Journal of Civil Aspects and Structural Engineering

www.case.reapress.com

J. Civ. Asp. Struct. Eng. Vol. 2, No. 1 (2025) 76–90.

Paper Type: Original Article

Designing a Flexible Residential Complex to Suit Lifestyles in Temperate and Humid Climates

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Citation:

Received: 12 July 2024 *Revised: 22 August 2024* *Accepted: 20 December 2024*	Amirnia, S. (2025). Designing a flexible residential complex to suit lifestyles in temperate and humid climates. *Journal of civil aspects and structural engineering*, 2(1), 76-90.

Abstract

Changeable housing is an institution created in line with a series of purposes, which have emerged in accordance with the countless needs of humans. If housing is to be responsive to the needs of the user, housing architecture must also adapt to new and changing needs, given the variability of some needs. One of the concepts related to human life that has received much attention today is the concept of quality. Housing is also one of the categories that quality is essential to improve living conditions. Quality of life can be interpreted as satisfaction with life and the living environment. The quality of space and user satisfaction depend on the needs and desires of users, on the one hand, and the other hand, on the characteristics of the environment. In order to respond to the needs and desires of users, in addition to meeting basic needs, it is also important to meet their psychological needs. These needs include the concepts of privacy, territory, and personal space on the one hand and are related to the behavioral patterns, culture, and lifestyle of users on the other. In relation to improving the characteristics of the environment as another element affecting the quality of space, the design of spaces must be in accordance with the expected performance and with regard to the aesthetic characteristics in housing design. Since the needs and desires -both basic and psychological- of users are constantly changing during their stay in housing, housing can still have the desired quality if it can meet new needs. This requires that spaces have sufficient variability to meet the changing needs of users. In this research, an attempt has been made to produce and process data qualitatively in two parts through a descriptive-analytical structure and a documentary method.

Keywords: Variable housing, Lifestyle, Temperate and humid climate.

1 | Introduction

Housing, as one of the real phenomena, is one of the first issues that humankind has always struggled with and has always been trying to change and find a suitable, reasonable, and harmonious answer to its different needs in order to increase the desirability of housing. In general, the housing category is a very broad and

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10.48314/jcase.v2i1.53

complex concept composed of various dimensions [1]. Therefore, it is impossible to provide a comprehensive and barrier-free definition. Housing, as a physical place, is considered the primary and basic shelter of every family, in which some of the basic needs of the family or individual, such as sleep, rest, protection from weather conditions, etc., are provided.

The housing issue is one of the most important and central issues considered in our country today due to the increasing need for it, and the government's most significant effort is in the direction of issues related to housing and residence. This is even though no specific and definite solution has been given so far, and every day, they try to solve the housing problem by resorting to maps and programs without a logical and specific strategy [2].

Perhaps one of the reasons for the lack of satisfaction with housing in Iran is the lack of recognition of the changes that have occurred over time, consequently affecting the housing issue. These changes include a wide range of factors, generally called economic, cultural, and social changes, which are somehow effective in the housing issue. Perhaps if the housing issue in Iran was pursued radically and the solutions to respond to it were not short-term, sectional, and ad hoc, and although the basis of decisions in this matter was not only based on the experiences of other countries but were made with the support of rich Iranian architecture, this issue would not have emerged in this way today.

One of the issues that Iranian housing architecture paid attention to in the past and was used in the construction of buildings to maximize the efficiency of housing was the principle of "Changeability," which, while meeting the needs of residents, also met some of their future needs in proportion to changes in their living conditions. In addition to the advantages listed, it also ensured the sustainability of the social base of housing [3]. This principle was fundamental in Iranian architecture in the past, and traditional housing, by utilizing it, solved problems that have become a problem for today's society in terms of housing. On the other hand, climate change is one of the world's biggest challenges today.

The industrial revolution and rapid technological advances have paved the way for the excessive use of non-renewable energy sources and fossil fuels, resulting in energy crises, air pollution, global warming, etc. This led to the concept of sustainability in using existing valuable resources and reserves so that future generations can also have a share in using them to the same extent. Current buildings and constructions have allocated much energy consumption to the implementation, construction, and operation stages. According to statistics, the housing sector consumes between 37 and 45 percent of the country's total energy. As one of the first decision-makers in this field, architects can play a very effective role in reducing this statistic and forming more sustainable architecture by presenting efficient and optimal designs [4].

Research on variability has been conducted in Iran and the West, which have different results and goals separately; this method of design, in the modern era and the early twentieth century, was started by Mies van Droege [5] with the definition of a model of the structure that was an open design with an arbitrary definition of the internal walls, and also by Haberkan for the reasons of providing structural needs as well as changes in thinking and pure humanism by identifying superficial physical and spiritual demands. Haberkan has mentioned this in his book called "Varieties in House Building," which was first translated in 1988; in short, he has defined the concept of variability as the ability of the building to physically change and adapt to new types according to changing conditions, and he knows variability. People like Schneider and Thiel are also pioneers in this field, and their books and articles titled "Flexible Housing: Opportunities and Limits" have referred to determining functional areas in homes with change capabilities and determining limited places for change [6].

