark 18% reveals the necessity of this type of housing [1]. Due to poor quality of life in supportive housing and poverty concentration and inequalities as well as crime occurrence [2-3], Affordable housing Was introduced as a form of social housing which is under the supervision of the government, cooperative incorporations or a combination of both. The concept of affordable housing was dispersed from the 1980s in Europe and North America and its construction initiated about the 1990s [4] and studies indicate that it was accepted in several countries for instance Malaysia 78000 units [5] America 376000 units [6], Australia 304000 units [7]. The economic sufficient house is a house which is perfectly suitable for people with low and moderate income from the perspective of standards and locations, and the housing costs are in an extent which the habitants could manage the other primarily needs of themselves. The presence of such form of housing is one of the important social- economic infrastructures for having a healthy city which in its planning, the living and housing quality standards are concentrated [5, 8-10].

The economic sufficient housing quality criteria have devoted many studies to itself in different countries such as Australia, China, England, and America (for example go to [8, 11-13]). These studies show that in the first degree of this kind of housing, it has been evaluated from the economic perspective and the extent of income of the suitable individuals was specified, and it includes the individuals with low and moderate income of [11-19]

** Corresponding author: A.nourtaghani@gu.ac.ir*
Tell: +981732441003; Fax: +981732430516

of every society. In following, the quality and standards of the affordable housing are favored by planners and designers (We can also include to studies of in Australia and [20-21, 40] china and also the studies of [11-19] in U.S.A and England). Some of the qualitative features of affordable housing are presented in [22]; this report outlines the rules for developing of affordable housing in relation to the region's economy, site selection, investors, and residents' income. Office of Land Servicing & Housing in Canada [23] also explains the rules and regulations for developing affordable housing. According to the report, the qualitative factors of this type of housing include economy, combination of uses and residents, location and building design. Along with the experience of affordable housing in other countries, Iran's housing support has been called Mehr housing plan in recent years; however, despite the extensive experience of this supporting housing in the country, its quality and affordability measures research, are few. Some of these researches were the satisfaction of inhabitants of Mehr housing [24], evaluation of the location of Mehr housing projects [25], Criticism and Pathology of Operational Policies and Planning of Mehr housing ([26]; [27]) that they evaluated factors affecting the quality of life of low income households include functional, formal, semantic and environmental factors.

According to these researches, different countries have identified indicators for affordability of their housing. These indicators are developed taking into account the regional policies and characteristics of each country and the level of quality of life that they consider to be. Therefore, due to the dependence of these indicators on the economic and socio-cultural characteristics of each region and the high cost of construction and utilization of supportive housing in the country and its problems, it is necessary to determine the criteria for assessing the affordability of housing. Another Necessity for identifying affordable measures is the need to focus on the localization of low income housing programs in countries. On the other hand, research has shown that the criteria set by the country's experts and policy makers have been sufficiently limited to provide a catalog, categorization or hierarchical classification of factors. While measuring these indicators is also relevant to users, they should be considered. Therefore, after providing these criteria by experts it is necessary to prioritizing them by residents.

Therefore, the present study, while categorizing affordable housing criteria from residents' point of view, attempts to prioritize and investigate the relationship between them to be effective in providing low-income support housing. To achieve this goal, the following questions were examined:

- What is the affordability criteria of supportive housing from the perspective of residents?
- What is the relationship between these cost-effective measures?

2. THEORETICAL FOUNDATIONS OF RESEARCH

Several indicators have been introduced to measure housing purchasing afford. But the indicator used in most countries to identify and classify people in need of government assistance in housing is the percentage of the individual's monthly income for housing. According to the standard defined by the HUD, house is affordable when it costs lower than 25% of family income or being leased for rent or mortgage loans, lower than 30% of family income. This standard should refer to the geographical location, family size, income status in terms of whether being low income happens at a particular time, or whether a person is considering low income according to average income of him/her in the whole life. In some countries, inclusion is defined as a percentage of the region's income. In such a way, if an individual's income is supposed to be lower than 80% of the area median income, he will be eligible for assistance [28].

As noted, housing is considered affordable that its variables be provided by the country, state, region or municipality of the place concerned. In Australia, affordable housing is one of the housing that is standard and well located for low-income and middle-income individuals, and housing costs are such that residents can afford to meet their other basic needs. So that housing costs for residents be less than 30% of their income [15]. Affordable housing in the UK is rented and medium-sized housing provided to eligible families whose housing needs are not matched by market rates [29]. Affordable housing in China is often defined as housing that is used for renting and spending less than 30% of family income, and the cost of purchasing it is less than 3 times the annual income of the family [16]. With these definitions one can conclude that the main objective of affordable housing is to increase the quality of housing and, consequently, the quality of life of the people living in it. In each country particularly, it defines, according to indicators, a level of quality of life that varies from country to country. These attributes may include physical, social, economic, infrastructure, health and characteristics.

3. METHODOLOGY

This research is a descriptive-analytical method in terms of purpose and in terms of research method. Considering the nature of the subject and the indicators studied, the current approach to this research was survey type. First, by analyzing the content of the researches, the affordable indicators of supportive housing were extracted and then, according to these indicators, the questionnaire was designed. This questionnaire was distributed in the statistical community. To assess the questionnaire whether or not it really measures what is to be considered, factor analysis was used. Factor analysis of the operational set for the validity of this test (questionnaire). In order to validate the questionnaire on whether the questionnaire basically measures something, internal consistency of questions, such as Cronbach's alpha, was used.

