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The concept of flexibility in the formation of contemporary biological spaces

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ABSTRACT
Flexibility in architectural spaces makes it possible to adjust the living conditions associated with human settlements and adapt the residential unit to human behavior. Today, due to the lack of a correct statement about the proper placement of spaces, biologic neighborhoods in relation to geographic location and the neglect of the true concept of comfort in modern buildings, seems necessary to provide appropriate solutions to this problem. What is the concept of flexibility and how to create and achieve solutions for the reconciliation of the human environment in the climate of own habitat? All of this research seeks to provide a solution to the creative design of flexible spaces, with goals such as: improving and increasing the performance of residential spaces, developing creative design solutions in residential spaces, introducing theoretical foundations and criteria for flexible spaces, and taking advantage of in today's design of housing. The study of theoretical concepts of flexible spaces will help residents to create comfort in the living space of contemporary buildings. This research proposes, through deductive reasoning, appropriate solutions to the positive effects of physical, functional, social and functional characteristics, on increasing the comfort of living in resident settlements. This research is of qualitative and descriptive-analytic method for elaboration of the issue of flexibility and promotion of biological comfort in contemporary habitat. In the discussion of theoretical foundations, a library research has been used including specialized sites, books and scientific articles that use Results and data aggregation can be found in effective physical solutions appropriate to the conditions of the construction of contemporary buildings in Iran.
KEYWORDS: Flexibility, Settlement, Space, Biocompatibility.

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El concepto de flexibilidad en la formación de espacios biológicos contemporáneos

RESUMEN

La flexibilidad en los espacios arquitectónicos permite ajustar las condiciones de vida asociadas con los asentamientos humanos y adaptar la unidad residencial al comportamiento humano. Hoy, debido a la falta de una declaración correcta sobre la ubicación adecuada de los espacios, los vecindarios biológicos en relación con su ubicación geográfica y el descuido del verdadero concepto de confort en los edificios modernos, resulta necesario proporcionar soluciones adecuadas a este tipo de problemas. ¿Cuál es el concepto de flexibilidad y cómo crear soluciones para la reconciliación del entorno humano con su propio hábitat? Esta investigación busca proporcionar una solución al diseño creativo de espacios flexibles, con objetivos tales como: mejorar e incrementar el rendimiento de los espacios residenciales, desarrollar soluciones de diseño creativo en espacios residenciales, introducir fundamentos teóricos y criterios para espacios flexibles, y tomar ventaja del diseño actual de la vivienda. El estudio de los conceptos teóricos de los espacios flexibles ayudará a los residentes a crear comodidad en el espacio habitable de los edificios contemporáneos. Esta investigación propone, a través del razonamiento deductivo, soluciones apropiadas a los efectos positivos de las características físicas, funcionales, sociales y funcionales, para aumentar la comodidad de vivir en asentamientos residentes. Esta investigación es de método cualitativo y descriptivo-analítico para la elaboración del tema de la flexibilidad y la promoción del confort biológico en el hábitat contemporáneo. En la discusión de los fundamentos teóricos, se ha utilizado una investigación bibliográfica, que incluye sitios especializados, libros y artículos científicos que utilizan resultados y datos que pueden emplearse para soluciones físicas efectivas apropiadas a las condiciones de la construcción de edificios contemporáneos en Irán.

PALABRAS CLAVE: Flexibilidad, Asentamiento, Espacio, Biocompatibilidad

Introduction

Flexibility in biological spaces is one of the most important concepts that the minds of humans have been focusing on for a long time and have sought a systematic approach to creating improved spaces, not only in terms of function but also in terms of the principles of aesthetics. As a result, by testing and utilizing these strategies, humans were able to identify biocompatible components by creating constant and semi-constant flexible spaces. Flexibility in architectural spaces creates a variety of variations that make it possible to adjust environmental conditions dependent on

human settlements and create a comfortable environment and adapt a residential unit to human behavior. By measuring their needs, these humans over time have come to understand the concept of flexible space.

1. Problem statement

Today, due to the lack of attention to the proper location of biological spaces and neighborhoods in relation to the geographical location, as well as the neglect of the real concept of comfort in the habitat of residents of contemporary buildings today, providing appropriate solutions to this issue seems necessary. What is the concept of flexibility and how it is created and how to achieve solutions to reconcile the environment of human life in the climate of one's own habitation is one of the issues that a person can always identify with and create these flexible spaces, effective communication between man and space, the opportunity for people to communicate with each other, with the context of their surroundings and the formation of everyday events, qualitative needs, access hierarchies, safety, and comfort.

2. The importance of research

Looking at the past and receiving the concepts of space and functional architecture of the era before, including residential buildings, we can actually conclude that the most prominent feature of the architecture of each settlement is the need for flexible spaces with the ability to evolve space in functional, physical, social and functional fields. In fact, the creation of space expresses what he wants to bring to man's mind, using functional forms, and on the other hand, observing the aesthetic principles. As a result, flexible and variable spaces can be changed over time and will create human needs.

3. Litreture Review

The idea of flexible design of residential units has been introduced since the beginning of the twentieth century as part of the modern movement by architects such as Le Corbusier, Mises and Huberakan. With common methods, various solutions, such as folding furniture, moving partitions, etc are offred. The possibility of overlapping of spaces in the interior composition of the building was provided. In the 1990s, flexibility became an effective means of solving the multiple and varied applications of housing in

rapidly changing societies, shifting from the idea of structural flexibility and functional flexibility, meaning that withoutthem the form of flexibility in the form of space, was able to accommodate various activities (Borhani, 2006).