Bentley et al., in their book Responsive Environments, translated by Behzadfar [7], have examined variability and adaptability in urban collective environments and have considered micro and macro scales in this design to design residential complexes. Also, one of the important sources of this research is John Lang's book "The creation of architectural theory" [8], which discusses the variability and adaptability of any environment with respect to human behavior and how designers apply it. Gürbüztürk [9], Akinbolu [10], and Danko [11] are

among the theses that have examined the issues of flexibility and adaptability in housing in countries around the world and have conducted review studies on this subject, which include, respectively, the study of housing in Turkey, the relationship between performance and adaptability of housing in Ghana, and suitable housing for adaptation.

Of course, these studies do not have new outputs. Variable architecture in traditional Iranian buildings has also mainly existed due to implementation limitations. A research project on variability in traditional Iranian housing design was conducted under the supervision of Ain Yafar at the University of Tehran with the output of the article A model for analyzing variability in traditional Iranian housing [12]. It has mentioned adaptable, versatile, and variable patterns in traditional Iranian housing, which is considered one of the essential sources of this research. Mohtasham and Hamzenjad have proposed in two studies in 2015 and 2016 that a correct understanding of the dimensions of privacy in housing limits the permission for changes in internal spaces [13], [14]. By applying privacy, the options selected will not be as many as Western examples in plan changes. Zandiyeh and his colleagues also conducted a comparative study of the strategic system of variable housing design in the West and Iran, and the essential difference between the two is the category of privacy, which the use of Western design structures in the Iranian context has ignored [15]. This issue has caused a change in the lifestyle of Iranians in imitation of Western architectural styles, without knowing such a capability in Iranian architecture; by understanding this issue, we can consider this social dimension of housing (Privacy) in the variable complex to witness the greatest richness of this concept in the body of Iranian architecture.

2 | Research Method

Various methods are used in each research, with the subject and scope of the study and the factors affecting it. In this thesis, data production and processing are qualitatively addressed in two parts through a descriptive-analytical structure and a documentary method to achieve the goals mentioned earlier. The first part explains variability, its history and types, and how it affects housing quality. In the second part, site climate studies are designed. Climatic solutions are examined to design in harmony with the climate, as well as research analysis using SPSS software, and how this effect and the importance and priority of each factor will be determined according to the users' opinions, in accordance with the personality, culture, and personal experiences of individuals. In this way, a plan can be presented that is appropriate to the users' culture, needs, and mental background in a way that a logical connection with the place is obtained. The basis of the design phase is the selection of practical solutions for flexible housing in Iran while considering the climatic conditions of the design site and energy-efficient climate solutions, and the proposed design is presented. Also, after introducing the solutions and criteria for flexible design, the common housing pattern of Abbas Abad, Mazandaran is extracted by adding field studies, and the necessary solutions and implementation details for designing a common flexible housing pattern are presented.

2.1 | Research Process

The term process in common sense refers to a set of steps and stages that the researcher must take one after the other to reach the answer and solution to reach the right answer or solution [16]. In the field of determining the relationship between effective factors and research objectives, the present research is of a theoretical and practical nature. It aims to identify the principles and effective factors in the conceptual link between architecture and changeability. The content analysis method was also used.

The use of new tools and techniques has an inherent risk. In many cases, using new tools and techniques without knowing the people for whom the design is to be made is like giving a knife to a child without familiarizing him with the dangers. This is an example of designers and architects who design for their employer without knowing. Appropriate design requires research based on the needs of the employer and the user. The research process is written in the following order [17].

Table 1. Research process [18].

The process of conducting research Introduction	Question Notes
Suggesting time for each task	Recording topics of interest
Research system	Reviewing available resources
Discovering and selecting a topic	Writing a proposal
Relating to sources with research topic	Guide to writing a research proposal
Scope review	Defending a proposal
Browsing different topics	

2.2 | Information Collection Method

Collecting the required information is one of the basic stages of research, and because of its importance, information collection methods are sometimes mistakenly called research methods. The information collection stage begins the process, during which the researcher collects field and library findings, then categorizes and analyzes them and evaluates his formulated hypotheses. Information collection methods can generally be divided into two categories. Library methods and field methods. Library methods are used in all scientific research. Still, in some of them, this method is used in part of the research process, and in some of them, the subject of research is essentially a library in terms of method and relies on library research findings from beginning to end.

2.3 | Residential Complex Design Standards

Public spaces are parts of the built environment that occupy the volume between the built body. They can be composed of natural or artificial elements and have a beautiful, attractive, and pleasant landscape. These spaces attract people and create a sense of belonging and vitality in the environment. Public spaces can respond to the basic needs of their users and play an essential role in creating a desirable residential environment. Since design often focuses solely on creating volumes without considering the range of collective activities of residents, public open spaces are empty of activity and have become the remnants of built areas. Most public spaces do not satisfy residents and create unsafe and unpleasant environments for them [19]. Since the place of activity is a public space, it is possible to create desirable spaces to enable the emergence of more diverse activities that lead to the vitality of the residential environment.

