A Typology of Sistan's Vernacular Housing in Terms of Open and Closed Space Formation

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Abstract

Housing types depend on the relationship between human needs and the environment. They are variable and complex due to humans' different lifestyles and environmental conditions. What distinguishes them is not the constituent parts; rather, it is the logic of the spatial arrangement of the components, which varies based on the time, place and way of residence and represents the cultural, economic and climatic characteristics of the residence method. Identifying and preserving the heritage of rural architecture help us to preserve national historical assets and apply the long-established principles remaining from the past eras to new physical forms via discovering the mysteries, signs and symbols hidden in these assets. Vernacular housing types, especially in rural areas, are strongly influenced by their surrounding environment. Therefore, discussing the housing typology of each region requires an understanding of the context, location and rural fabric of that region. Developed via field measurements, observations and library research, this article is the result of the study of vernacular housing samples from 20 selected villages in Sistan using the descriptive-analytical research methodology. This study sought to classify and introduce the physical characteristics of vernacular housing in Sistan in terms of the formation of open and closed spaces. The approach of this research was the typology of spatial organization of Sistan vernacular housing in terms of open and closed space formation. The research sought to answer the question that whether the types of Sistan vernacular housing can be classified into different types with similarities in terms of outdoor and indoor design. The results showed that Sistan has special climatic conditions, and its social and livelihood structure has led to formation of unique housing architecture types. These types include basal, linear, L-shaped, U-shaped, central courtyard and kiosk. Given that recent constructions in the rural areas of Sistan are being modeled after urban housing, promotion of these house types can help revitalize vernacular rural housing in Sistan.

Keywords: Typology, village, vernacular housing, closed and open spaces, Sistan

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Introduction

The vernacular architecture of each region has been created under the influence of climatic, geographical and cultural conditions of that region and shows centuries of experience in the optimal use of materials, construction methods and climatic considerations. Ignoring this rich history can cause the disappearance of vernacular architecture and the experiences of those who practiced it (Maghouli and Ahmadzadeh, 2017: 87). Identifying and preserving the precious heritage of vernacular architecture in general and rural architecture in particular, while being a kind of protection of the national historical assets of the country, helps us to discover the mysteries, symbols and signs that lie in them. It will also lead to implementing the sustainable principles of the past anew and preserving the identity and architectural originality of rural settlements (Sartipipour, 2009: 2). Moreover, the study of rural architecture can help designing spaces suitable for the conditions of different regions and solve some problems in the context of rural and urban settlements and lead to the formation of a set of desirable villages in the country (Sartipipour, 2008: 12). To achieve this goal, typology is one of the most basic scientific steps. A correct knowledge and classification of different types of architecture can help not only in better understanding and preserving the space, but also in acquisition of new design methods (Hassanpour Lemer, 2014: 117).

In Iran, the diversity of architecture is even visible in a small area, and the Sistan region is no exception. In this area, rural settlements are different in terms of physical texture and the formation of open and closed spaces. This has led to the emergence of unique types of housing in this area, which is affected by the interaction between the characteristics of the built environment and the natural environment. The differences and the interaction between these characteristics have created different types of housing. Therefore, different types of housing indicate the interaction of various factors, and due to the determining role of the rural environment and also the less involvement of external forces in their formation, they are very valuable examples to study. Considering that the typology of rural housing in most parts of the country has been done by researchers and relevant institutions, it seems necessary to identify and introduce the vernacular housing types of Sistan that are still in use in the rural context of this region. Moreover, finding the principles affecting the formation of primary to more complicated types is a way to achieve suitable patterns for design.

Research questions

Given the goals and needs stated in the introduction, this article seeks to answer the following questions:

- Can the types of vernacular housing in Sistan be classified into specific types with similar characteristics in terms of outdoor and indoor design?
- What types of vernacular housing have been formed in Sistan?

Research Methodology

According to the purpose of this article, which is to identify and study the architectural types of vernacular housing in Sistan in terms of the formation of open and closed spaces, the research method is descriptive-analytical based on field observations. To classify Sistan's vernacular housing, information was extracted from 20 selected villages that had a richer vernacular texture in more than 900 villages of Sistan. Then, by using field surveys and comparing information based on the similarity of the buildings of each village, which are formed by the climate and living conditions of the people, the classification and localization of Sistan vernacular housing are discussed.