4. ANALYTICAL MODEL OF RESEARCH

This research is based on the discovery of affordability indicators from the residents' point of view, in order to improve the quality of supportive housing in Iran. In order to construct this measuring instrument, we extracted the affordability criteria through a content analysis of the research carried out in other countries, and a questionnaire was prepared and provided to the inhabitants of the Mehr housing in Babolsar. The results of the research were obtained by analyzing the findings of the native tool for measuring the affordability of housing support. In Fig. 1, the research structure is available.

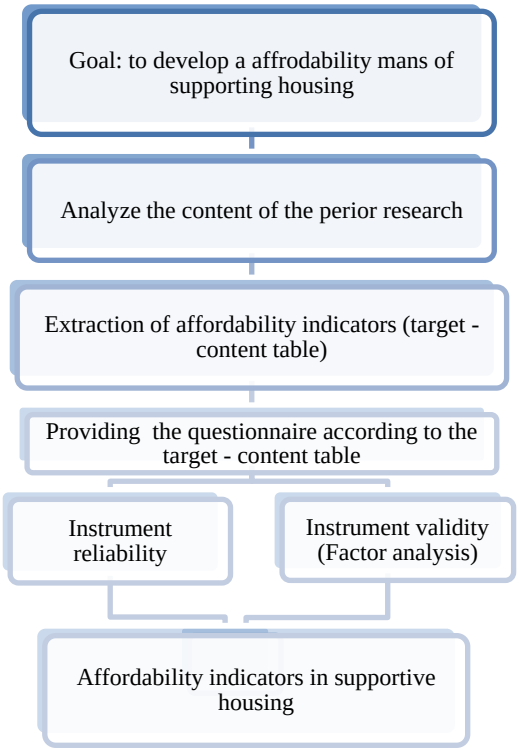

Fig. 1 Analytical framework of the research

4.1. Context and statistical population

The city of Babolsar has an area of 345.7 square kilometers covering about 1.46% of the total area of Mazandaran province. The city had 61984 inhabitants in 2011 [30]. Considering this population and the household size of 3.3, Babolsar has 18,783 households, of which about 2300 households are resident in the public and non-profit buildings. So far, in the public sector, all 576 units are in the form of Three residential complexes (Danesh, Talash and Andisheh) were delivered to qualified applicants.

In this research, the statistical population was selected from the families living in Mehr housing in Babolsar. According to this statistical society, 340 questionnaires were distributed among families selected by random cluster sampling. In the sample size estimation, Klein's relation [31] has been used. Out of the distributed questionnaires, the number of final questionnaires was 310 with 30 counts. To obtain affordability criteria, an exploratory factor analysis tool was developed.

4.2. Research means' development stages

Discovery study of affordability through variant countries indicators (analysis of the performed researches content).

In this sector, first affordable housing policies and factors in the countries of Australia, America, and china are proceeded (the reason of proceeding to affordable housing directives in these three countries, is their vast activities in this manner and economic and social development of them) and following with analyzing them and putting these data as the basis, the content-goal table which includes the affordability factors in Iran was conducted.

In Australia, there are directives for creating affordable housing present that in it, these kind of housing applicants' capabilities are represented. These capabilities include regulations, income, and need of housing, wealth, and competence. Individuals with three income groups of very low (lower than 50% AMI[1]), low (between 50 to 80% AMI) and moderate (between the 80 to 120% AMI) could have a share of this type of housing with appropriate mortgage. The applicants of this type of housing must require house in a way that they could have not provided their need without the support from the government in the meantime and must not possess a wealth for eliminating their need of house. According to law the affordable housing in Australia must acquire energy and environmental standards, suitable accessibility to resources and urban public transport, combination of groups with different social levels and allocating some housing units to disabled and elder individuals [13].

In America, a law is considered for constructing affordable housing which is in relation with investors and the support of the government, correct identification of deserved individuals and their needs, choosing the right plan site and using the opportunities, social health, appropriate design in order to promote the society, security and glory, power and to empower the habitants and sustainability [21, 23] has divided the construction and design of affordable housing directives into 6 main parts: 1) specifying the construction team: determination and evaluation of costs and possible risks of the project, resources and requirements; 2) financial analysis: identifying the project's costs, investment resources and also exploitation costs and the confidence from the adequacy of the fund for construction; 3) combining the groups with different social levels: Diversity in the size of the units and the possibility for people to access with different levels of income, form and size accommodation of the houses with habitants and society; 4) connection: an effective connection with investors and easy access to information and the constructional process of the project; 5) locating and context: constructing the project in a location with appropriate accessibility to services and public transportation, optimizing the site context before designing the details, constructing the structure with

positive visual influence and connectivity with the society, creating security, open space, and sufficient parking; 6) appropriate structure design: increasing the level of sufficiency with optimizing density, creating a high quality house, designing service and welfare spaces, an accessible and possible design based on disabled and elderly people needs, flexible and adaptable design proportionate to variant needs of families in their life, applying durable and inexpensive materials and also sustainable approaches for optimizing energy, designing an inviting and showing entrance. Various researches have been conducted to study the affordable housings. Appropriate accessibility and locating is one of the primary factors of sufficiency and follows with vast economic and social benefits [11-12]; [32]. The green affordable housing also acquires economic and biological benefits and the application of sustainable architectural strategies would guarantee the sufficiency of the housing throughout the time of exploitation and the residents would be benefited from its perks [33]. On the other hand, the affordable housing creates employment opportunities both in constructional stages and also after it for individuals and at the time of exploitation, the residents could earn a living inside the residential complex. This action would be effective in order to promote the economic state of residents and would sustain their relations with the individuals from the society [34].

