DESIGNING A PREFABRICATED RESIDENTIAL COMPLEX WITH A FLEXIBLE APPROACH IN QESHM ISLAN

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Abstract

In today's world construction, sustainable development is considered one of the most important issues. Sustainable housing development is paying attention to the needs of the future generation while meeting the current housing needs of the community. In the goals of sustainable architecture, flexible housing design is one of the valuable points. Nowadays, with the change in the life pattern and structure of families, people's need for residential spaces is changing and transforming. In this way, a family's house of yesterday is no longer suitable for their tomorrow, and not paying attention to the category of flexibility over time will lead to problems such as short life and inadequate functional efficiency of the building and environmental problems with an approach to the past residential architecture of Iran and The type of design and its response to the function and needs of the residents had created comfort and peace in itself. This responsiveness is examined in three processes, adaptability, changeability and diversity.In today's buildings, four key factors support long-term resilience. The depth of the building, the accessibility of the building, the height of the building, the level of occupation of the building, each of which plays a role in the form of an effective factor in the flexibility of the building. In this research, using the qualitative method and using library research to answer the questions, borrowing from past architecture and modern solutions, in order to achieve an efficient result for the sustainability of buildings from the physical and functional dimension in is the length of time./

Keywords: residential complex, flexibility approach, Qeshm Island, prefabricated residential complex

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Introduction

The purpose of the design of the new residential complex is not to create a successful project in the field of architecture, but to attract the special attention of technical experts and policymakers to the category of energy and modern architecture and its importance in general, and to create a context for the formation of coherent and responsive organizations for modern architecture. And the method of its current implementation in cities and residential space with conventional and proportionate comfort and also strategies in the sustainability of these spaces are considered. Considering this horizon on the one hand and also dealing with the subject with an artistic-engineering approach on the other hand, an attempt was made to choose the topic of learning and the needs of the current society. After searching among many clichéd topics, the specific topic of the sustainable residential complex was chosen.It may seem that this topic is not as specific as it should be, but here the sustainable residential complex is not a normal residential space, but a complex in which all its components have been adapted to modern architecture and an ideal space from every point of view, especially in terms of saving energy and The use of new and non-damaging energies to the natural environment of the region has been given attention, therefore, due to the special approach of the subject, it can be considered as one of the most important issues at present. (Purdihimi, 1390).

Considering the position of environmental preservation and saving fossil resources, the need to benefit from renewable and clean energies such as solar energy and maximum use of natural

ventilation for cooling is felt more and more day by day, Also, by observing the patterns and techniques of reducing energy consumption in residential buildings, while reducing costs and achieving environmental goals, it is possible to take steps towards raising awareness of the society about the importance of reducing fossil fuel consumption and using clean energy, while preserving national capital, from He also prevented environmental pollution as much as possible.

The 20th century architecture's reliance on large-scale technology caused architecture to play an undeniable role in disrupting and disrupting the life cycle and ecosystem and creating dangerous phenomena such as ozone depletion, greenhouse and greenhouse effects, and air pollution. In this global movement Architecture, along with other scientists, have been searching for new solutions to ensure a good human life, it is obvious that life, work, entertainment and rest.They are all activities that take place in the spaces designed by architects and because the weak and strong points of a building will have a direct impact on the world's ecosystem. Architects have a very sensitive duty in this regard. (Pirnia, 1378).

The application of prefabricated and flexible concepts in architecture has opened a new topic called architecture with ecological architecture or green architecture or environmental architecture, all of which have the same meaning and imply architecture compatible with the environment. Definition of development Modern, which is generally accepted, is the definition contained in the Brutland report, according to which "modern development is a development that meets the needs of the present without compromising and ignoring the abilities of future generations to meet their needs." In the above definition, three key words "development", "need" and "future generation" are emphasized. Here, the word development, unlike the word growth, which refers to the physical and quantitative expansion of the economic system, development has a qualitative meaning that deals with a kind of improvement and progress that takes into account all cultural, social and economic aspects (Pirnia, 2012).Also, the plan and need and "future generation" in the mentioned definition implies attention to the concept of equality in the use of facilities both in the intragenerational framework and in the intergenerational framework. Based on this, the aim of the current research is to design a prefabricated residential complex with a flexibility approach in Qeshm Island./