In traditional Iranian homes influenced by the habitat and climate tradition, a summary of nature with regular geometry is organized in the inner courtyard of the house and all the original spaces of the house are opened to the human handmade nature, while traditional houses of Iranian building with fixed elements and slab walls was formed and the flexibility was created by moving the day and the person in different directions of the house. The most important spatial feature of the Shiraz houses is the visual and sensory connection of the main room of the house with the evergreen courtyard. Most of the houses in the old style of Shiraz are the main room of the main room of the house that this room is located on the northern front and the water pool facing it is to portray the lush green space of the courtyard with its dense water that illustrates the sky and trees are one of the most suitable tools. This large wooden bay, with the help of its various perceptions that can be moved to use, has many features. When the bottom of the whole understanding, interior spaces are completely separated from the space of the courtyard, the light passes through the colorful glasses a pleasant atmosphere.

With all the perceptions, the room turns into a porch that faces the courtyard. And by raising one of the perceptions, the communication is controlled by the yard (Memar, 2010; Rasooli Sani Abadi, 2017),). In the study of resilience in this research, from specialized books such as "A Yen Bentley" entitled "Responsive Environments" and architectural aesthetics from "Jorg Corrupt Grotter", an example of flexible housing cases on a scale and microclimate and flexibility of multi functional spaces have been used, and John Huberakan's paper, "Design for Flexibility (2008)" and from existing research in Iran, can also be found in articles such as a template for Flexibility, written by Alireza Einifar, who has been selected from a research project of the same name at Tehran University, which lists the types and factors Flexibility in traditional housing, in all of these sources, is flexible in adapting to housing changes to suit the current and future needs of users.

4. Purposes

In fact, flexible spaces in biological spaces are considered as a solution to prevent the collapse of people interactions with their habitat and the possibility of adapting housing to their physical and psychological needs, changing their audience and having flexibility with the ecosystem and the qualitative needs of each user. The aim of this research is to help improve the living space of residents by creating a comfortable environment for residents through a flexible way of creative design of flexible spaces. Therefore, the following goals are:

Develop a creative design approach in residential spaces. To introduce theoretical foundations and criteria for flexible spaces and the possibility of using it in today's housing design.

Address the theoretical study of the concepts of flexible spaces for creating comfort in contemporary buildings.

5. Hypothesis

Due to the inadequacy of the proper placement of biological spaces and the lack of consideration of the biological comfort in people's daily lives and the interactions of residents, as well as the lack of correct answer to the question of how to create spaces with greater flexibility in the design of contemporary residential buildings, the hypothesis of this research is that through deductive reasoning. It is able to offer a suitable solution for contemporary constructions by providing a positive impact on the physical, functional, social and functional features, increasing the comfort of the inhabitants' settlements, and able to organize the built spaces features for definition of the possible needs of its comfort.

6. Theoretical Foundations

Space in the design of architects is an attempt to create desirable and useful spaces for human beings that determine how to use it and generally consider the qualitative and quantitative dimensions of human behavior within each space of the scenario of space. According to Louis Kahn, "space particles open space that wants space." Charles Moore says: When a room is made of a floor and a ceiling and four walls, a sixth element alongside the six elements has a seventh element that is space, and this element has more effect than the physical elements that space has been made by them.

But the quality of space in the first place is dependent on the elements and the relation of these elements (Grother, 2004). This is where the organization of human space is constructed and changed in order to achieve the conditions, needs, and applications of a new term with a new dimension called the human space, with the definition of such a "human environment" of the metaphors of literary texts for achieving a concept which one calls the unconscious geometry of human space.

His analysis reveals a huge shift from the imagined space of the Renaissance, which is geometric and rational, to emphasize the "sense" of space, and in fact, the concept of space requires more displacement and from beyond the boundary of vision to a very sensory atmosphere going deeper "and, as a result, creates a flexible environment has been used to a large extent in traditional Iranian architecture from the earliest times. Flexibility is an applied concept for optimal use of residential spaces. Changes in life and human desires, executive needs such as the need to strengthen the relationship between designer-user and the transformation of lifestyle over time are the main reasons for this concept (Hall, 1996).

6.1. Siri in the concept of flexibility

To explain the concept of flexibility, research has been carried out and numerous definitions have been presented, some of which are further elaborated by the authors.

Table 1: Siri in the Concept of Flexibility

Thinkers	definitions
John Lang	Some environments provide many activities without changing or reorganizing. Some environments can easily be modified to provide various activities. Environmental designers have used different terms to define these two situations. Here, the first "adaptable" And the latter is called "flexible".
Robert Venturi	The postmodern architect is concerned with expressing the quality of the flexibility of the functionality of a space and believes that this building has several decent functionalities. A room can have different functions at one time or at different times.
Bentley	Places that can be used for a variety of purposes offer more choices to users than those designed for a limited, user-friendly environment. The environments that have the capability to offer such options are of a quality that is flexible. We call it

Rapport	The flexibility of a building is primarily related to its ability to be broadened (reproducible) or, conversely, to a smaller extent to meet a newer or wider need.
Grotter	When it comes to a system without having to compromise the principle of the system or its main elements and allow the space to be adapted to the need, it is talk of flexibility, and since the space constructors are defining that space, then it must inevitably be for Space flexibility These factors are also flexible
Hobrakan	The concept of flexibility is defined as building capability for physical change and adaptation with respect to changing conditions. Flexibility is "a new kind of challenging architecture"
Edward Hall	Since the building blocks of architectural space are defining it in its entirety, in order to achieve a flexible space, these elements of the components of the component must be flexible too.
OVEN	In the architecture and design of the environment, the concept of the flexibility of organizing the human space is made and changed in order to meet the conditions, needs and new applications.