Ulrich discusses in his study more in relation with the kinds of economic sufficient housing in china and its economic aspect that includes investment resources, tax, and the rate of the market [18]. A comparison between the price of the houses and the income of individuals in the cities of china would be proposed in the final part. The changes of approaches and affordable housing regulations between the years of 1994-2007 were also studied in a study. these regulations are about the type of the house, the characteristics of inhabiting individuals, the land, rate of profit, type of possession and ownership [35]. The other concerned options and characteristics are choosing the right land for construction, investment resources and supporting the project and costs. The required facilities and services in the sufficient complex and security is also important and is considered to be the primary characteristics of affordable housing. Through conducting a questionnaire, the rate of inhabitants' income, their monthly costs for housing, the rate of income savings, accessibility to city center's services and the housing's dimensions could be evaluated and with these indicators the level of sufficiency of the housing would be measured. The existence of smaller units, the site's location with more accessibility to urban services and resources and the cost of housing in proportionate to the family's income, would cause the level of sufficiency of the housing [19]. [36], mention the application of sustainable architectural strategies in affordable housing in their research, including heat insulation for exterior walls and reserving energy. They have acknowledged this approach as economic for little affordable housings.

Table 1 summarizes the above and categorizes the policies and indicators of the three countries of Australia, America and China because of their vast and successful experiences. Until the analysis of these funds and indicators, we can achieve the indicators of affordability in Iran and set the target-content table.

Table 1 Aspects and indicators of affordable housing in three countries Australia, America and China (resource: authors)

Countries	Aspects	Indicators
Australia	Economic	Level of income-Rent cost-Buying cost
	Social	Combination of different levels of society
	Location of the site and accessibility to services	Accessibility to public transportation-Accessibility to urban Services
	Sustainability	Green architecture-Economic sustainability
	Building design	Accessible design (disabled and elderly individuals- Area of units
America	Economic	Level of income-Rent cost-Buying cost-The cost of buying the land and leveling-The cost of building the complex-Maintenance cost
	Social	Combination of different levels of society-Open social spaces
	Density	Density optimization unit and population
	Location of the site and accessibility to services	Accessibility to public transportation-Accessibility to urban services
	Application	Employment for inhabitants inside the complex-Combination of different
	Sustainability	Green architecture-Economic sustainability-Structure and housing environment flexibility-Social sustainability
	Building design	Security-Accessible design (disabled and elderly individuals)-Bedroom diversity
China	Economic	Level of income- rent cost- Buying cost-The cost of building the complex-maintenance cost
	Density	Smaller units with high density
	Location of the site and accessibility to services	Accessibility to public transportation-Accessibility to urban Services
	Application	Combination of different
	Sustainability	Green architecture
	Building design	Security-Accessible design (disabled and elderly individuals)-Durable and non-Expensive materials

4.3. Designing the goal-context table

According to the effective factors on affordable housing which has been said afore in the 1-3 part, and with the analysis the context of sufficiency characteristics in the countries of Australia, America, and China, in order to achieve the target means, the goal- context table (Table 1) has been created. The economically sufficiency characteristics are assorted in the below form. The conduction of this table, is one of the most important steps in this research in the stage of tool-making. In this table in the first column (left side) the affordable housing aspects or the same effective factors have been places. The characteristics of these forms are evaluated from two aspects: 1- inhabitants, 2- environmental and physical aspect.

Table 2 Affordable housing aspects and characteristics (Goal-context table) (resource: authors)

Indicators / Aspects	Inhabitants			Environmental and structural aspect					
Economic	Level of income	Rent cost	Buying cost	The cost of buying the land and leveling	The cost of building the complex	Maintenance cost			
Social	The cultural and social level of inhabitants	Combination of different levels of society	Combination of groups with different ages and physical capabilities	Closed social spaces	Open social spaces	Connection to the social environment outside of the complex			
Density	Density of the complex inhabitants			Density of housing units	Density of other applications	Parking density			
Location of the site and accessibility to services	Accessibility to resources and services inside and outside the complex through walking and biking	Accessibility to housing units		Accessibility to public transportation	Accessibility to urban Services	Accessibility to workplace			
Application (use)	Employment for inhabitants inside the complex			Combination of different residential, service, commercial, health, educational, leisure, and sport applications inside the complex					
Sustainability	Social sustainability (social interactions, neighbor affairs)	Biological sustainability (the possibility of family growth during life)	Economic sustainability	Green architecture		Structure and housing environment flexibility			
Building design	Acoustic and climatic comfort	Accessible design (disabled and elderly individuals)	Respect for privacy and public / Security	Mass according to the form and context	Durable and non-expensive materials	Number of stories and units	Bedroom diversity	Complex and units' entrance	Appropriate landscape

4.4. Conducting the questionnaire based on the goal-context table

Based on the goal-content table a questionnaire has been conducted, in this way that, there are some questions specified to affordability characteristics.

A) Visual and contextual validity of the questionnaire: The prototype questionnaire achieved through the goal-content table was approved and edited by 5 professionals in order of evaluation of visual validity with the purpose of determining the obviousness and clarification of questions, and also the level of adaptation of the questions with the goal-content table.

B) Initial administration of the questionnaire: After ensuring of the contextual validity of the questions, the prototype questionnaire was performed on a selective number of the individuals.

The area under study: the population under study of this research are the inhabitants of the governmental and non-governmental complexes of the Mehr Housing in Babolsar that they have been divided in to two parts with high and low density. Amongst this population under study, a number of 340 individuals was selected for answering the questionnaire with the branch method that amongst these individuals the 310 number of questionnaires were finalized.