Research Methodology

The research is descriptive-analytical. Gathering more information was through interviews and using information and websites. Since the current research does not have a quantitative and statistical aspect, a qualitative method will be used for data analysis, and the criterion and basis in qualitative analyzes is the power of reasoning, thinking, reason and logic./

Housing problems

There is a housing problem all over the world, but in developing countries due to rapid population growth and urbanization, internal migrations, lack of sufficient financial resources, problems related to land supply, supply of construction materials and lack of specialized manpower and most importantly, lack of The policy, policy-making and appropriate programs regarding land and housing, this problem has become acute and critical. Rapid industrialization drives the population of rural areas to the cities. In most cases, the social dimension of industrialization does not lead to the provision of cheap housing, social services, and also the welfare of workers, as a result, the number of residents in urban areas increases every day.In addition to the above, factors such as the change in the size of households and the tendency to downsize, the change in the concept of housing and turning it into liquidity, more tendency to acquire the right to own housing, lack of interest or less desire to live in apartment units and large residential complexes, The lack of cooperative culture in its organizational and advanced form in order to solve problems and peaceful coexistence in newly constructed residential areas and complexes, the obsolescence of traditional living patterns, changes in life patterns and standards, separation of married people from the family, conversion of consumption (change of use), Destruction and renovation of buildings, natural disasters and many other factors have made the housing problem in these countries more acute. Housing problems can be generally divided into two parts: general problems and special problems.(Tranova, 1384)

A) General problems: The social and economic structure that governs every society creates problems that make the housing problem more

complicated due to the lack of clarity of goals or the lack of appropriateness of policies and the lack of necessary flexibility in existing programs and some organizational inefficiencies.The most important of these problems are the limitation of the governments' executive power due to the inconsistency and incoherence between residential programs and housing provision policies and the lack of compatibility of these programs with general economic and social policies and programs, especially population control and migration management programs; the limitation of financial resources of governments in solving Providing housing for low-income groups; the inadequacy of the private sector in providing housing, especially for low-income groups, because this sector only provides housing for those who have high purchasing power; conflict and inconsistency between the two systems of regional and spatial planning or housing planning and planning urban and regional; housing programs are intermittent and there is no comprehensive housing planning according to the major development plans;

b) Special problems: The housing sector consists of sub-sectors, each of which has its own characteristics and problems.The lack of coordination between them and the existence of defects in each of the elements that make up the housing cause the whole part to lose its coordination and coherence and its performance decreases./

Designing public spaces of residential units

Nowadays, the dimensions of the internal spaces of residential units in general and especially for certain strata of the society have decreased. With the shrinking of housing, many of the current needs of life cannot be manifested in the limited private space of the residential unit, and it is natural that they overflow outside this space. This is where the semi-private, semi-public and public spaces find their importance and serious function. These spaces in small residential complexes should have maximum facilities. Since in most cases these facilities do not have the required logical scope, these spaces seriously need their proper definition.

Public spaces are parts of the artificial environment that occupy the volume between the built body and can be composed of natural or artificial elements and have a beautiful, attractive and pleasant landscape.By attracting people, these spaces create belongingness and liveliness of the environment. Public spaces can respond to the basic needs of their users and play an important role in creating a desirable residential environment. Since often in the design, without considering the range of collective activities of the residents, only the creation of volumes is done without paying attention to the needs of the users, the public open spaces are empty of activity and have become the residue of the built sections. Most of the public spaces do not satisfy the residents and create unsafe and unpleasant environments for them.

Because the place of activity is the public space, by creating favorable spaces, it is possible to provide the emergence of more diverse activities that contribute to the vitality of the residential environment.Public open spaces are designed to meet the needs of residents, or their users, so in the first stage, the needs of people in these spaces are studied. After examining the activities in public spaces, the location and space of these activities are discussed and the basics of public space planning and design are explained./