Theoretical Framework and Background of the Research

The word typology in Western culture is derived from the word "type", which in English is equivalent to the words "model, example, form, category, symbol and attribute". In scientific definitions, a type refers to a classification in which a number of different objects are organized based on one or a set[1] of common features, and the science that studies and analyzes them is typology. The criteria of this identification can be different depending on the researcher (Memarian and Dehghani Tafti, 2018: 22). The Moratoria School has the greatest

thinkers of architectural typology in the world. They consider the basal types as a simple space (for example, a room) from which more complete types emerge. Moratorians believe that the basal types have older roots and call it the first or primary cell (27). Researchers have identified two areas for the application of types and typology in architecture; one in southern Europe and countries such as Italy and France, which have paid much attention to the theoretical aspects of the subject, and the other in Northern Europe, where the types are considered merely as conceptual phenomena and numerical methods. Believers in the idea of space syntax in architecture also name two types of "biological pattern" and "physical pattern", the first pattern focuses on the spatial relationship of a building that can be repeated in other buildings and the second on the body that can be called a physical form (Memarian, 2018: 199). Raheb states that the type of housing is the result of human interaction with the environment and is derived from the context; therefore, it is necessary to study the underlying components and its effects on housing formation. She believes that effective variables can be distinguished in two categories of dependent and independent variables. Independent variables are the underlying factors affecting housing formation and dependent variables are different dimensions of housing formation. (Raheb, 2015: 15).

In the latest related research on the subject, Memarian and Dehghani Tafti, while examining different theories about types and typology, proposed a definition of type as a multidimensional reality composed of organs and schemas where both the material and the immaterial are present simultaneously. In this research, a type refers to a physical form intertwined with the life of the inhabitants, the mentality of the architects and the semantic experiences and architecture of the past (Memarian and Dehghani Tafti, 2018: 36). Despite all these descriptions, it seems that the term type and typology, due to its historical background, is more associated with formal and physical aspects, and several researches have been done in different parts of the country in this regard (Hassanpour Lemer, 2014; Maghouli and Ahmadzadeh, 2017; Azad et al., 2018; Dana Salem et al., 2019).

In Iran, typology has been one of the topics discussed by the two governmental organizations –the Islamic Revolution Housing Foundation and the Building and Housing Research Center– since the 1980s. Also, several researches have been done by different people, especially consulting companies, each of which has used different criteria (Memarian, 2008: 201). Gholamhossein Memarian in his book "Introduction to Iranian Residential Architecture" (extrovert typology) has studied the architecture of vernacular dwellings of Gilan, Masouleh and Abyaneh plains. In his book, he discusses that nature is the determining factor in the architecture of dwellings in these areas and the general plan of the types. In another book of the same name, he also deals with introvert typology and studies the architecture of the vernacular dwellings of Bushehr, Yazd and Zavareh (Memarian, 2008).

In Sistan, many researchers have conducted studies in the field of vernacular and rural architecture (Tate, 1910; Davtalab and Azarsa, 2009; Fazelnia et al., 2011; Mir Lotfi et al., 2012; Heidari et al., 2014; Sargazi, 2016; Memarian et al., 2017). In the field of typology in this region, Oveisi Kaikha in his dissertation entitled "Interaction of Climatic and Social Factors in the Formation of Open and Closed Spaces of Vernacular Rural Settlements of Iran" examines different types of housing in Sistan (Oveisi Keikha, 2013). Heidari argues that in the field of rural housing typology of Sistan, the formation of vernacular housing starts from a cell called "room", and from the combination of rooms, the vernacular rural houses of Sistan are formed (Heidari, 1394: 55). Despite the above studies, so far, no research has been conducted with the aim of reviving rural architecture in Sistan. Therefore, this research deals with the spatial organization of vernacular housing in Sistan region, which is representative of the vernacular architecture of this region in terms of the formation of open and closed spaces with the above

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purpose.