C) Analyzing the questionnaires items

- Discrimination coefficient: Discrimination coefficient shows the power of the questions in discriminating within the replying individuals [37]. Based on this concept, such questions are appropriate that discriminate amongst the answers with the most highly values, and is used according to the direct relationship of the discrimination coefficient and the Pearson coherence.
- The loop method or the internal consistency factor calculation: In the present study with consideration of the consistency factor equal to 0.744 for the whole examination and the calculated consistency factor for each question, it was designated that with omission of some questions, the consistency factor would be increased to 0.872. Therefore, for in order to increase the accuracy of the means, the weak questions that are not homological to others were omitted and the final questionnaire was performed with 28 items.

D) The final questionnaire: Based on the results gathered from performing the pilot, some of the questions were omitted through performance of statistical analysis (Discrimination coefficient and the loop method which are described as follows) and the final examination was performed amongst the people of interest based on the volume of the sampling

4.5. Measurement tool's validity proof

In the present study, in order to determine the validity of questions, visual validity, contextual validity and structural validity has been utilized:

a) face validity: In order to evaluate the face validity and approving this point that the questions' appearances are

suitable for measuring the conception construction of houses, the experts' opinions were used.

b) Contextual validity: Methods for determining the contextual validity are known as judgmental methods and in them the measurement tool itself is facing trial and judgment. In the present study in order to evaluate the contextual validity and approval on this point that the context of the examination is a good and suitable sample of the target subject, the experts' opinions were used through sending the questions and the goal-context table.

c) Structural validity: In order to determine the structural validity, we must first define the target structure. For evaluating the structural validity, various methods are present from which the factor analyzing method is the most popular kind of structural validity and it has been utilized in the present study which will be discussed as follows.

The selection of respondents from all inhabiting families in the governmental and non-governmental Mehr housings were performed. A number of variables which might affect the concept and rate of economically sufficiency could include the volume or the scale of project, type of housing, the state of being governmental or non-governmental. In order to control the effect of these factors, we have chosen the samples from both governmental and non-governmental (cooperative and private) using the random cluster method. The random cluster method was in this way that amongst 170 governmental units and 40 non-profit units the sampling was performed. Amongst each one of these random samples, the questionnaires were dispersed amongst families which were also chosen as random cluster method.

In times that the researcher would want to summarize from a correlation of a group of variables, their changes in More limited factors or would want to determine the underlying feature of one group of data, uses the factor analysis method. The other absolute application of this factor analysis is that it aids the researcher in organizing or conceptualizing a group of measurements which has been achieved through a research context [38].

Evaluation of suitability of the volume of the selected sample is necessary for performing the factor analysis; due to this matter it is necessary to use the KMO and Burtelt sphericity test. The least acceptable amount for KMO is equal to 0.6 therefore the gathered amount for KMO in the present study which is equal to 0.778 indicates that the sample volume of a number of 310 individuals is suitable for analysis after lowering the samples.

Table 3 KMO and Kroit Burtelt examination (resources: authors)

KMO sampling adequacy		0.778
Kroit Burtelt	Chi square	1922.858
	DF	378
	meaningfulness	P< 0.001

Based on Table 3, in the Bartlett examination null hypothesis according to the amount of chi square (0.778) and DF (378), is denied in 99.9 percent of confirmation. Hence, the basic questions of the questionnaire contains adequate and meaningful correlation for forming the factors and we are allowed to use the factor analysis method. The factor analysis method used in the present study, is the method of primary principles. In the foretold method, factor load (special value of factors) is used to extract factors. With evaluation of special values, it seems that eight factors, due to the factor load larger than 1, are extractable Table 3.

For final extraction of effective factors in the study, consideration of Scree plot chart is also necessary (Chart 1). This chart indicates that the number of appropriate factors for circulation are 8 factors and after the circulation the eight foretold factors with the varimax (orthogonal), the load of 1-8 factors have a more monotonic distribution. Amongst the 8 factors, two were omitted. Although this matter has been confirmed in evaluating the variance amount of each factor after the circulation. The evaluation of variance amount has been emerged, extraction of 6 factors were more appropriate and other factors do not have a significant influence in explaining of it Table 4.

Table 4 Explained variance total before and after circulation (resources: authors)

Factors	Before circulation			After circulation		
	Total	Variance in term of percentage	Cumulative variance in term of percentage	Total	Variance in term of percentage	Cumulative variance in term of percentage
1	6.451	23.040	23.040	3.220	11.501	11.501
2	2.091	7.467	30.507	2.387	8.524	20.025
3	1.993	7.118	37.625	2.159	7.710	27.735
4	1.531	5.466	43.091	2.088	7.456	35.191
5	1.477	5.274	48.365	2.026	7.237	42.428
6	1.313	4.690	53.055	1.778	6.352	48.780
7	1.219	4.355	57.410	1.777	6.346	55.125
8	1.093	3.904	61.314	1.733	6.188	61.314