Public open spaces are designed to meet the needs of residents or users of them; therefore, in the first stage, the needs of individuals in these spaces are studied. After examining the activities in public spaces, the place and space of these activities are discussed, and the basics of planning and designing public spaces are explained. The effect of the design of residential complexes on operation management In recent years, the demand for residence in large residential complexes has increased; the speed of this increase varies depending on the size of the city and its population growth rate. In small and medium-sized cities, most residential complexes are located around cities. These complexes, which are often designed based on the criteria and studies of preparatory plans, include a large number of residential units constructed in the form of 3 to 5 story building blocks on a large plot of land (observing certain distances from each other). In these lands, despite residential complexes, the buildings are low-rise, and the economics of the land do not justify the construction of high-rise buildings [20]. On the other hand, in large cities, the term residential complex conjures up tall, multi-unit buildings and the high value of the land has made the construction of short, low-rise buildings uneconomical and unprofitable.

The economic power of the household, culture, construction management, and operation management effectively encourage households to live in residential complexes. The share of different income groups and social classes in residential complexes is not the same. While in big cities, 10 percent of the residents of these complexes are wealthy families. In small and medium-sized cities, no wealthy family lives in an apartment. Of course, it should not be forgotten that in these cities, no low-income family lives in a housing complex. These

families have chosen to live in small single-unit housing on the outskirts or cheap areas of the city. Living in housing complexes is specific to middle-income groups, which has its strengths and weaknesses in different cities. Apartment living in the country did not arise all at once, but the need for housing and land limitations have forced cities and citizens to follow this path and have added the terms apartment living culture and apartment management, etc., to the neighborhood dictionary. Various and numerous factors cause apartment living problems and disputes between neighbors. The lack of agreement among residents on how to use the common areas, the existence of tastes, cultures, and tangible social differences among residents, the absence of written rules and regulations for the design, construction, and operation of these complexes, the lack of attention by residents to respecting the rights of their neighbors, and the lack of obligation on them to compensate for potential damages they cause, are among the factors that have made living in these complexes difficult [21].

2.4 | Convergent and Divergent Spaces

I. Spaces whose main function is such that they may cause divergence and dispersion among residents and whose main function is to give independence to units or to define and facilitate spatial orders of transition from public to private, as well as elements whose separation is mandatory for each unit.

II. Spaces that cause convergence are effective in aligning the relationships of units and increasing the good neighborliness of residents of neighboring units, or they contain elements and activities that require the participation of residents in its exploitation [22].

2.5 | Residential Site Design

The main stages of designing a residential site One of the important and effective factors in the shape and design of each site is a correct and complete understanding of the needs and precise desires of the people for whom the design is prepared. Of course, the nature of the plan changes depending on factors such as whether the development is private or public sector, the income levels of the residents, and the possibility of development (depending on whether it is located in the central area, on the outskirts of the city, or in the countryside). Although each site requires a specific approach based on its specific characteristics, it is possible to search for general elements and principles that are common to all cases and to examine their most important ones [23].

Within the framework of the staged process of site design, the stages of designing a residential site can be rearranged in detail as follows:

- *Setting physical design goals and policies.*
- *Determining spaces.*
- *Required applications on the site.*
- *Determining spatial dimensions.*
- *Deciding on the ratio between residential units with different dimensions.*
- *Determining residential density standards.*
- *Categorizing the design of an entire residential neighborhood.*
- *Categorizing the design of a neighborhood unit.*
- *Categorizing the design of an urban block.*
- *Categorizing the design of a dead end.*
- *Categorizing the way buildings are connected.*

2.6 | Criteria for Designing a Residential Complex

I. The total area of the total infrastructure of the residential units is a maximum equivalent of 120% of the land area allowed. Each residential unit's gross land area per capita is at least 100 square meters.

II. The area of the smallest residential unit should not be less than 80 square meters.

III. The maximum permitted occupancy area on the ground floor is 35% of the total land area. The surfaces of the security infrastructure, greenhouse, shower and locker rooms, sanitary services, swimming pool, and indoor recreational space for children are not responsible for the above area.

IV. Construction of car parking spaces in a number equivalent to at least 75% of the number of residential units is mandatory.

V. The minimum net parking area for each car is 12.5 square meters.

VI. The minimum width of access passages to parking spaces should be 5.5 meters.

VII. The total occupied surfaces of the infrastructure of residential buildings on the ground floor plus the occupied surfaces of the car paths and parking lots, in conditions where parking lots are planned in the open area, should not exceed 60 percent of the total land area [22].