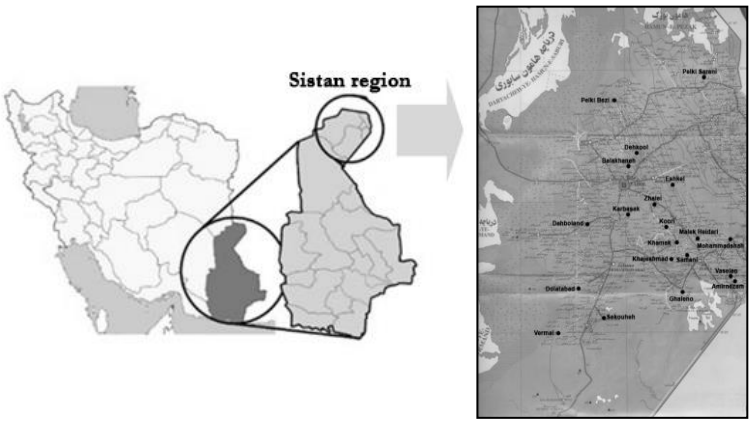
Discussion and Results

Case study of the research

Sistan flatland is located in a low and flat plain in the southeast of the country and in the north of Sistan and Baluchestan province. This region is bordered with Afghanistan from the north and east, with Zahedan from the south, and with Lut desert and Birjand from the west and northwest (Afshar Sistani, 1991: 145). For the purpose of this study, 20 villages with rich and valuable texture were selected as a sample from which candidate vernacular dwellings were collected and analyzed (Figure 1).

Characteristics of Sistan Vernacular Housing

Vernacular housing in the Sistan region, like other parts of our country, has been established with emphasis on climatic conditions and the facilities provided by the environment to the vernacular architect. One of the principles of vernacular architecture is the maximum use of renewable energy and the minimum use of fossil energy. This is also evident in the Sistan region. Vernacular architects of Sistan in the best possible way benefited from the prevailing climatic phenomenon of the region –the 120-day winds of Sistan (Davtalab and Azarsa, 2010, 6). The direction of these winds is from northwest to southeast regulating the heat conditions of the region and affecting the physical orientation of the vernacular settlements (Figure 2) to provide the possibility of directing the wind flow into residential houses through special windbreaks called "Kolak" (Fazelnia et al., 2011: 7). In Sistan region, in order to make the most of these winds and to use solar energy, houses are built in such a way that Kolaks are northwestward (windward) and the doors of the houses face the southeast (leeward) (Golmohammadi, 2011, 84).



F1. Sistan map, the location and the name of candidate villages (Source: Negarandegan).

F2. Vernacular architecture of Sistan, Ghaleno Village (Memarian et al., 2017 :26).

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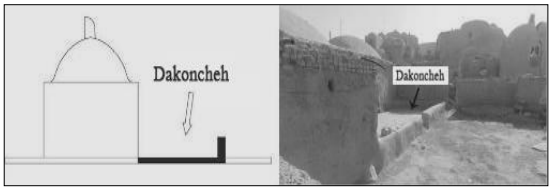
Typology of Sistan Vernacular Housing

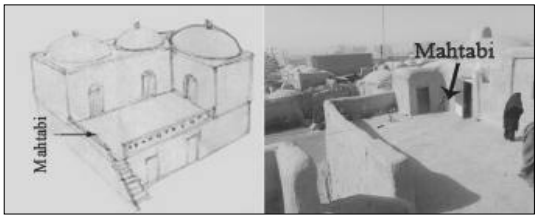
One of the important factors in determining the type of houses in Sistan region is the separation of living space and livestock space. This division has led to the creation of spaces such as "Dakoncheh" and "Mahtabi".

Dakoncheh: In some rural houses, where livestock space and living space have two different directions, Dakoncheh refers to the open area in front of the living spaces surrounded by them. This area is usually separated from the main yard by a wall 60 cm high. Due to the fact that this space is leeward, the favorable weather and calm wind in this area is used for rest in the evenings and nights (Figure 3).