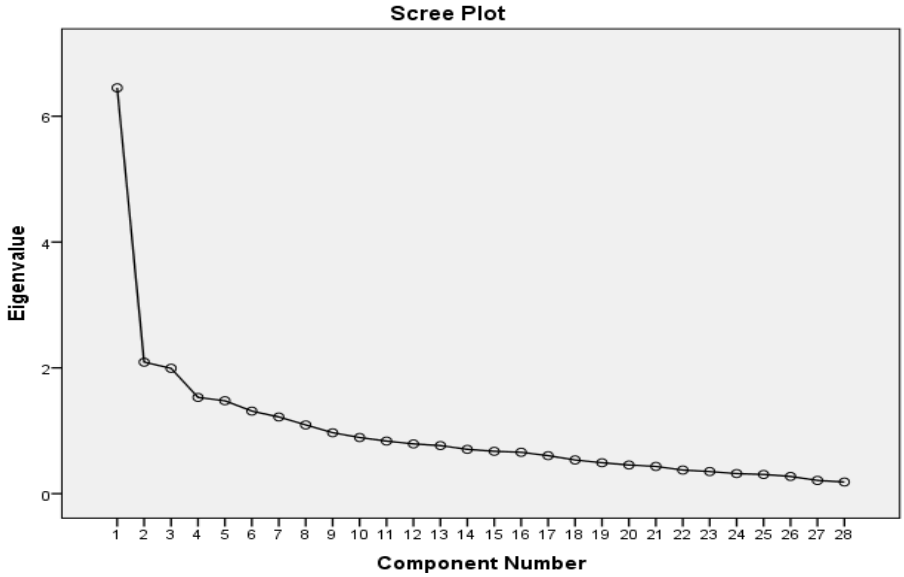

Chart 1. Scree plot (resource: authors)

Table 5 The matrix of 6 extracted factors after circulation (resource: authors)

First factor		Second factor		Third factor		Fourth factor		Fifth factor		Sixth factor	
Item	Factor load	Item	Factor load	Item	Factor load	Item	Factor load	Item	Factor load	Item	Factor load
Q80	0.763	Q51	0.868	Q84	0.774	Q69	0.798	Q55	0.860	Q63	0.849
Q81	0.727	Q52	0.789	Q83	0.750	Q70	0.788	Q56	0.861	Q64	0.840
Q82	0.629	Q50	0.753	Q85	0.592	Q72	0.464	Q54	0.629		
Q79	0.517					Q73	0.381				
Q71	0.50										
Q58	0.498										
Q66	0.461										
Q67	0.399										

Seventh factor		Eight factor	
Item	Factor load	Item	Factor load
Q75	0.714	Q49	0.819
Q74	0.674	Q48	0.760
		Q68	0.464

D) Naming the factors: As it was foretold, each question of the questionnaire in fact is a measurement of belief and opinion of respondents in proportionate to affordability aspects.

With evaluation of the correlation amongst all questions, the answers which are in correlation meaning their changes are in line with them, have been discovered. With this method eventually affordable housing factors were discovered. Each of these factors are defined based on the related questions and for each one of them a proper title was chosen. In order to validate these findings, these titles were sent to experts alongside the related questions and definitions and based on their comments the proper reforms were done. Table 6 shows the related questions for each factors and their selective titles.

Table 6 Related questions and suggested title to factors

	Question Code	Related Questions	
Factor 1	Q80	How satisfied are you with the materials that used inside your residential unit (such as floor, ceiling, etc.)?	0.805
	Q81	Are you satisfied with the materials used in the facade?	
	Q82	Are you satisfied with the accessibility of residential unit to your parking lot?	
	Q79	How secure are you in your complex?	
	Q71	How much do you want to spend all your life in this complex?	
	Q58	Are you satisfied with your parking space?	
	Q66	Are you satisfied with the infrastructure like water, electricity, gas, telephone, etc.?	
	Q67	How satisfied are you with amenities, services and inside the complex?	
Suggested title: Physical comfort			
	Question Code	Related Questions	

Factor 2	Q51	Are disabled facilities (such as ease of access to spaces, etc.) inside the unit?	0.778
	Q52	Are disabled facilities (such as ease of access to spaces, etc.) outdoors?	
	Q50	Are there facilities for the disabled and the elderly in your residential unit and in the complex?	
Suggested title: Elderly and disabled people facilitations			
	Question Code	Related Questions	
Factor 3	Q84	Are you satisfied with the size of your green space (as a private space)?	0.643
	Q83	How much green space is there near your residential unit (as a private yard)?	
	Q85	Are you satisfied with the landscape of your residential unit?	
Suggested title: Green spaces' landscape			
	Question Code	Related Questions	
Factor 4	Q69	Are you satisfied with the number of residential units in your area?	0.655
	Q70	Does the size of your single spaces fit your needs?	
	Q72	Is it possible to change the spaces (room, kitchen, living room, etc.) and the walls of your residential unit?	
	Q73	How much silence and acoustic peace are you in your residential complex?	
Suggested title: Intra-housing characteristics			
	Question Code	Related Questions	
Factor 5	Q55	Are you using the green space for rest, leisure and communication with your neighbors?	0.677
	Q56	Are you satisfied with the space of your child's entertainment and play at the complex?	
	Q54	Are you satisfied with your green space?	
Suggested title: Open spaces efficiency			
	Question Code	Related Questions	
Factor 6	Q49	Are you satisfied with the residence of different social classes (residents of different income) in the complex?	0.557
	Q48	Are you satisfied with the cultural diversity (migration from different cities) in the complex?	
	Q68	How close are you with your neighbors in the complex?	
Suggested title: Social interactions			

4.6. The measurement tool's validity proof

The validity of a tool consists of stability and accuracy of the results gathered from the tool [37]. In simple terms, the meaning of a measurement tool's validity is that if the target characteristic is measured with that same tool (or a similar, comparable tool) in similar circumstances twice, how much the results achieved are similar, accurate, predictable and reliable [39]. Various methods are present for evaluating validity; in the present study the cronbach's alpha method has been used. The least acceptable amount of cronbach's alpha is equal to 0.7, the validity achieved for the questions of this questionnaire is equal to 0.872 that indicates that the researcher based questionnaire has an acceptable and appropriate validity.

