

# The Manifestations of Architectural Flexibility in Rural Houses; Case Study: Tazareh Village in Damghan, Iran

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## ABSTRACT

The "flexibility" concept has been long considered in Iranian rural houses. However, nowadays, changes in socio-economic structure have led to extensive evolutions in the architectural pattern of rural housing, and less attention has been paid to the "flexibility" concept. Moreover, the architecture of old rural housing includes several valuable characteristics and standards related to flexibility. Thus, the present study aims to examine the manifestations of architectural flexibility in rural housing. This study is applied, descriptive, and analytical research. First, the main manifestations of flexibility (diversity, adaptability, changeability) are identified using a library study. Next, the identified manifestations are investigated and compared in six characteristic housing plans in Tazareh village throughout the field studies. This study suggests that in Tazareh village, all the residential housing plans are flexible and there is a manifestation of flexibility in all the micro-spaces of these plans, with higher architectural flexibility in the plans with higher numbers of courtyards, floors, porches, and entrances. Moreover, the results indicate that the most effective factors making the rural housing architecture flexible are the elements such as several courtyards next to the building mass or several masses next to the courtyard, various entrances, and floors (two-storey houses) that allow for the division of the building between more than one household or various uses. Therefore, the "changeability" component of flexibility is the main design factor in rural housing.

**Keywords:** Flexibility, Rural Housing, Tazareh Village in Damghan.

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## 1. INTRODUCTION

Rural housing gives an identity to the physical structure of the village and explains a large part of its historical and cultural features (Amiri 2014, 27). Rural housing is influenced by climate and environmental conditions, and on the other hand, it is related to the livelihood pattern of rural families (Yaghoobi et al. 2016). Today, one can evidently observe the inevitable effects of new technologies, environmental and climate changes, changed social relations, and changed cultural structures on rural housing (Ala Al-Hesabi and Borhani Darian 2007, 21). Therefore, housing must be designed and provided in accordance with such changes and have the capacity for changeability and, in a general sense, flexibility. One of the irrefutable principles of traditional Iranian architecture is the "flexibility" concept. This concept has been long considered in rural housing in Iran and other countries (Einifar 2003, 65), but today, its role in rural housing has diminished. Moreover, the architecture of old rural housing includes several valuable characteristics and standards related to flexibility which can be used in new constructions after being identified and analyzed. Thus, the present study aims to investigate the manifestations of architectural flexibility in rural housing. For this purpose, after reviewing the literature on flexibility to identify its various manifestations, how the flexibility is in the characteristic rural housing plans in Tazareh Village and its physical components were analyzed.

## 2. RESEARCH QUESTIONS

1. What are the factors influencing the flexibility of housing in Tazareh village?
2. What are the manifestations of flexibility in each of the housing plans in Tazareh village?

## 3. RESEARCH BACKGROUND

Einifar, in his study entitled "A Model for Flexibility Analysis in Traditional Iranian Housing", has introduced the factors of flexibility as diversity, adaptability, changeability. According to him, flexibility plays a key role in the formation of traditional Iranian architecture and should be used in the design of contemporary Iranian housing (Einifar 2003). In the article "Rural Housing Indicators in Iran", Sartipipour has compiled and recognized rural housing features and introduced rural residential spaces with multiple functions (Sartipipour 2005). Zargar, in his book "An Introduction to the Iranian Rural Architecture", has studied and analyzed the rural texture and rural housing in Iran, and in some parts, has mentioned the multipurpose spaces and the variety of activities in rural houses (Zargar 2009). Also, in a study entitled "Aspects Affecting Rural Housing Design", Zargar and Hatami Khanghahi have

described Iranian rural architecture as a homogeneous complex with a specific physical identity that manifests the functions and multifunctional role of spaces, mentioning flexibility in rural housing (Zargar and Hatami Khanghahi 2014). In their article, Shakouri and Seyyed Khamoushi have also explained how flexibility acts, specifically in one of the special buildings of Iranian aristocratic houses, called Shekam Darideh Room (Shakouri and Seyyed Khamoushi 2017). However, none of the above-mentioned research has specifically and fully investigated flexibility in rural housing. Therefore, in the present study, it was attempted to investigate flexibility in rural housing in a case study of Tazareh Village in Damghan and to examine and compare its manifestations in the characteristic housing patterns and their micro-spaces in this village to provide the factors affecting flexibility in rural housing.