Based on the studies carried out and the definitions of the term on theoretical foundations, one can express: Reflecting the concept of flexibility in designing a space architecture, responding appropriately to changing the needs of the audience and changing the functional patterns in accordance with the wishes of people and living environments that they are formed. Accordingly, by creating flexible spaces in traditional habitats and using them in the system of contemporary living environments, effective factors can be considered: increasing social interactions, regulating human relationship with man and nature with man, improving the quality of space, grading Suitable hierarchy of access to spaces, the ability to adapt and expand the spaces, and consequently to increase the comfort of the living can be helped.

6.2. Reasons for Flexibility

Explaining the need for flexibility in housing can clearly help the research question. Given the need for flexibility to change over time and with changing human needs, one can only generalize the factors that make effective payments. The need for flexibility in the residential unit can be classified into social-economic and economic functional areas. The requirements for functioning with changing family and household size, lifestyle changes, changes in activities and changes resulting from the aging process of household members and changes in the use of equipment, home appliances and furniture. The psychological and social effects of each of these changes

make residential space more flexible. The financial and human resources of the people can contribute to the creation of space flexibility if the impact of the functional factors and its social and psychological outcomes is well known.

6.3. Flexible variety

In a book on architectural planning, Perchal et al, 2015 have considered flexibility to include multifunctional architectural features, variations in internal spaces, and externality, and argue that each of these concepts alone can not replace the concept of flexibility. The important point to be taken from past experiences and its subsequent uses is that all the concepts of flexibility are not of a single species and on a scale. Identification of species and the scale of flexibility will help to better understand the concept. Variants of flexibility are defined as diversity (multifunctional concepts), adaptability (daily seasonal displacement), and versatility (segregation) (Perchal et all, 2005).

6.4. Adaptability (seasonal and daily displacement)

The versatility or the ability to coordinate a space with new conditions is required. In the new housing, adaptability is the ability to provide new needs by changing the interior walls and installing parts in residential units, provided that these changes do not change the area of the residential unit. In practice, the versatility of all internal changes, such as changing personality and structure, micro elements, and composition of spaces, are included. In planning of new residential complexes, the most effective way to achieve versatility, are the lack of internal implementation and the possibility of their various combinations. In traditional Iranian housing, following the map, the facade and the house spaces, a general pattern of formation and the establishment of fixed spaces, the adaptation of daily and seasonal life by adjusting the horizontal and vertical relationships of the house and the use of different spaces at different times of the day and in different seasons are possible. Spaces such as summer, winter, basement, and roof make it possible to adapt a home to different living conditions. The organizer of flexibility on this scale is the central element of the house, the courtyard (Einifar, 2003; Hobraken, 1986).

Table 2: Types of Flexibility (Versatility)

Flexible species		Iranian house
Adaptation	operational	The connection of the rooms by opening the doors, the connection inside and outside the house by opening in the curtain window
	Structural	Pimon is a modular with longitudinal divisions, with a pivotal function of roof covering with heavy and fixed walls
	Spatial	A room is used in the Iranian house around the room.

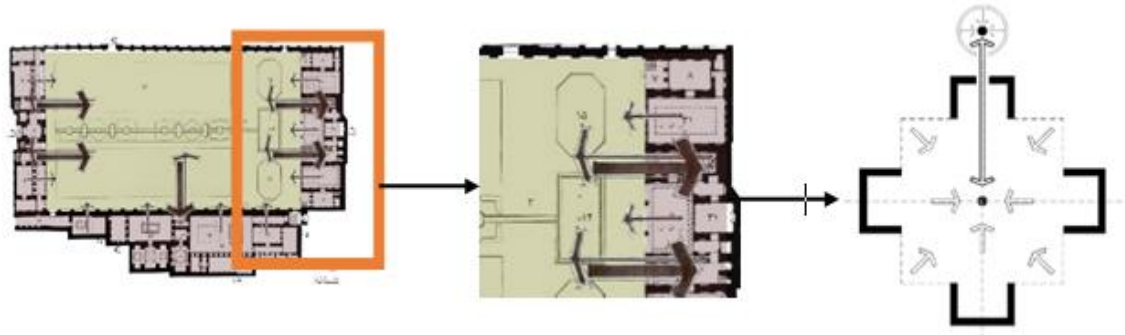


Figure 1: Types of Flexibility (Versatility)

1. B. Diversity (Multi Functional Space)
2. Variation is the ability to provide various uses of space.
3. This flexibility is affected by two variables of space and time.
4. Residential space can be used for several functions simultaneously, and for different functions at different times.
5. Variance can be achieved by designing a map with a regular geometric structure, easy and readily accessible access to housing equipment or by adjusting the size of the rooms.
6. Variation is the most basic and effective way to achieve flexibility in the design of traditional Iranian honey.
7. The reason for this is the ability to replace the working space over time.
8. The most important properties of spatial diversity are:
9. Easy and legible accessibility to the rooms
10. Integrating functions in a space and reducing waste in communication spaces
11. Usefulness of the access, so that the functions can be converted
12. Follow building facades from the general pattern of house formation

Table 3: Types of Flexibility (Diversity)

Flexibility Scales		Iranian homes
Variation	operational	The room responds to different functions at one time or at different times, such as the three doors and the five doors, summer and winter
	Structural	The structure of heavy structures and walls and ceilings are fixed
	Spatial	The porch and the interiors doors allow the flow of fluid between the spaces. The height of the room and the opening of the hall will help to distinguish between public and private spaces.