The concept of flexibility

Despite the vast dimensions of research conducted in the field of housing in Iran and the world, in the field of interior architecture and flexibility in housing, only a limited number of researches have been conducted focusing on this issue. Dimensional coordinations and special attention has not been paid to internal architecture and the quality of internal spaces and how to have the best efficiency of residential units. Considering the changing needs, from birth to death, the design of residential units should be such that it responds to the needs of the residents in the best way at any time and can also change based on the needs of the consumer. A residential building with a flexible relationship with the living environment and It acquires its vitality, which is one of the most important qualities of design.Most of the houses that are designed with flexible housing patterns have the necessary efficiency in terms of space and improve their ability to respond optimally to the needs of the residents. According to the needs, expectations and desires of humans in residential spaces, the living space should be designed in such a way that the meaningful relationship between the living environment and them is considered. (Jalili, 2012)

Flexibility is an approach that the designer seeks to apply in order to respond to the needs of his audience, to change the functional model of the project according to changing demands.

According to some, this concept means the development of the building by adding parts to it. According to some others, functional changes can be made in the building by changing spaces. From the point of view of some people, maximum use can be achieved by creating multi-functional spaces.In fact, flexibility includes all three items, the ability to add and expand, change, and multitask.

In a traditional Iranian house, the basis of order is the pimon house, which was used by the architects of that time in the form of big, small and small pimon. Relying on the mentioned system, the highest task of the architect is to recognize, understand and spatially visualize the static and current forces in the load-bearing body of the building, and the proportions and dimensions of the empty parts of the building were determined by the nobility that was created in the building designer. (Sifian, 2006) .

Flexibility in architectural design and interior architecture is very useful as an approach to respond to different functions of space and various activities of its users. With the help of this approach, it is possible to create solutions for space optimization at different levels of building design, from architecture to furniture.To explain the concept of flexibility, Bentley emphasizes a quality dependent on the dimensions of environmental capabilities that respond to different uses that are compatible with people's needs. Such a quality causes places to be used for various purposes and give users more choice (Bentley, 15:5:1382) "Flexibility is the ability to change objects and objects. In architecture and environment design, this term means spatial flexibility, the organization of man-made space and changes in it to achieve new conditions, needs and applications. (Einifar, 66:1382) In another definition, flexibility is understood as the concept of "controlling the change process".

One of the most important architectural spaces that require flexibility is residential spaces.According to the amount of intervention that can be done inside or outside the residential units, as well as the amount of changes that are given in the whole or its details, different definitions of a flexible housing can be provided. In a general definition, flexible housing is a space that responds to all the needs of its residents in an actual way and also has the ability to respond to future and sometimes unpredictable needs. According to the different capabilities and solutions that are included in a residential unit to respond to the future needs and demands of the house, the degree of flexibility will also be different../

Technical and operational issues of prefabricated buildings

Building systems can be divided from the following points of view:

1. In terms of construction methods:

In terms of construction methods, systems are divided into the following three groups: plate system, frame (skeletal) system, volumetric (cellular) system. Plate system includes flat plates with dimensions of one The diagram of the wall or the whole wall as a separator or bearing. This system is one of the most successful prefabrication methods after World War II. Usually, in these systems, to deal with horizontal forces, central cores made up of cross-bearing panels are used, and these cores are used as space for facilities and services, etc. In the distance between them, separating non-bearing walls - in other words, two different groups of elements - are used. The volume system, which is made in the form of different cells, the same size as the rooms - which are both load-bearing and separating. (Siavashpour, 2013).

2. In terms of type of materials:

Light systems are systems whose specific weight of the constituent materials is less than the specific weight of water. These materials are mainly composite materials, wood and its derivatives such as paper and cardboard, etc. One to two-story buildings with a light system are without skeleton and metal or concrete framing, but in tall buildings, metal or concrete skeleton and covering materials are light materials. Heavy systems are systems whose specific weight of the constituent materials is greater than the specific weight of water. Heavy systems usually weigh more than 1000 kilograms per cubic meter of space, and their materials are concrete, brick, etc. is.