2.7 | General Principles of Design of Neighborhood Units (Light and Privacy)

As a general rule, a design that attempts to align the fronts of residential buildings in an approximate north-south direction is more suitable than one that is oriented east-west: This way, both the front and back of the buildings receive light, one in the morning and the other in the afternoon and evening. The orientation of buildings in terms of light becomes important in the location of high-rise buildings and high-density developments because, in these cases, the terraced blocks usually have only one central corridor, and each unit can have only one front-facing light [23].

In general, the daylight and sunlight that a unit receives are affected by the space and distance between the buildings: Full light is possible when there is a line of sight with an angle of 25 degrees from the horizon. The required space between buildings so that sufficient daylight is provided [20].

Observing the privacy distance is one of the important principles of urban design. About 21.5 meters is the minimum acceptable distance for window-to-window privacy. This distance is also acceptable for passages or private open spaces where pedestrians on the side of the building in question have a blurred view of the windows of higher floors and for pedestrians who walk on the opposite side of the building in question, who, despite having a more direct view, are about 13-14 meters away. Privacy distance: The minimum acceptable privacy distance from window to window is 21 meters. If there is no public passageway between residential buildings, the most appropriate distance between two buildings is at least 21.0 meters. The distance of 0.21 meters, which is considered the appropriate distance between buildings, is the distance at which the human body shape becomes blurred and human actions become unrecognizable. Therefore, it is the distance at which personal privacy is maintained. Privacy distance: A person at the far end of the private open space of each plot should be at least 10.5-11 meters away from the opposite building. If possible, a distance of 18 meters should be considered from the window of each building to the boundary wall of the plots.

Privacy distance: A person at the far end of the private open space of each plot can be at a desirable distance of 18 meters from the opposite building. If the length of the sections is short, design innovations can compensate for the lack of distance to some extent, such as the windows of the upper floors of the units being higher than the eye line in a standing position and the fence separating the sections being higher than the average human height. Installing doors and windows that open towards the passage and exceeding the facade level when opened is prohibited. Draining rainwater into the sidewalk is prohibited, and it must pass below the sidewalk level. Installing a steam pipe on the exterior wall overlooking the passage or its exit from the wall is prohibited. It is prohibited to install stairs in front of the extension of buildings unless this is required due to a change in the street level and with the municipality's approval. In streets longer than 8 meters, the number of overhangs is 1.2 of the sidewalk width and a maximum of 1.20 meters, and the height is not less than 3 meters. The console at a height of 2.4 meters, such as a pilot, should not exceed 1.3 of the sidewalk width and a maximum of 60 meters from the sidewalk floor. The sidewalk is 1/6 of the width of the

street. The staircase console can only be at a height of 20/2 or 2/40 from the floor and has a maximum overhang of 70 cm and a width of 3 meters. The consoles constructed on the street are not part of the building density. If the terrace is open on both sides, half of its area is considered part of the floor area. If the terrace is closed on both sides, 2/3 of its area is part of the floor area [20].

If the terrace is closed on all sides by a wall or glass, it is completely part of the infrastructure area. Observing the height limit of buildings on streets with a width of 30 meters or more, up to 30 meters in height, do not need to observe the limit. The height of buildings on streets with a width of less than 30 meters should not exceed the width of the street. If exceeded, it must retreat by the same amount: 45-degree view. The height of buildings with two or more spans with passages less than 30 meters is allowed in the passage to the height of the pilot + two floors, and from the third floor, it must retreat by 3.5 meters from the passage. According to the regulations, the length of the passage that has increased should increase the height, and if the height exceeds 32 meters again, it must retreat 4 meters for each floor. If the width of the street is between 12 and 30 meters, there is no height limit. If the width of the street is between 7 and 12 meters, the height of each additional floor must be 4 meters.

Parking The number of parking spaces required will be 70 percent of the number of permitted units. The parking ramp is foreseen in the open space of the building and is not part of the infrastructure level. The maximum parking height is 2.04, and the minimum entrance height is 1.80 meters. Underground parking must have direct access to the floors. Ramp slope 17% (Maximum) Parking space for each car 2.5 x 5.00 plus adequate space for inbound and outbound movement (Standard) Minimum ramp width for residential parking access 2.5 meters and 3.5 meters for commercial parking. In parking, the distance between the axes of the columns on the ground floor or basement is at least 5.5 meters. One parking space is required for every two residential units. In the case of a garage, a minimum of 16 square meters of parking space is required, and two garages are required for each plate. In 4-unit apartments, two parking spaces are required (One for each of the two units). One parking space is required for each additional unit, and the area of each parking space should be at least 25 square meters. Construction regulations for residential complexes [19].