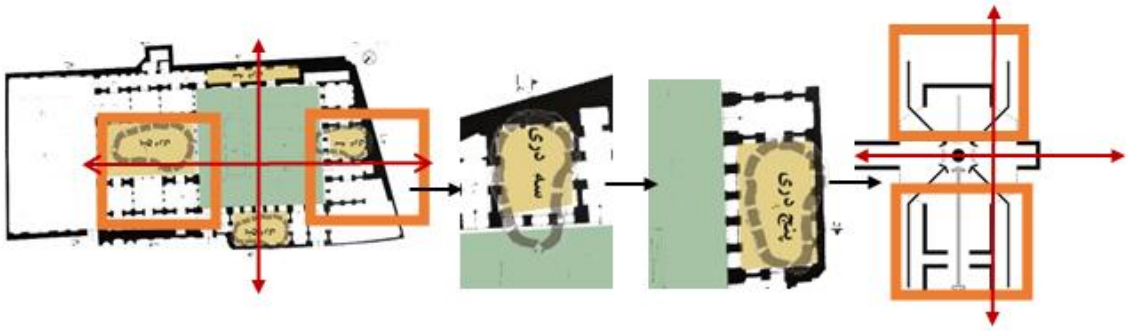


Figure 2: Species of Flexibility (Variability) - Source: Writer

6.5. Variability (segregation and aggregation)

In the design of housing flexibility, it is said to increase and decrease a little or the separation and aggregation of spaces and the possibility of returning to the initial design of a residential unit after its expansion or reduction. In this case, flexibility means the ability to respond to the growth of the household at different stages of life. In other words, this feature makes it possible to resize the residential unit either in the direction of its smaller size or in the direction of enlargement. The need for such flexibility may be due to long-term or short-term needs. The type of long-term, with changing the size of the household and the need for more space for life, and the type of short-term, space change is due to other reasons. Variability can be achieved in two ways by adding to the existing home infrastructure, and by separating its spaces (without changing the area).

This case has been applied to the horizontal or vertical expansion of traditional Iranian homes and the separation of multi-courtyard houses and their use for the extended family life in different stages of life (Einifar, 2003).

Table 4: Types of Flexibility (Separability)

Flexibility Scales		Iranian homes
Variation	operational	Self-propelled and single-span and fixed-span and single-span houses
	Structural	Fixed blood unit allows for more space than fixed
	Spatial	Native and small niches with each nest in the basement of the house make it possible for new entrants to have a stable home

Flexible species of Iranian house

Functional variation of the vertical and horizontal expansion of the house and the ability to separate and integrate multi-courtyard houses. The structure of a repeatable Peyman unit allows the use of a variable of a fixed structure space. Space change of the public and private space with the vestibular intermediate element on the threshold of the house. Possible to create a new entry for the house segregated sections.

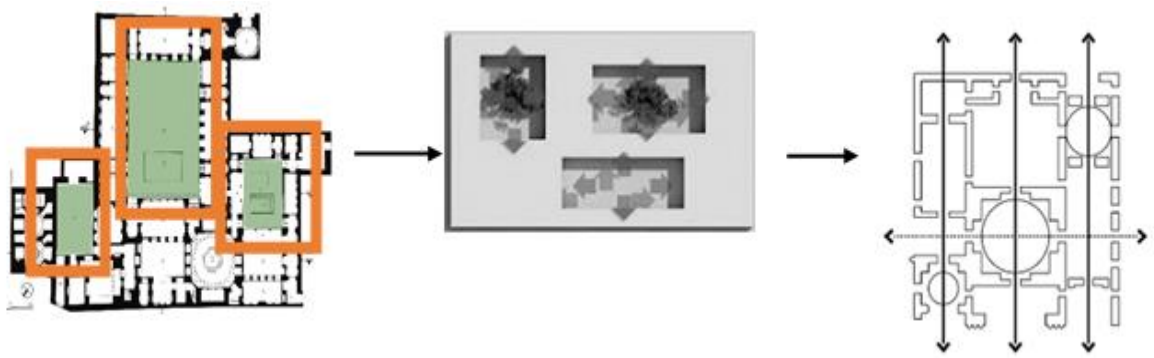


Figure 3: Types of Flexibility (Separability)

Different parts of space have different potentialities for influencing or interacting in flexibility. Two types of these sectors require special attention:

Soft and hard parts: In the form of buildings, there are spaces that offer common facilities such as stairways, elevators and ducts. In their place. These spaces are often considered to be part of the "hard" building. The probability of functional change in

these parts during the useful building is very low. This hard part should be deployed in places where the rest of the space can not be restrained. (Bentley et al., 2006).

Active and Inactive sections: Within an important range of productivity and potential, flexible exterior spaces depend on activities or organizations that occur in areas or adjacent areas. For some indoor activities, the ability to develop in adjacent outer public spaces may be beneficial. If such a process occurs, they will be involved in public space activities. (Bentley et al., 2006; Demaria, Colorado, 2015).

Table 5: Potential Impact Sectors on Flexibility

Potential Affecting Sectors	the part	Space	Change User	Location
	Soft and hard	Stairs, elevators, ducts	is low	Do not have any restrictions on other spaces
	Active and inactive	The adjacent parts of the outer exterior are flexible, such as edges	Relative to the life of the building can be changed	There is no limit to other spaces

Types of Flexibility Scales

Flexibility is defined in the dimensions and spatial and functional components of the home of the service spaces and the spaces of the recipient and the spaces of communication.

Small-scale flexibility: Micro-scale flexibility involves smaller and smaller design decisions, so it is critical to users and can be considered at the latest stages or in later stages. (Bentley et al., 2006).