4.7. Extracting the affordability criteria

In order to extract the effective factors on the affordable housing, the factor analysis has been utilized. In this regard, a number of 340 researcher based questionnaire was dispersed amongst the residents of the social Mehr housing. The collected data was factor analyzed. The factor analysis Table 5 indicated that the cumulative variance after the circulation is equal 61.31. The concept of this matter is that utilizing the researcher-made tool, it is possible to explain 61.31 percent of the affordable housing aspects which exists in the population of interest's Mehr Housing, and utilizing the achieved 6 factors, 48.6 percent of it is explainable. These factors are as follows:

- Physical comfort: The physical comfort factor with the variance equal to 0.115 has the most variance. This manner represents its high explanatory power (11.5%) and the respondents had the most agreement in common understanding of this factor. This factor is the first determinative factor of the state of being affordability of residential complexes. The definition of physical comfort could be presented in this manner: this factor is the result of the designing of the structure aspects which includes satisfaction from the materials used in internal and external facade of the residential units, satisfaction from accessibility to parking and feeling secure in the complex, and also achieving to sustainability aspects meaning the desire to continuity of life in the complex. In order to achieve the physical comfort is necessary that accessibility to facilities including amenities, services and infrastructural resources should also be provided. These three aspects of structural designing, sustainability, and accessibility to resources, would form the physical comfort in affordable complexes.

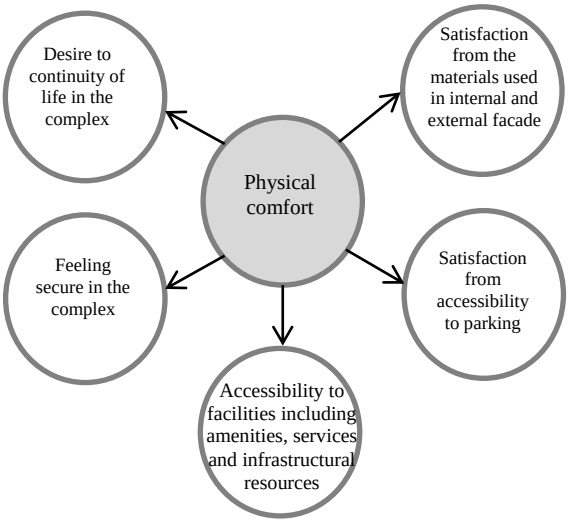

Fig. 2 Display of the first factor

- Elderly and disabled people facilitations: The elderly and disabled people facilitations factor based on table No.4 with the variance equal to 0.085 is the second most effective factor on affordability of houses that 8.5% of affordable housing aspects are explained with this factor. This factor could be defined as this manner: One of the aspects of affordable housing aspects, is to provide facilitations for elderly and disabled people. This factor could be provided based on the designing aspect that includes appropriate interior design of residential units and open areas. Therefore, in order to achieve the affordable housing, creation of these facilitations in open and closed areas is necessary.

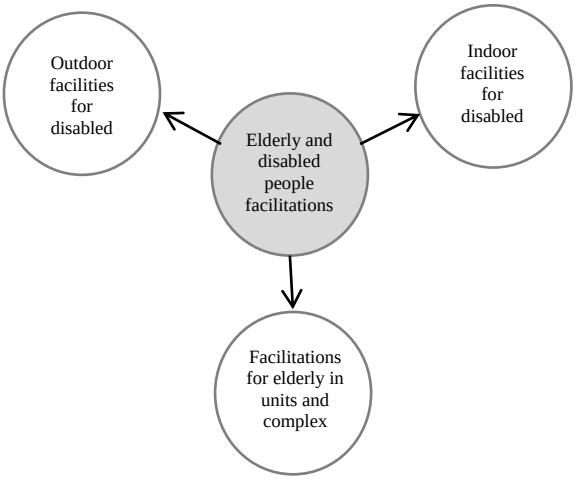

Fig. 3 Display of the second factor

- Green spaces' landscape: The green spaces' landscape based on Table 4 has a variance equal to 0.077 and 7.7% of affordable housing aspect is explained by this factor. The definition of this factor consists of: This factor stems from the dimensions of private green spaces and satisfactory from it and also the satisfaction from the residential unit's landscape that are related to designing aspects. Therefor public and private green space's designing aspect, would provide the land scape factor in affordable residential complexes.

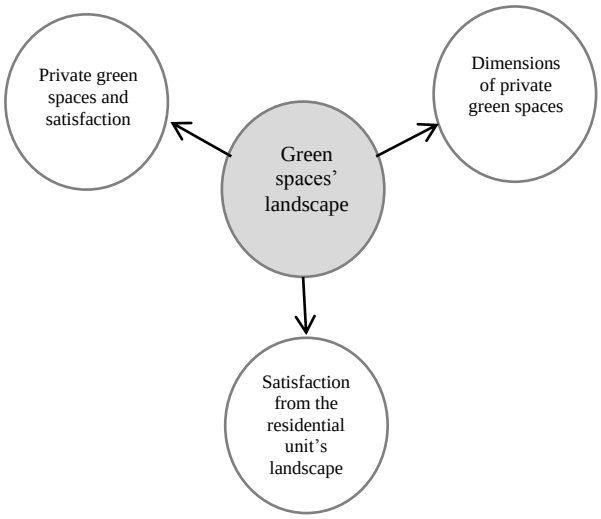

Fig. 4 Display of the third factor

- Intra-housing characteristics: The intra-housing characteristics' factor based on Table 4 has a variance equal to 0.074 and 7.4% of the affordable housings' aspects is explained with this factor. This factor is defined as follows: This factor is achieved through physical designing aspects that includes rooms and the size of the housing units, silence and audio peace of the complex and also the sustainability aspects including interior spaces' flexibility. The two physical designing and sustainability aspects are the formers of the intra-housing characteristics in affordable housing complexes.