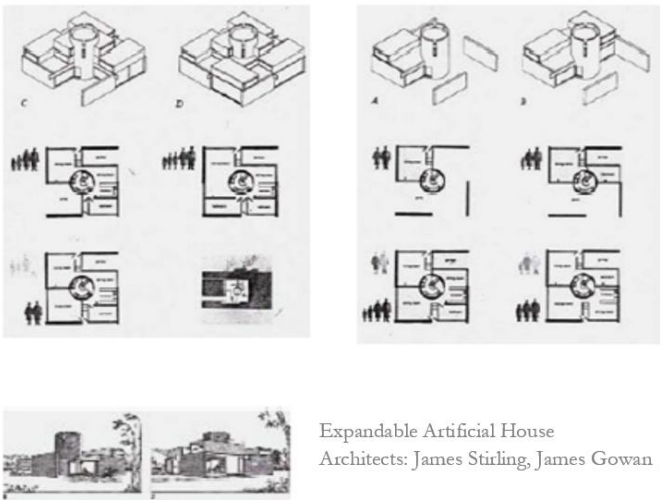

Fig. 1. Example of house expansion and development.

3|Findings

3.1|Descriptive Indicators

Descriptive indicators indicate the mean, variance, and standard deviation of age and work experience, as well as their frequency and percentage of frequency. In this section, descriptive indicators of variables and descriptive indicators related to questionnaire responses and the frequency distribution of respondents' opinions about the variables of the research model are presented using SPSS software.

3.2 | Descriptive Indicators Related to the Demographics of Respondents

Gender

The distribution of respondents in terms of gender is according to the following table and graph:

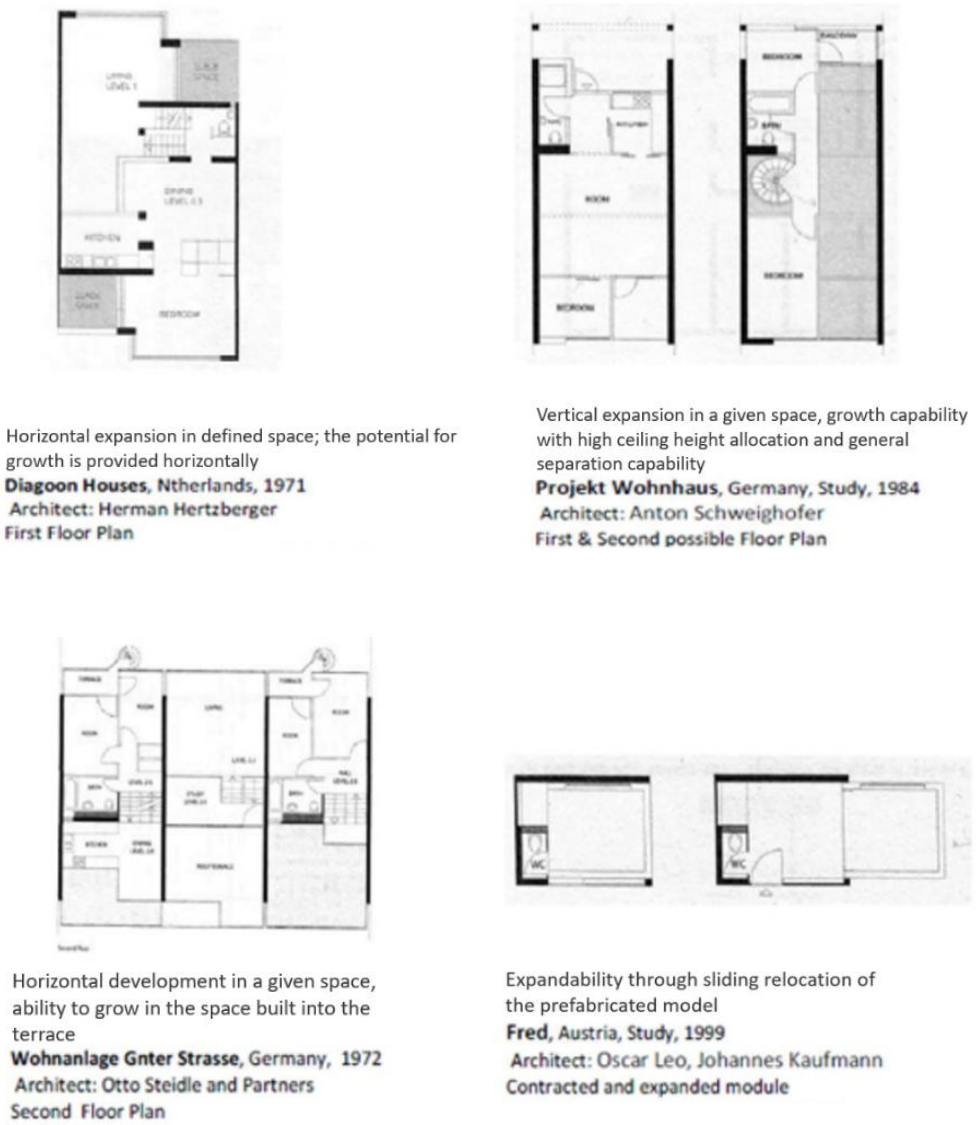

Fig. 2. Horizontal expansion.