Table 6: Flexibility Scales (Small Scale)

	Flexibility Scales	**Iranian homes**
Small scale	**Fixed space**	(Three doors, five doors, a hall, a windproof, a sash, a chest and a porch, a niche, a raft, etc., a tatami room, a closet, fixed doors
	Semi-stabilized space	Rugs, pillows, mattresses, tablecloths, etc.
	Shapeless space	A multi-functional space whose relations between elements are provided through interfaces such as the porch and the floor and the gate of the circle

Intermediate scale flexibility

This scale is related to the flexibility of a residential unit in how spaces are grouped to respond to household needs, and deals with the main pattern and home-based activities of the home. The functional layers of the building and the use of natural light and natural ventilation are very important in this regard. Also, the internal and external views of the house and their adherence to the general pattern of formation are also significant points. (Bentley et al., 2006)

Table 7: Flexibility Scales

Flexibility Scales		Iranian homes
Medium scale	Fixed space	The courtyard of the house and the communicator of the functional elements in the periphery of the yard
	Semi-stabilized space	Elements shaping the green space of the house and the bed on the pond and so on
	Shapeless space	The intruder courtyard is the place of all the home events. The relationship between the house's inhabitants and the fluid space between the inside and outside through the porch and elements such as the in-window

Macro-scale flexibility

The macro-scale flexibility is about the ability of variability in the use of the whole building as a single unit or major parts of the building. (Bentley et al., 2006).

Table 8: Flexibility Scales (Macro Scale)

Flexibility Scales		Iranian homes
Macro scale	Fixed space	Consolidation and separation of outer and inner courtyards and indirect communication with overstone interfaces with outer space
	Semi-stabilized space	Elements such as the cover of the courtyard ceiling that is used in certain times
	Shapeless space	The changing external and internal social environment of each

Flexibility is trying to answer a wide range of practices used in an environment. In this approach, by exploiting the potential for development, change, and multiplicity of the environment, the quality of the project designed to interact with the needs of its audience will increase. In general, the space created by the flexibility approach can be considered as a plan that responds to a variety of locations designed for specific and limited functionality in order to fit different needs of the audience, and the right to offers a greater choice for its users. Locations that have the ability to create such spaces can be examined and evaluated with the above features and behavioral characteristics. (Einifar, 2007). In the meantime, we examine the flexibility approach by analyzing the three key factors of "variability", "versatility" and "changeability:"

1) Depth of building: The use of buildings requires light and natural ventilation. Buildings with a very large depth or length can not easily respond to user changes in this regard.
2) Access: They need some communications and connections to the outside world. So the number of access points can be made by one of the users. The key elements of the organization are to facilitate the adaptation of the diversity of use in a building.
3) The height of the building also affects the importance of access to the height of the building. In high-rise buildings, the higher the floors go, the greater the limitations of access to the outside. Hence, the upper classes take a more inappropriate position for a wide range of applications. (Bentley et al., 2006).
4) Flexibility in the design of a residential home: In the traditional Persian house, the ordering base is the Paymun home, used in the form of a large, small pyramid, used by the architects of time. It is relying on that system, the highest task of the architect of cognition, the perception and visualization of the living and moving forces in the building was carried by the building, and with the aristocracy created in the design, and the proportions and dimensions of the perimeter sections were determined. (Abolqasemi, 1986).

Figure 1: Effective Flexibility Factor in the Long Term

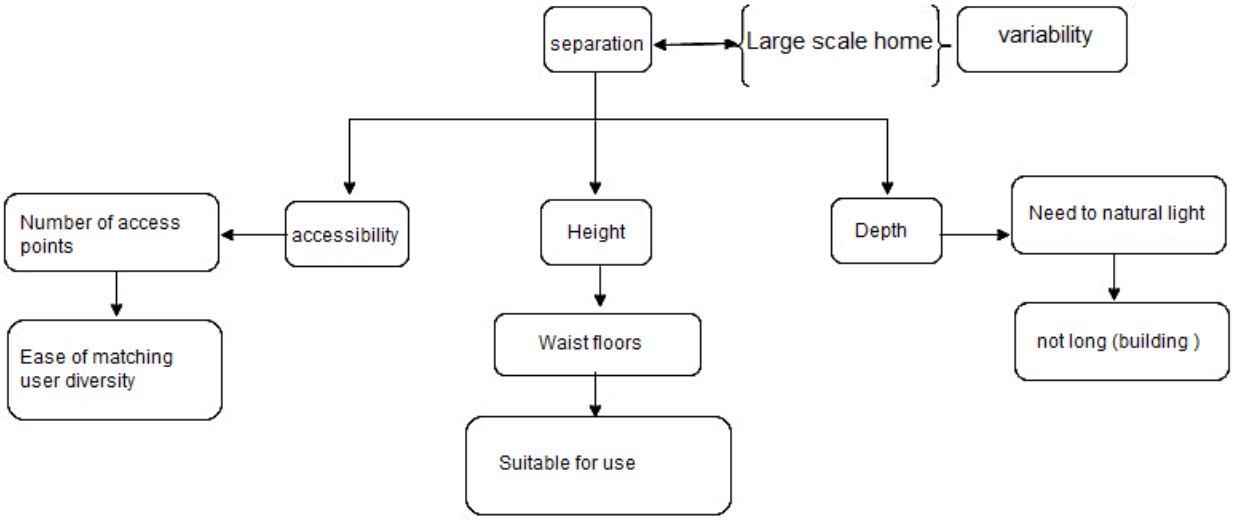
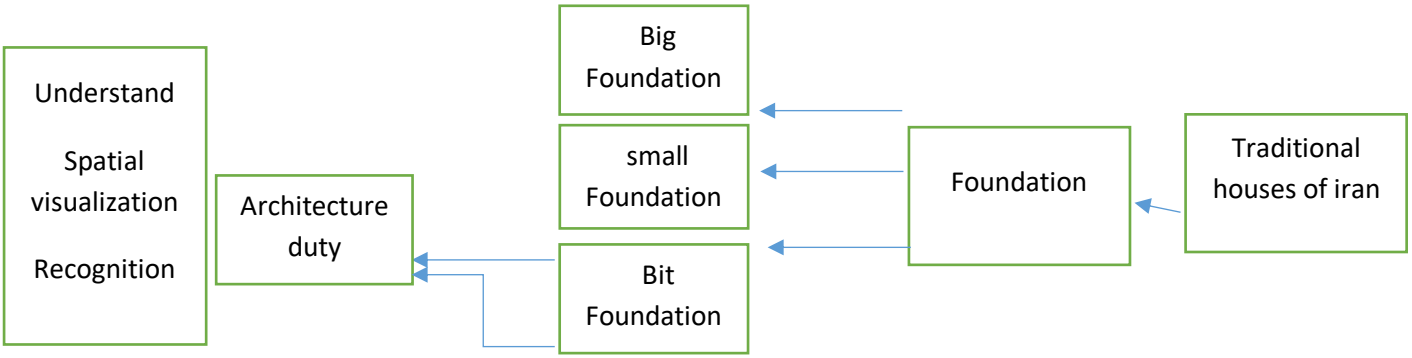