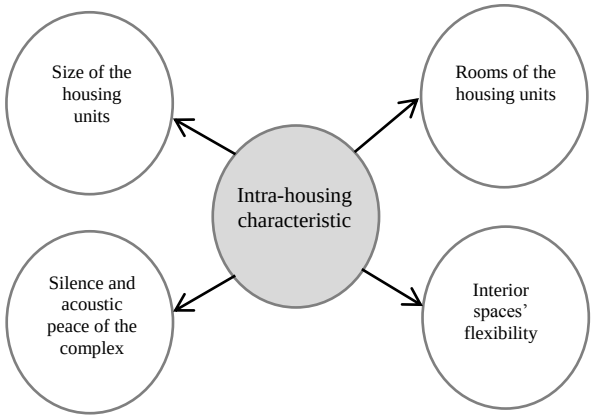

Fig. 5 Display of the forth factor

- Open spaces efficiency: The open spaces efficiency factor based on Table 4 has a variance equal to 0.072 and 7.2% of the affordable housing aspects is explained with this factor. The definition of this factor consists of: The open spaces efficiency factor is provided, according to the social aspect which includes the green spaces size in the complex and the satisfaction from it and satisfaction from the children's playground. Therefore, in order to achieve an affordable complex, the social aspect of open areas of the complex should be considered.

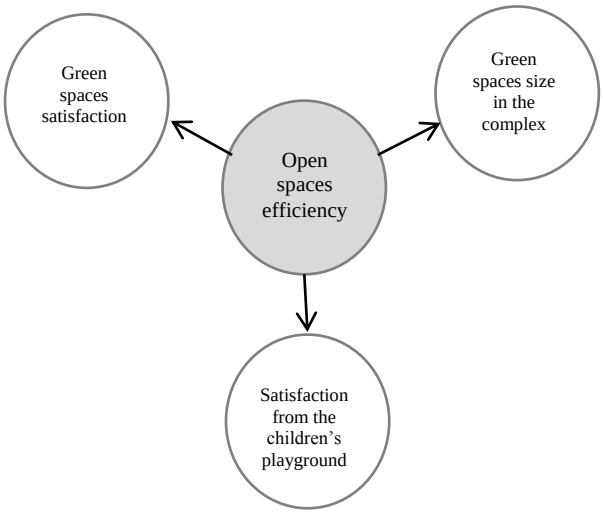

Fig. 6 Display of the fifth factor

- Social interactions: The social interaction factor based on Table 4 has a variance equal to 0.061 and 6.1% of the affordable housing aspects is explained with this factor. The definition of this factor consists of: Social interaction that is one of the aspects of the state of being affordable houses is achieved through providing the satisfaction of residents of different social-economical levels in the complex and the rate of their relation with the neighbors. The social aspect that includes inhabitant of different social levels and neighbor affairs, forms the social interactions in the affordable housing.

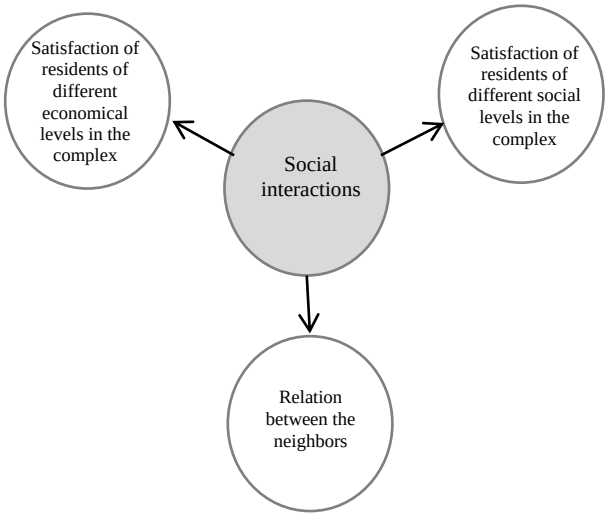

Fig. 7 Display of the sixth factor

4.8. Prioritizing the criteria in order to qualify social housing

In regard to qualify the social housing in Iran the necessity is to evaluate he effective factors on this matter and eliminate the related problems to each one of these factors. In this manner first, the effective factors on social housings' affordability (based on the Babolsar's Mehr housing inhabitants) have been graded based on the order of acquiring the most influence in physical comfort in affordable housing. In order to perform such act, the regression analysis was used. In the manner of identifying the most important factors that are effective on affordability of social housings, the regression analysis has been used. In this manner, first we must define the dependent and independent variable. Based on the factor analysis taken place, the physical comfort with the variance equal to 0.115 is the most effective factor on affordability of housing that has been selected as the independent variable. The other 5 factors have also been considered as the title of independent variable.