F3. Location of Dakoncheh in Sistan vernacular houses (Source: Negarandegan).

Mahtabi: It is an enclosed and roofless space that is located between the rooms and is used in some types of rural housing in Sistan, where the living space is on the upper floor and the livestock space is on the lower floor. The use of this space is like Dakoncheh (Figure 4).



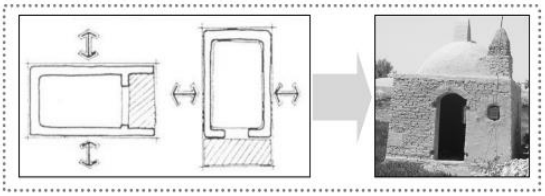
F4. Location of Mahtabi in Sistan vernacular houses (Source: Negarandegan).

According to the information and observations obtained from the vernacular dwellings in the selected villages and considering the climatic, environmental, subsistence, and social factors as well as the characteristics of the general form of architecture of vernacular houses in the region, the dwellings in Sistan can be categorized and divided into the following:

Basal, linear, L-shaped, U-shaped, central courtyard and kiosk

Basal (primary cell)

The first type of housing identified in the Sistan region, which are thousands of years old, are the basal types. This type is very simple and primitive and is referred to as the primary cell of local habitat formation (Heidari, 2015: 55), which has been gradually changed into more complex forms under the influence of various factors (Figure 5).

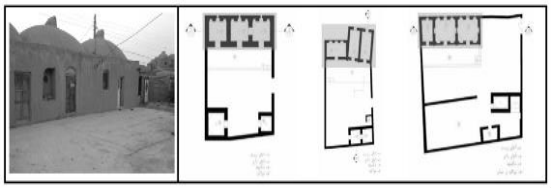


F5. An example of basal type in Sistan vernacular housing (Source: Negarandegan).

Linear

The linear type consists of two or more rooms that are arranged in a row and are usually located northwestward to exploit wind energy. The closed space of this type of residential unit occupies the entire width of the land, or in some cases, up to two thirds of it. Also, the open space in this type of housing is more extensive than its closed space (Figure 6). In terms of living space and livestock space, the linear type is categorized into two subtypes, including those with Dakoncheh and those with Mahtabi.

They are mostly used by farmers, ranchers or service workers. This pattern is also often seen in villages that have a continuous and integrated texture.



F6. Examples of Linear type in Sistan vernacular housing (Source: Negarandegan).

L-shaped types

This type is a more complete linear pattern that is executed in an L-shape. The closed space in this pattern, like the linear types, is

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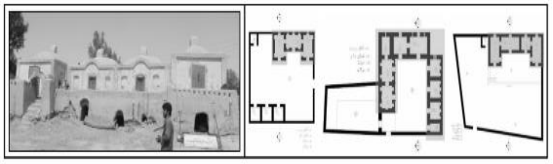
usually located on the northwest of the house and its open space is located on the southeast. The shorter wing, which usually consists of one or two nesting rooms, has a reception or sometimes service (kitchen and storage) area (Figure 7). Dakoncheh and Mahtabi, as the open space of the living space, are also present in this pattern. Economically and socially, users of this type of housing have better economic strength than those using the linear one.

F7. Examples of L-shaped type in Sistan vernacular housing (Source: Negarandegan).

U-shaped types

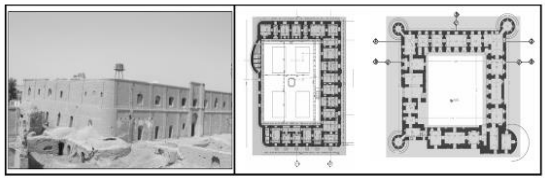
This type consists of at least 3 rooms and sometimes, depending on the social class and the financial scope of the user, it has more than three rooms and is considered as a more complete example of the previous two types. The closed area in this type is located on the north, adjacent to the passage, and to the south, it faces the open space of the house. The covered porch, which is built in front of the rooms, plays a major role in cooling the interior space and ventilating the rooms. In some examples of this type, living space, closed livestock space and service space are often located on the south of the open space. Examples that include Mahtabi are the ideal housing among the villagers and belong to the more affluent class (Figure 8).