Chart 2: The Basis of Order in Iranian Traditional Homes



6.6. Contexts of adaptation of concepts and structures in the organization of space

In order to select an appropriate case study, to obtain an analytical result among the examples of the concept of flexibility in the current habitat of ones, among the houses of the Qajari of Shiraz, one of the factors is the way of creating the comfort of a home made up of large houses over 100 square meter is a relatively healthy home, where accessibility and field observations are available, for a case study.

House of Qavam

Table 9: Specimen Specifications: House of Qavam

Profile of the building	The direction of the building	Course and Area	Sample name
1. The Narenjestan's buildings are made up of two parts: the northern part with an adjoining porch and one underground floor, and two upper floors used for office and ceremonial use, and the south part with four rooms in the southeast corner and Southwest where the crew were present	Northeast to the southwest, the main entrance of the garden, opens to the south	An area of 3500 square meters and a 940 square meter substructure located at Lotf Ali Khan Zand Shiraz Avenue	House of Narenjest Qavam

Fig 4: Plan and showcase the house of Narenjestan Qavam

Forogh ol Molk House

Table 10: Specimen Specifications: Forough Al-Mulk Home

Name	Course and Area	The direction of the building	Profile of the building
Forogh ol Molk House	AN AREA OF 1020 SQUARE METERS LOCATED IN THE BLACK STONE SHIRAZ NEIGHBORHOOD	Northeast southwest	It has four main parts: exterior, interior, furnishings, baths and stalls. The exterior of the building is connected by the corridors to the courtyard of the mansion and an interior for the use of family members. The Indoor Mansion has a main lounge, such as a reception room and a number of rooms in the east and west. The mirror room is located in the south of this same area. Materials used in the construction of wood, stone and bricks are covered with gypsum mortar, soil, and some spit dots. In two parts, north and south, there are two five-door rooms, three floors with basements, all floors are connected by a basement used as a warehouse.