Table 2. Number and percentage of respondents by gender.

Abundance / Gender	Number	Percentage	Cumulative percentage
Male	44	%74	%74
Female	15	%26	%100
Total	59	%100	-

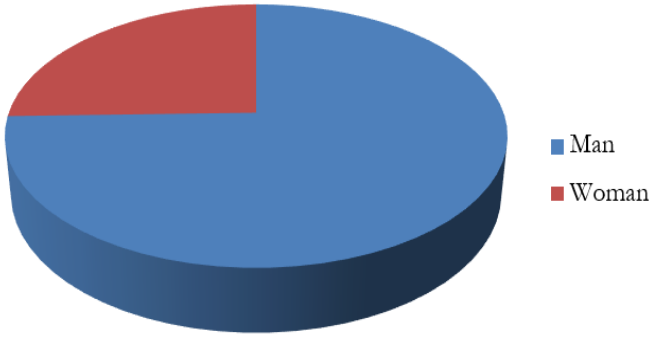

Fig. 3. Number and percentage of respondents by gender.

Based on the information obtained from the questionnaire, 44 people, equivalent to 74 percent of the total respondents, are men, and 15 people, equivalent to 26 percent, are women.

Age

The table and graph below show the distribution of respondents in terms of age.

Table 3. Number and percentage of respondents by age.

Abundance / Age	Number	Percentage	Cumulative percentage
Less than 25 years	2	%3	%3
20 to 30 years	5	%9	%12
30 to 40 years	15	%25	%37
Between 40 and 50 years	25	%43	%80
More than 50 years	12	%20	%100
Total	59	%100	%-

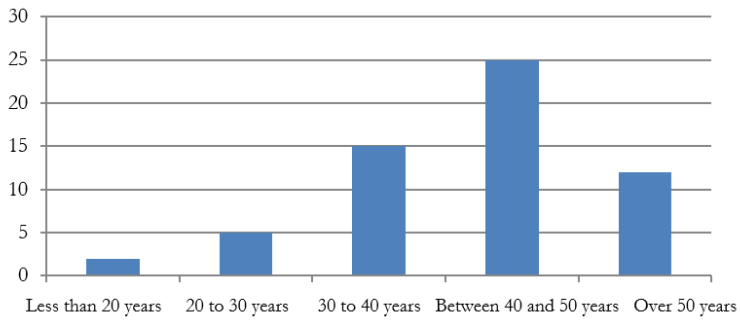

Fig. 4. Number and percentage of respondents by age.

As the tables show, most of the respondents are in the age group of 40 to 50, which is equivalent to 43% of the total people. Also, the lowest frequency is related to people in the age group of less than 25 years.

Education

Table 4- Number and percentage of respondents by education level.

Abundance / Educational level	Number	Percentage	Cumulative percentage
Bachelor's Degree	12	%20	%20
Master's Degree	29	%31	%69
Doctorate and Above	18	%49	%100
Total	59	%100	-

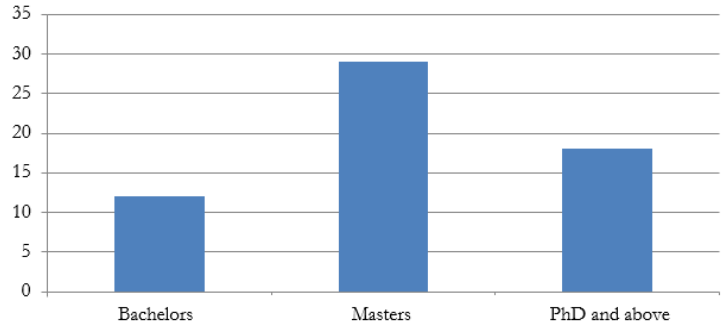

Fig. 5. Number and percentage of respondents by literacy level.

Statistics show that most people have a master's degree, with about 49 percent of all respondents having a master's degree. The lowest frequency is for people with a bachelor's degree. These people make up about 20 percent of all people. Also, 31 percent have a doctorate or higher.

Work experience

The table and figure below show the distribution of respondents in terms of work experience.

Table 5. Number and percentage of respondents by work experience.

Abundance / Age	Number	Percentage	Cumulative Percentage
Less than 5 years	6	%11	%11
5 to 10 years	10	%17	%28
Between 10 and 15 years	28	%47	%75
More than 15 years	15	%25	%100
Total	59	%100	-

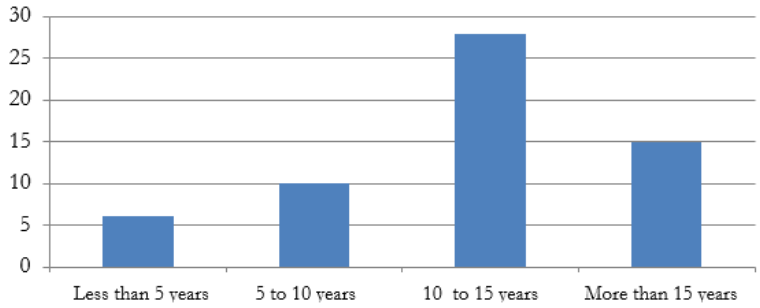

Fig. 6. Number and percentage of respondents by work experience.