F8. Examples of U-shaped type in Sistan vernacular housing (Source: Negarandegan).

Central courtyard types

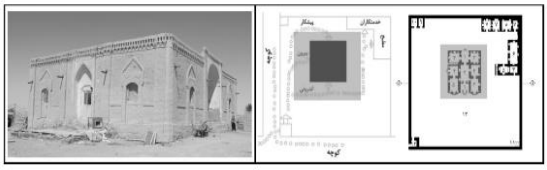
In general, the central courtyard types are completely introverted and all its views are towards the courtyard. This type includes a complete set of rooms with residential and service uses, the main living spaces of which are located on the northwest to use wind energy for natural ventilation. The owners of this type of residential units have often been the Khans of the region, and it is more common in villages with dense texture. In this type, the side views of the building control the sunlight and create shadows on different levels. Also, in winter, due to the compactness of the building, the spaces protect each other from the flow of cold air (Figure 9).



F9. Examples of central courtyard type in Sistan vernacular housing (Source: Negarandegan).

Kiosk types

In the past, a kind of kiosk building known as Sardari house was built in Sistan. This type is specific to local chiefs and is of imported architecture. It is not a product of collective culture and has been formed by the ruling class with a kind of personal taste against local culture and local buildings and has little compatibility with vernacular architecture. In other words, the social class and economic power of the individual are influential in forming this type, examples of which are scattered throughout the regionIn. They have often one floor, and the building is located inside a courtyard surrounded by high walls with an extroverted form. Also, in some examples, spaces in a corner of the land are provided for service work. For some examples of this type, there are three entrances for the external, internal and service sections. The entrance to the closed space is often located on the north reaching the building through a long porch (Figure 10).



F10. Examples of Kiosk type in Sistan vernacular housing (Source: Negarandegan).

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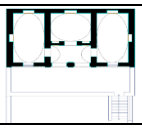
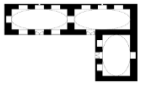
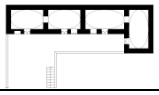
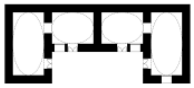
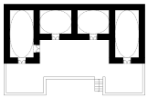
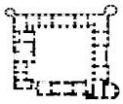
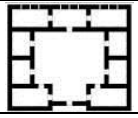
Typological analysis

Typology is a way to classify rural houses based on the form and plan of spatial relationships and knowledge of built spaces (Maghouli and Ahmadzadeh, 2017). The formation of residential types is the result of an interactive process between influential forces that gradually emerges from primitive to more complete types. These types are the product of a collective culture that has been formed and evolved over time by the people of the same region and has been adapted to the vernacular culture of each region.

In this research, an attempt has been made to classify them. The main criterion here has been the general shape of the building and the relationship between open and closed space. In Sistan, from prehistoric times, there has been permanent (not temporary) settlement and the formation of brick settlements in it has a long history. According to a field study, the initial housing of the people was very simple and primitive, and buildings gradually changed from simple forms to more complex ones under the influence of various factors. According to the research findings, rural houses in this area are divided into 6 types: basal, linear, L-shaped, U-shaped, central courtyard and kiosk (Table 1).

Row	Type	Plan	Picture	Description
1	Basal			
2	Linear			With Dakoncheh
				With Mahtabi
3	L-shaped			With Dakoncheh
				With Mahtabi
4	U-shaped			With Dakoncheh
				With Mahtabi
5	Central courtyard			
6	Kiosk			

T1. Typology of vernacular housing of Sistan in terms of open and closed spaces (Source: Negarandegan).