Table 7 and 8 show the correlation coefficients and the other information achieved from the multivariate regression calculation in order to anticipate the dependent variable of physical comfort that the following results can be concluded from it:

1. Amongst the total of the 28 items inserted into the equation, the 5 variables of elderly and disabled people's facilitation, green spaces landscape, intra housing characteristics, outdoors efficiency, and social interaction has shown a meaningful relationship with the dependent variable (sig=0.000)
2. The multivariate correlation coefficient (0.673) indicates the strong correlation amongst the present variables in the regression equation Table 2.
3. Judgment about the share of each of the quintet variables in explanation of the dependent variable should be conceded to the numbers of the Betas. Because these numbers were standardized and provides the possibility of comparison and determination of the relative contribution of each of the variables. According to Betas achieved Table 8, the intra housing characteristics variable has the most powerful relationship with physical comfort and explains about 42.8 percent of the changes of physical comfort singly, after that, the other variables are places that are arranged in order of effectiveness as follows: elderly and disabled individuals facilitations, green spaces landscape, open spaces efficiency and social interactions that have less roles in anticipating physical comfort rather than other variables.

Table 7 Model summary and data regression analysis ANOVA table

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
11	.673[a]	.453	.439	3.59606

a. Predictors: (Constant), f6, f4, f3, f2, f5

ANOVA[a]						
	Model	Sum of Squares	DF	Mean Square	F	Sig.
1	Regression	2182.447	5	436.489	33.754	.000[b]
	Residual	2638.053	204	12.932		
	Total	4820.500	209			

a. Dependent Variable: f1
b. Predictors: (Constant), f6, f4, f3, f2, f5

Table 8 Beta coefficient and the order of effective factors on physical comfort (in order for affordability of housings)

Coefficients[a]						
Prioritizing the Factors	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	2.252	1.363		1.652	.100
1	Intra housing characteristics	.850	.109	.428	7.780	.000
2	Elderly and disabled people facilitations	.614	.161	.209	3.823	.000
3	Green spaces' landscape	.450	.146	.173	3.085	.002
4	Open spaces efficiency	.426	.165	.147	2.576	.011
5	Social interactions	.196	.145	.073	1.351	.178

a. Dependent Variable: physical comfort

5. DISCUSSION AND CONCLUSION

The low income supportive housing is one of the important problems in developing countries that from one side insufficiency in infrastructures and their planning and from the other side the accelerated growth of urban inhabitation, has encountered the quality of shelter with difficulties. The Mehr housing that is also a kind of social housing in our country is not an exception in this issue. One of the means for evaluating the level of quality of social housings around the globe is affordability criteria. These criteria should be designed and places in proportionate to economic, social and structural characteristics of each area and because not such device was discovered in Iran, therefore the necessity of creating of the tool for evaluating the level affordability of housing in proportionate to the area was present. In order to perform such act, through analyzing the context of performed studies in various countries, the goal- context table including affordability criteria has been conducted and its stability and validity has been proved. In the next stage, in order to receive that which one of these indicators is as the determinative indicator in Mehr housings' inhabitants' opinion, utilizing the tool created, a number of 340 questionnaires was dispersed into hands of the population under study of the Mehr housings of Babolsar: with factor analysis of questionnaires, 6 effective factors of economically sufficiency of housing were discovered by the inhabitants of these houses. These factors in the order of prioritization are as follows: Physical comfort, Elderly and Disabled individuals' facilitations, Green spaces landscape, Intra-housing characteristics, Open spaces efficiency, and Social interactions. Amongst the 6 factors discovered, the physical comfort with the variance equal to 0.115 has the most power in explaining the level of affordability and is placed in the first rank rather than others. Hence, the physical comfort factor is considered as the prior (dependent) variable and using the multivariable regression, the rate of its correlation with the other five factors (as the anticipating or independent variables) has been evaluated. The intra-housing characteristics with the Beta coefficient equal to 0.428 have the strongest role in establishment of physical comfort. The effect of other factors on physical comfort in order of correlation is as follows: Elderly and disabled facilitation, Green spaces landscape, Open spaces efficiency, and Social interactions.

The present researcher-built tool that acquires an acceptable sustainability and validity, could be places as a criterion in order to evaluate the present Mehr housings and promoting the new policies and planning of housing and eventually qualifying housing and the life of its inhabitants. According to the opinion of the inhabitants of Mehr housing in Babolsar, the most important criterion in affordability of housing is possessing physical comfort. Therefore, in order to qualify the residential projects, a deep concentration to this criterion is necessary. The resulted physical comfort aspect of structural design that includes satisfaction form the material used in the internal and external views of the structure, satisfaction from accessibility to parking and feeling secure in the complex, and also accessibility to sustainability aspects meaning the desire to life continuum in the complex. In order to achieve the physical comfort, it is also necessary to provide the accessibility to facilities such as amenities, services and infrastructure resources. The most influencing factor on physical comfort in comparison to the analysis performed. Are the intra-housing characteristics. This factor is achieved through physical designing aspects that

includes the number of rooms and the unit's measures, silence and sound serenity of the complex and also sustainability aspects including interior spaces flexibility. Therefor in order to possess such qualified house it is necessary to use these approaching items with special consideration.

It is recommended that in the following researches, the conducted questionnaire be also performed in other Mehr housings in other areas in order to extract the affordability criteria in a more vast scale.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

NOTE

1. Area median income

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AUTHOR (S) BIOSKETCHES

Ramezanpour, M., *MA Student, School of Architectural Engineering, Golestan University, Golestan, Iran*
Email*: A.nourtaghani@gu.ac.ir*

Nourtaghani, A., *Assistant Professor, School of Architectural Engineering, Golestan University, Golestan, Iran*
Email: *M.ramzanpour90@gmail.com*

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