The tables show that most respondents have 10 to 15 years of work experience. Also, the lowest frequency is for people with less than 5 years of work experience.

3.3 | Inferential Statistics

3.3.1 | Test for normality of factor distribution

The Kolmogorov-Smirnov test is used to check the normality of the data. The null hypothesis in this test states that the data has a normal distribution. Statistically, we have:

H_0. H_0: $\beta i = 0$.

H_1. H_1: $\beta i \neq 0$.

In this test, if the significance level is less than 0.05, zero is rejected, and hypothesis one is accepted if the significance level is greater than 0.05. The results of the factor normality test are given in *Table 6*.

Table 6- Kolmogorov-Smirnov test results.

Tests of Normality				Test result
Variables	Kolmogorov-Smirnov[a]			
	Statistic	Df	Sig.	
Economic factors (Financial and credit)	0/178	59	0/125	The distribution is normal
Political factors	0/205	59	0/085	The distribution is normal
Executive factors (Structural and institutional)	0/208	59	0/213	The distribution is normal
Cultural and social factors	0/163	59	0/210	The distribution is normal
Environmental factors and conditions	0/204	59	0/095	The distribution is normal
Legal and regulatory factors	0/204	59	0/095	The distribution is normal

Given that the significance level of the data is greater than 0.05, the null hypothesis is confirmed, and the first hypothesis is rejected. The results show that the data have a normal distribution; in other words, the distribution of the desired sample is normal, and parametric tests are used to test the hypotheses.

3.4 | Regression Analysis

We use multiple regression to examine the simultaneous effect of independent variables on the dependent variable and also to determine the extent of the effect of independent variables on the dependent variable. In this study, multiple regression is used to measure the extent of the effect of obstacles to the implementation of employment programs during the fourth and fifth national development plans and the simultaneous effect of these factors. This test shows whether changes in one of the model's dimensions affect other dimensions of the model. It also shows the extent of the effect of each dimension.

3.4.1 | Assumptions of linear regression test

In order for the ordinary least squares estimators of the regression coefficients in the linear regression model to be the best linearly unbiased estimators, it is necessary to examine and test the assumptions of this model as follows:

3.4.2 | Assumption of normality of residuals

In the first step, the normality of the unstandardized residuals of the statistical data, which is one of the assumptions of using linear regression, is examined. For this purpose, first, a new column is calculated in SPSS software, including the unstandardized residuals; then, the K-S test is performed on the column. Based on the test results in *Table 7*, sig = 0.134. Therefore, Hypothesis (1), which is that the residuals are non-normal, is rejected, and Hypothesis (2), which is that the residuals are normal, is accepted.

Table 7. Results of Kolmogorov-Smirnov normality test for non-standard residuals.

	Amount of statistics	Number	Significance level
Remains	1.427	59	0.134

3.4.3 | Checking the non-collinearity of independent variables

For this purpose, the collinearity of independent variables is considered and checked as an independent variable. This means that the regression test can be used whenever the independent variables are orthogonal. However, when the correlation between independent variables is high, the inference on the regression model can be misleading. If there is a linear dependence between independent variables, it is said that there is multiple collinearity. To check the test for the absence of multiple collinearity, the Variance Inflation Factor (VIF) and tolerance values are used in the coefficient table. The tolerance value is a number between 0 and 1. The higher the tolerance value (Closer to the number 1), the lower the degree of collinearity between the variables. On the contrary, the smaller the value of VIF is than the number 2, the lower the degree of collinearity between

the variables. The test results in *Table 8* show that there is no linearity between the research variables, and there is no obstacle to using the regression test.

Table 8. Results of the non-collinearity test of independent variables.

Indicators	Collinearity Statistics	
	VIF	Tolerance
Economic factors (Financial and credit)	1/005	0/995
Political factors	1/002	0/938
Executive factors (Structural and institutional)	1/108	0/916
Cultural and social factors	1/112	0/987
Environmental factors and conditions	1/102	0/921
Legal and regulatory factors	1/113	0/893

3.5 | Linear Regression Analysis

After examining the assumptions of the regression analysis test and confirming that it is possible to perform it, this section presents the regression analysis results for the conceptual model of the research.

The results in *Table 9* show that the regression model and the Enter method were used to predict the obstacles to implementing employment programs during the fourth and fifth development programs. The value of the correlation coefficient (R) between the variables is 0.795, indicating a strong correlation between the set of independent variables and the dependent variable of the research.