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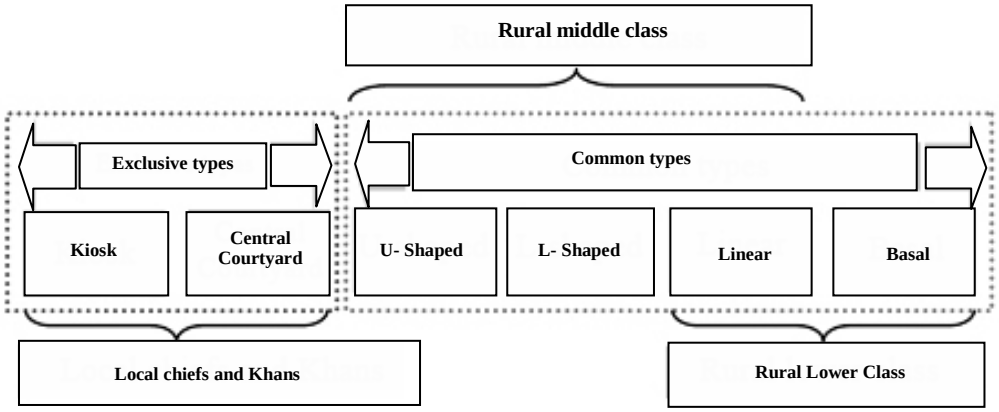
In this study, it was found that with the exception of the central courtyard and kiosk types, in all other types, the spatial components of the residential area consist of a primary cell, and this growth and expansion of the primary cell is based on different needs and factors such as economic, living, social and climatic factors. Moreover, it was found that one of the influential factors in determining the type of housing was the discussion of the separation of living space and livestock space. Thus, the commonly known types were divided into two parts, Dakoncheh and Mahtabi. Also, depending on the context of the village, different types have been implemented. Linear, L-shaped and U-shaped types are most abundant in villages with continuous and integrated texture. In addition, these types are found around villages with dense texture and hills. However, in these areas, the ratio of the open space to the closed space is less than villages with continuous and integrated texture. The highest frequency of subtypes with Mahtabi is seen in villages with dense texture and hills. Central courtyard and Kiosk types are also occasionally found in some villages of the region with dense texture. The reasons for this are due to the effect of environmental factors on the formation of rural texture. Most of the compact villages are located near fertile lands and away from the danger of river floods and the main path of hurricane-force winds, which is one of the causes of instability in the region. There were fewer villages under the dunes. In the villages with continuous and integrated texture, which are adjacent to the Hamoon Lake, simpler types have formed, because the above unstable factors were more severe there and prevented the establishment of population and the formation of villages with dense texture.

In Sistan, different types of housing have changed from simple to complex according to the economic capacity of individuals. According to studies, the linear type is usually simple, and the low-income people use it more. However, in some cases, this type, especially those with Mahtabi, is used by those who have better financial means. The central courtyard and the Kiosk types are for local Khans and chiefs and is known as Sardari house (Figure 11).



F11. Common and special types of Sistan vernacular housing and classification of their users (Source: Negarandegan).

Conclusion

A look at the studies on the typology of vernacular housing shows that despite the rich and unique architecture that exists in the vernacular context of Sistan villages, no comprehensive studies on the spatial organization of vernacular housing in this area have been conducted. In this study, the authors tried to identify and study the architectural types of vernacular housing in Sistan in terms of the formation of open and closed spaces. They used field surveys and compared information based on the similarity of buildings in each village. Finally, the

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authors of this paper classified, and thus typologized, these types, which were formed from the climatic conditions and the lifestyle of people.

Studies have shown that the initial housing of the people of this region is very simple and primitive, and the residential buildings of the region have gradually developed to complex forms from simpler ones under the influence of various factors. Also, the rural houses of the region are divided into six types: basal, linear, L-shaped, U-shaped, central courtyard and Kiosk. It was also found that one of the influential factors in determining the type of housing has been the separation of living space and livestock space. Thus, the most abundant types (linear, L-shaped and U-shaped) were divided into two subtypes, those with Dakoncheh and those with Mahtabi. In addition, research has shown that the central courtyard and Kiosk types, which are also known as Sardari house, were for local Khans and chiefs.

Considering that recent constructions in rural areas of Sistan have been modeled on urban housing, recognizing these types can lead to the design of vernacular rural housing in today's Sistan architecture. The focus of this study was specifically on the spatial organization of rural housing in Sistan, and further studies may analyze the typology of rural housing in this region with different climatic and social attitudes.

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