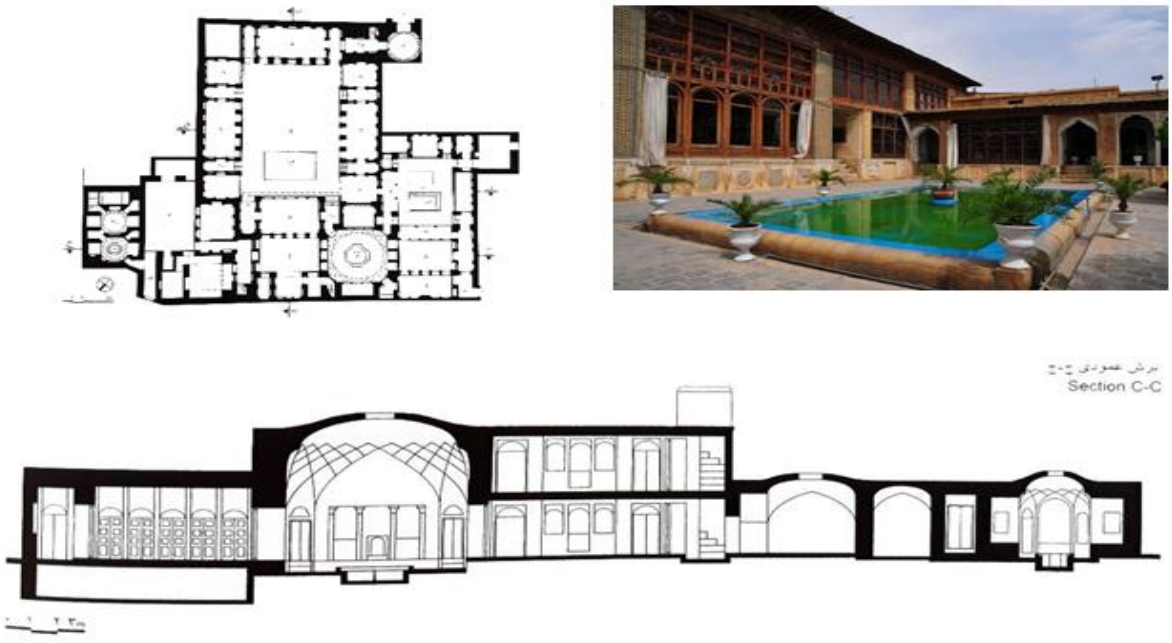


Fig 5: Plan and cut the house forogh al-Milk

Nasir ol molk house

Table 11: Specimen Specifications: House of Nasir ol molk

name	Course and Area	The direction of the building	Profile of the building
Nasir ol molk house	THE TOTAL AREA OF NASIR AL-MOLK COMPLEX IS 2890 SQUARE METERS AND THE INFRASTRUCTURE IS 2216 SQUARE METERS	Northeast southwest	What's left of Nasir al-Mulk's home now includes the main hall, part of the inner courtyard, the exterior and the basement. The hall of the mirror is made up of symmetrical shapes, and on both sides there are two sashs (a kind of old that has a special frame and has been opened and closed up and down) A large country with a subtle Chinese knot and colored glass that is connected to the inner and outer courtyards, as well as a large five-leaf arches in the middle of which are two floors with high ridges and a basement with bolts with arches And the rocky skylights are beautiful.

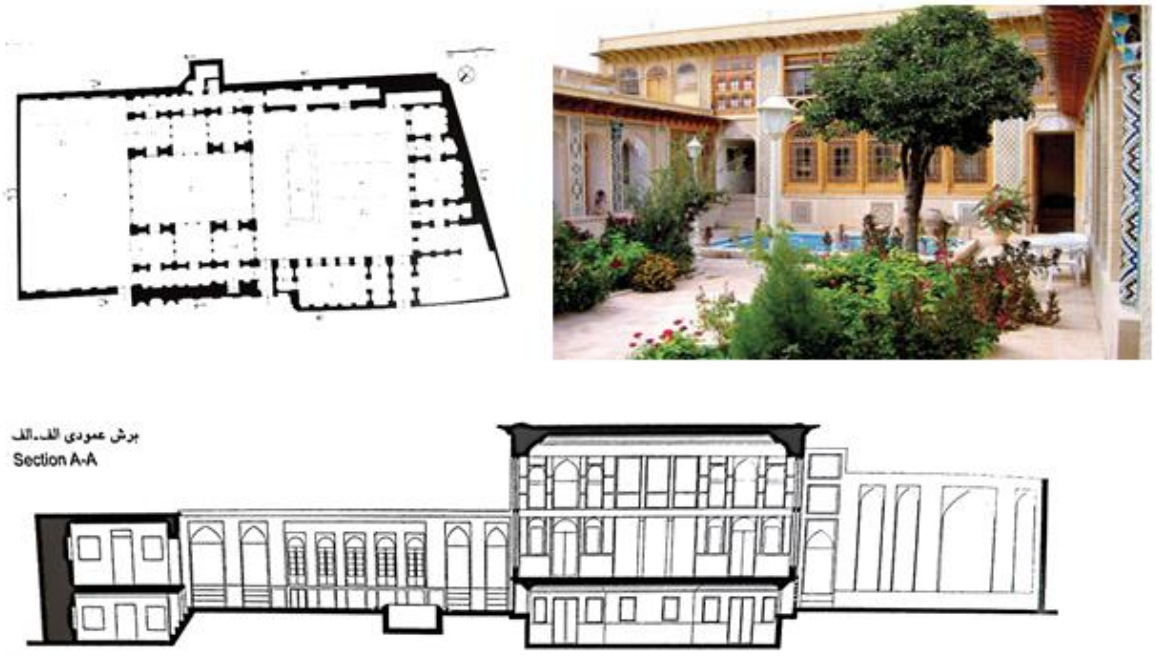


fig 6: Plan and Cut the House of Nasir ol molk

Define levels of complexity

In order to create a hierarchy in the analysis of samples and given the complexity of different projects is not the same in terms of flexibility. In this study, the complexity levels and order of examining case examples on the basis of the adjustment of the role of communication spaces at each level is also analyzed to find that various levels of complexity contribute to flexible understanding, and facilitates familiarization with simpler levels of complex design process. Several branches are involved in determining the complexity of a project. One of the most stable indicators is the ability to change the use of indoor spaces, and it may be said that the creation of flexibility in a plan is based on these characteristics, and it can be claimed that this feature is more or less present in all flexible projects.

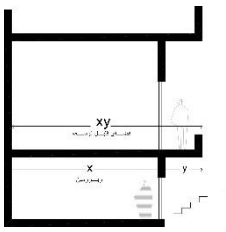
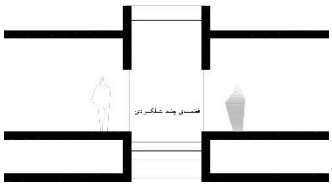
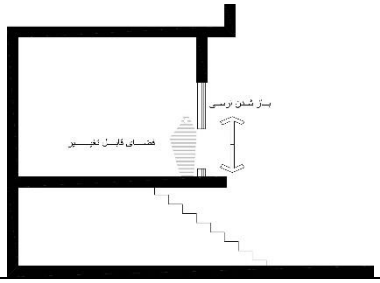
Table 12: Flexibility solutions from the perspective of contemporary houses and traditional elements at levels of complexity.