3. In terms of the type of expansion:

Closed systems refer to systems in which a pre-fabrication factory produces only the parts used for its buildings and executes and completes its project by consuming them. These systems are not coordinated with other systems, and as a

result, its elements are consumed and used only in the same system, that is, it is not coordinated with other systems in terms of size and connection. Open systems, since the main goal in industrial methods and Prefabrication is to reduce costs and economize the building, and due to the fact that in the closed market system, the sale of elements and parts is only limited to the same system, and as a result, sales decrease, therefore, the open system was created with the harmony between the systems and their components. In open systems, it is possible to receive small orders, while in closed systems, according to what was said, it is necessary to receive a minimum order of one thousand residential units to build a factory. (Danshpur, 1389)

4. In terms of the type of connections:

The system with more connections, in these systems, the components are connected in such a way that their connection is completely closed and 100% air does not pass through it. These connections are usually created by filling elements such as concrete. In such a way that a gap is considered at the junction of two parts, where some parts of the parts are involved in this gap, and then the desired gap is completely filled by pouring concrete.

A system with dry joints is called a system with dry joints. In this system, screw and nut connections or welding are usually used. The system with dry connections needs more delicacy and accuracy in terms of connection design, and all connection operations and facilities should be considered in advance. (Shia, 13849.

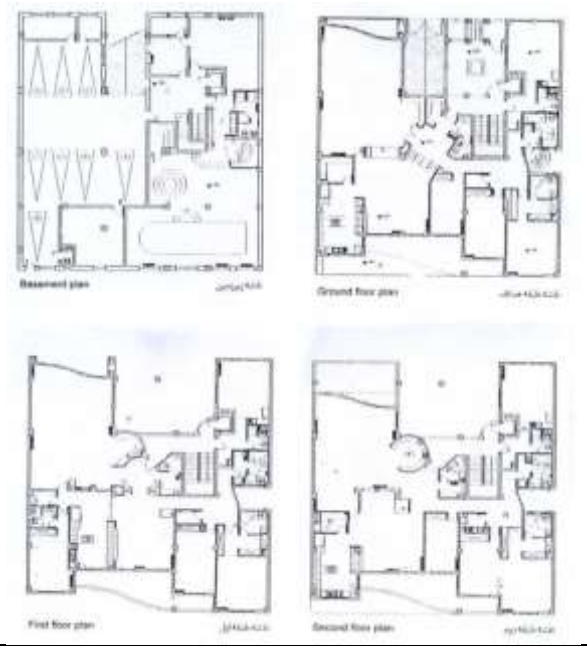
In the discussion of construction inside the country, we are generally faced with several categories of buildings, the first category is the canopies, which apparently have passed their test well and have their own customers, as if they can be found in every corner of the city under different excuses. Roitend and despite the unfavorable quality of the interior space in the absence of competitors with better quality, they are considered to be the first in the field. Caravan", "Rashistan" and many others.

Table 1: Interior examples of prefabricated buildings

Work samples	Company Name	Row
	"Suite Conex Iran" company	1
	"Speed House Builder" company	2

	"Farsan" company	3

Table 2: Residential complex

Work samples	Company Name	Row
	***Vavan residential complex***	1
	***Shahrivar residential complex / Ali Karimian***	2

	***Romaipart atrium houses residential complex; Budapest/ Janusz Monosz, Zhojazhuke, Sandro Nadi***	3
	***-Warsaw residential complex / JEMS group of architects***	4