As can be seen in the analysis of the variance table, the value of the F statistic and the corresponding significance level confirm the significance of the entire regression model (The significance level is less than 0.05), and the values of the coefficient of determination and the adjusted coefficient of determination are 0.633 and 0.619, respectively, which indicate the percentage of changes in the dependent variable that are explained by the assumed independent variables.

Table 9. Results of analysis of variance of variables.

Model	R	Coeffi	Adjusted Coefficient	F-Stat	Sig
1	0.795	0.633	0.619	48.209	0.000

Also, the adjusted coefficient of determination (R adj) equal to 0.619 shows that 61 percent of the total changes in the implementation rate of employment programs during the fourth and fifth development plans depend on the six obstacles mentioned in this equation. In other words, the set of independent variables predicts (Estimates) more than half of the variance of the variable of implementation of employment programs during the fourth and fifth development plans. Considering the obtained value of F (209.48), which is significant at an error level of less than 0.05, it shows that the regression model of the research consisting of 6 independent variables and one dependent variable is a good model and the set of independent variables are able to explain the changes in the implementation of employment programs during the fourth and fifth development plans. According to the standardized regression impact coefficients obtained in *Tables 4-12*, the results show that the impact of the factors determined and effective on the implementation of employment programs during the fourth and fifth development plans in this study is not the same, and the impact of these factors is different. The results show that the variable or executive factors (structural and institutional) with a coefficient of 0.587 have the highest impact on the non-implementation of employment programs during the country's fourth and fifth development plans, among other effective factors.

Also, the variable or policy factors with a coefficient of 0.538 are in the second place with the highest impact on the non-implementation of employment programs during the country's fourth and fifth development plans, among other effective factors. Then, the variable or environmental factors and conditions with a coefficient of 0.514 are in the third place with the highest impact on the non-implementation of employment programs during the country's fourth and fifth development plans, among other effective factors. Other obstacles include economic factors (Financial and credit) with a coefficient of 0.447, legal and regulatory factors with a coefficient of 0.418, and cultural and social factors with a coefficient of 0.268, ranking fourth

to sixth in terms of their impact on the failure to implement employment programs during the fourth and fifth development plans in the country.

Table 10. Regression coefficients.

Factors (Obstacles)	Non-Standard Coefficients B	Std. Error	Standard Coefficients Beta	T-Stat	Sig
View from the source	0.272	0.328	0.447	2.257	0.0000
Economic factors (financial and credit)	0.243	0.089	0.538	4.325	0.0230
Political factors	0.368	0.108	0.587	3.426	0.0001
Executive factors (structural and institutional)	0.189	0.127	0.268	3.875	0.0350
Cultural and social factors	0.452	0.096	0.514	6.352	0.0000
Business environment factors and conditions	0.022	0.083	0.418	7.248	0.0182
Legal and regulatory factors	0.457	0.352	0.447	4.253	0.0000

Table 11. Ranking of obstacles to the implementation of employment programs.

Influencing Factors	Beta Coefficient	Rank
Economic factors (Financial and credit)	0.447	4
Political factors	0.538	2
Executive factors (Structural and institutional)	0.587	1
Cultural and social factors	0.268	6
Environmental factors and conditions	0.514	3
Legal and regulatory factors	0.418	5

4 | Conclusion

The design of this sustainable, adaptable housing project is an attempt to connect today's life with a future that has not yet come but must be thought about now. In the unique climatic context of Abbasabad a place between evergreen forests and the breeze of the Caspian Sea- the opportunity arose to define a residence that is not just a shelter but a living, dynamic system that can adapt to the changes in human life. The design was based on a simple but efficient module, the 5x5 meter grid, a module that, as a flexible structure, provides the ability to reproduce, expand, and redefine over time. This grid not only helps the process of industrialization and prefabrication but also allows residents to participate in the development and transformation of space in accordance with their individual and family needs. Three main types of residential units were designed with the ability to combine, complement, and grow horizontally and vertically. It is an approach that recognizes demographic and social diversity and transforms the physical structure into a platform for life transformations. The architectural form of the project, while simple, is designed to strike a smart balance between environmental comfort and aesthetics, taking into account the prevailing wind direction, favorable solar radiation, and views of the surrounding natural landscapes.

On the other hand, separating functional layers - including the structure and facilities- allows the units to be easily repaired, upgraded, and changed during construction and throughout their life cycle without requiring extensive demolition or high costs. This functional separation is the main key to the long-term sustainability of the structure and its adaptability to an uncertain future. Ultimately, a deep understanding of "habitation" as a living process makes this project more than a mere residential complex. A dwelling in which humans are not passive consumers of space but active actors in its formation, change, and enrichment. This project is not only a response to today's architectural issues in the context of the temperate and humid climate of the north of the country but also a proposed model for a future in which sustainability, flexibility, and human-centeredness are the three fundamental axes of residential design.

Funding

There was no external funding received for this research.

Data Availability

The data that support the results of this study can be obtained from the corresponding author upon a reasonable request.

Conflicts of Interest

The authors state that there are no conflicts of interest.

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