Sample Traditional Elements	solutions	Levels of complexity
lporches -high home -basement	Definition: Ability to change user is one of the most important features of all types of flexibility and the most basic level that specially deals with multi-purpose rooms. The purpose of the design of the room is to accommodate different functions and to change the user of each room according to their needs.	Level 1: Multipurpose Rooms
-Injection or Tucker or Summer House -the hallway	Definition: refers to a room that is usually floated between two residential units and can be assigned to either of these two units. The purpose of the room design is to make the room an independent space	Level 2: Shared rooms
lArsy -Three Doors - five doors	Definition: In these plans, flexibility is often achieved through the multi-functional spaces and their change of use in a short time. The purpose of the room design is to have rooms in direct communication.	Level 3: Rooms with folding compartment

-Central courtyard -Eight -old man room	Definition: One of the ways that ensures the ability to change in a space defines the freedom of space, ie the use of separators with space constraints, applications, and activities. The purpose of the design is that the space is usually an open room with a head that can be made with different layers with light blades.	Level 4: Raw spaces

Analysis of the findings

In this regard, looking at the past and receiving the concepts of space and functional architecture of the era before, including residential buildings, we can conclude that the most prominent feature of the architecture of each settlement is the need for flexible spaces with the ability to evolve space in functional, physical, social and biological function. In fact, the creation of space expresses what he wants to bring to man's mind, using functional forms, and on the other hand, observing the aesthetic principles. As a result, flexible and varied spaces can be created over time with a view to changing human needs, and as a solution to prevent the collapse of individual interactions with their habitat and the possibility of adapting housing to the changing physical and mental needs of their audience.

		Multipurpose Rooms
		Shared rooms
		Rooms with folding compartment

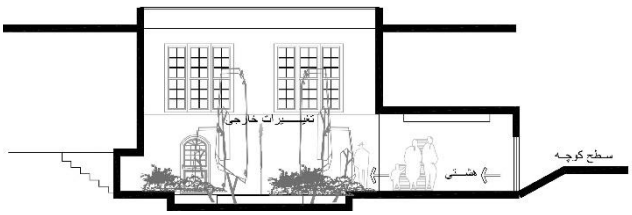
		Raw spaces

Table 13: Flexibility solutions in traditional homes and their use in contemporary.

Conclusion

The main findings from the conclusion in this study can be argued that flexible space includes varieties of designs that vary according to the short-term and long-term needs of users and, in response to their mental and psychological demands, are taken grfadually. Accordingly, the main domains of flexibility and its mode of operation in the contemporary and past times related to the differentiation, diversity, adaptability to the habitat of ones, by presenting variable and fixed solutions of a building, are described throughout the research. Obviously, full flexibility can not cover all of the changes, but by providing appropriate solutions, the use of past experiential factors, as well as significant changes in some parts of the building on a small scale, can be made to an acceptable level of environments with the appropriate response to the changing needs of people. The information and discussion presented in this study can be used as a background for further research on the issue of flexibility in designing contemporary homes. In addition, we can consider bio-comfort as a result of meeting the different needs of users with a variety of lifestyles, and finally it can be stated that "what distinguishes flexible spaces in terms of the comfort of biological spaces of particular rank."

It seems that designers of space patterns in the Iranian architectural tradition focus on the majority of mental and psychological conditions and everyday physical behaviors while at the same time creating a homogeneous environment, with a huge amount of responses for the needs of users and providing users who put it. In fact, by explaining the types of flexibility and concepts, each one provides a systematic and comprehensive analysis that helps in thinking space in the concept of flexibility. Based on the results, it seems that the conceptual value of the type and flexibility of operation are more effective than industrial solutions and developments in building technology in

housing design. Based on the fact that, with a better understanding of the concept of flexibility, we can make optimal use of the design spaces. In this way, the quality and quantity of houses, with the change in each of the factors of creativity, creates a significant impact on physical and physical functioning. By creating an internal relationship and relying on flexible concepts, a conceptual relationship can be found. Creating a better place in design and creativity.

References

Abolghasemi, Latif, Kiani, M. (1986). "Norms of Formation in Islamic Architecture of Iran": Iranian Architecture during Islamic Period, Jahad University Press.

Bentley, Yin et al. (2006). Respondent Environments, Translator: Mostafa Behzadfar, Tehran, University of Science and Technology, 160.

Borhani, Farnaz (2007). "Flexibility in Minimal Housing", Abadi No 20, No. 20.

Demaria, I.; Colorado, D. (2015). Trees, shrubs and lawn: Acoustic effects in urban parks, *Revista de la Universidad del Zulia*, 6 (14), 58-66.

Einifar, A (2003). "A Model for Flexibility Analysis in Traditional Iranian Housing, The Beautiful Arts", Tehran, No. 13.

Einifar, A (2007). "A Comparative Study of Flexibility in Iranian and Japanese Residential Architecture", Quarterly Journal, No. 55, p. 12.

Grötter, Uort Kurt, (2004). "Aesthetics in Architecture", Translated by: Jahanshah Pakzad, Shahid Beheshti University Press.

Hall, Edward (1998). "Hidden Dimension", Translated by: Manouchehr Tabibian, Tehran University Press.

Hobraken, N.J. (Others) (1986). "Types of Successions in Housing", Translation: Faridian, Golara, Yazdkhasti, Nasser, Center for Academic Publishing, Tehran.

Memar, G.H. (2010). "Urban Identity of Shiraz", Navid Shiraz Publications, Chapter Four.

Perchal, Steven A. Pena, William M. (2005). "Fundamentals of Architectural Planning", translated by Mohammad Ahmadinejad, Isfahan, Khak Publishers.

Rasooli Sani Abadi (2017). "The role of communication spaces in achieving flexible residential units," Safeh Journal, No. 76, pp. 17-36.