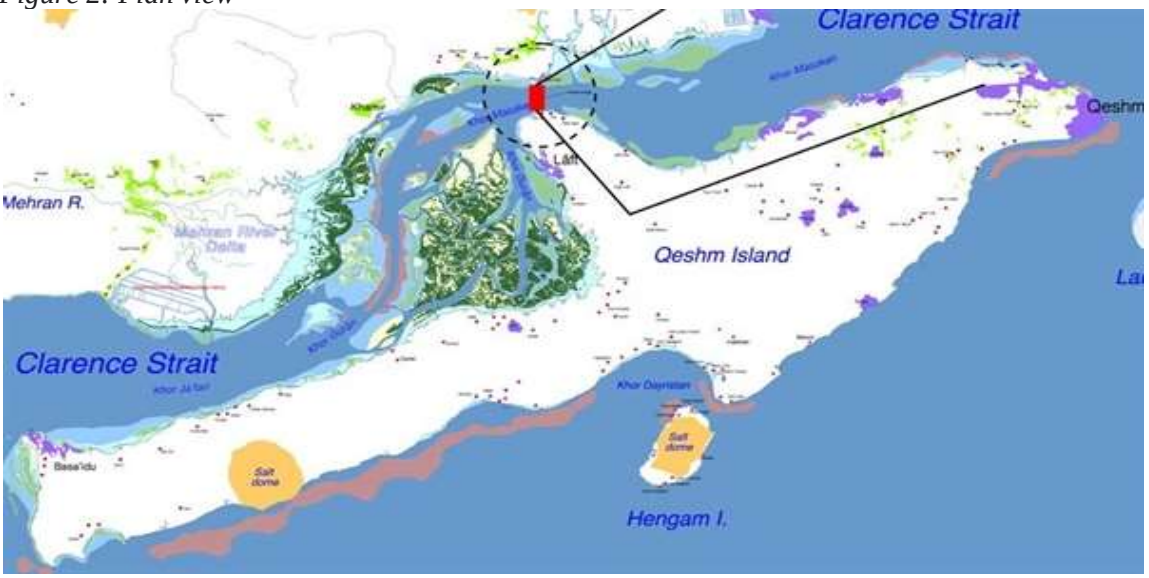
Knowing the environment

This island is bounded from the north by the city of Bandar Abbas, the center of Khmer district and a part of Bandarlange county, from the northeast by Hormuz Island, from the east by Lark Island, from the south by Hemang Island, and from the southwest by Big and Small Tanb and Bomosi islands. The closest port on the main coast of the country to Qeshm Island is Bandar Abbas, which is 8.10 nautical miles (20 kilometers) from Qeshm Port. The closest distance of this island to the main coast of the country is on the northern tip of the island, at the place of Bandar Laft (on Qeshm Island) to Bandar Pul, in Khamer city (on the main coast of the country), which is about one nautical mile (1800 meters) and It will be the construction site of the Persian Gulf bridge.

The area of the island is 1,491 square kilometers, about 2.5 times the second largest island in the Persian Gulf, Bahrain. The length of the island from Qeshm port to Basseedo port at the end of the island is estimated to be between 100 and 130 kilometers in various sources, and the length is mostly based on 115 and 120 kilometers. . In the explanatory report of the implementation of the Definitions Law, the total length of Qeshm Island is mentioned as 120 km. The width of the island is different in different places and on average it has three widths: low (between Tabal and Selah), high (between the old loft and long slope) and medium (in the accommodation area). Nevertheless, the average width of Qeshm Island can be considered 11 km.

The city of Qeshm is located at the easternmost point of the island, and although this city is not geometrically central to the whole island, but due to its important strategic location (wide view to the south, north and east, view to the Strait of Hormuz, proximity to Bandar Abbas, etc.) It has been important since ancient times and is considered the main settlement of the island. The selection of Qeshm city as the main base for the development of Qeshm commercial-industrial free zone has also added to the importance of this city.

Figure 2: Plan view



Conclusion

In the proposed design model or model called the tree model, all the main spatial elements of the house, which somehow include mental and functional comfort and stability, are tried to be considered. In this way, you can try to overcome the height of the building by using various accesses so that by speeding up the access, the residents will not have a problem with this. In the proposed model, by using the number of floors separated from each other, the problems that cause the most damage to the children due to lack of movement are ended and the sounds of the adjacent floors are not transmitted to each other anymore. In this proposed model, the spread of fire during a fire in one of the residential units to the neighboring units is prevented and the fire control is done faster. Due to having a yard and alley and connection with the outside space, residents are not locked in a closed area during a fire. Due to having a separate roof and yard, this method includes a flexible space for each unit in such a way that each unit will be able to change and develop horizontally and vertically according to its functional needs, according to the customization feature of the Veerindale slab project.

Even the alley around the building can be used for horizontal expansion and all three flexibility options "variability, adaptability, changeability" can be implemented in each of these units. Convenience and ease in repairing and changing the parts of the house in this design model is one of the valuable points because all the parts of the house are prefabricated and fastened in place with screws. By using this design model and the retreat of each floor compared to its lower floor, the sunlight shines into the courtyard and interior space as much as needed depending on the different seasons. Due to the separation of the floors from each other, all the floors benefit equally from the breeze and ventilation

By considering the explanations given, it is possible to achieve a functional physical stability and to increase the life of residential buildings with the proposed design model, because flexibility is considered one of the important sub-branches of flexible architecture in prefab form.

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