## 4. FLEXIBILITY

Flexible space refers to space that can be used for several functions at the same time and also for different functions at different times (Einifar et al. 2003, 15). Some spaces have multiple functions and can encompass a range of activities at the same time or over time with making no change in the building structure. Some other spaces can be changed to meet different needs (Gharavi Al-Khansari 2018, 31) and the presence of changeability and adaptability in a building requires long-term foresight in the initial design. Today, the users' needs and the functions of buildings are changing rapidly, making flexibility important in architecture, especially rural residential architecture, from different dimensions. In rural housing, economic, social, cultural, environmental, and physical aspects are effective factors that must be considered in rural housing design. For example, one can mention the rural family occupation and the spaces required for it, the gradual development of housing and the use of one space for multiple uses, the house price, and family affordability as economic factors, household form and household composition as social factors, and climate change adaptation as an environmental factor (Zargar and Hatami Khanghahi 2014, 47-54). The difference between the attitudes towards rural housing and the general definition of housing becomes greater when rural housing is also considered as a livelihood and economic unit. In this case, the continuity and survival of rural housing are subject to its compliance with the changes and demands of its residents (Pahlavani and Mohtavi 2015, 2). Therefore, the "flexibility" concept and adaptation to change are of particular importance in rural housing due to the different cultural, economic, and livelihood structures of rural families from urban families. In fact, flexibility has played a significant role in the old rural housing, and nowadays, the increased constructions in rural areas, without considering the

vernacular patterns of rural housing, imitation of urban housing plans, and its non-adaptation to rural living, have made its role more prominent. In general, "diversity", "adaptability" and "changeability" are considered as different manifestations of flexibility (Kiaei et al. 2019, 65), as discussed below.

#### 4.1. Manifestations of Flexibility

The "diversity" concept, which is better referred to as spatial potential, signifies the possibility of using the space for different uses at the same time or at different times, with making no change in the size of space. Diversity has been the most basic and effective way to achieve flexibility in the design of traditional Iranian housing because it allows changing the function of space over time. Moreover, since this approach did not require large open spaces or new construction methods and traditional building systems were well coordinated with it, it has been easily adapted to people's daily lives (Einifar 2003, 62). Easy and legible access to spaces, combining various uses in one space, creating personal and collective spaces due to the variety of activities, and usefully using access to convert uses can be mentioned as some property's diversity provides (Kiaei et al. 2019, 66). Diversity can be studied in two functional and spatial dimensions. In space, functional diversity allows a variety of functions to be in that space (simultaneously or at different times). This can be evaluated in the functional dimension of the plan. Spatial diversity also provides a variety of spaces to meet the users' needs. This can be evaluated in the spatial dimension of the plan.

The "adaptability" concept is one of the potentials of space, which refers to the capability of space to adapt to the new conditions required, provided that these conditions do not change the building area. Adaptability encompasses all internal changes including change of personality and structure, change of micro-elements, and space composition (Ali Alalhesabi and Borhani Darian 2007, 22). In traditional Iranian architecture, daily and seasonal life was adapted by adjusting the horizontal and vertical relations in the building and using different spaces at different times of the day and in different seasons. Spaces such as summer spaces, winter spaces, basement, attic, and roof had made it possible to adapt the building to different living conditions. In this scale, the courtyard, as the central element, organizes flexibility (Einifar 2003, 70). In other words, the adaptability of space allows the space to adapt to new functions. Among various concepts, the functional difference of space is one of the most important concepts related to "adaptability" that its recognition is very important to select the appropriate field to perform the user's desired activity. In fact, this means that in a spatial configuration, users' spatial identification of different areas can enhance the adaptability of the use to its appropriate space (Kiaei

et al. 2019). Also, the functional difference of space is identified through visual literacy. Therefore, the more visible the space, the greater the visual access to it, leading to the enhanced functional identification of it, and thereby its increased adaptability to the required use.

The "changeability" concept refers to the quantitative expansion/reduction or separation/ integration of spaces while it is possible to return to the original plan after expanding or reducing the area of the building (Einifar 2003, 70). The spatial needs in housing change over time and the building must adapt to these changes (Alexander 2014, 358). Resizing the house in the form of horizontal or vertical expansion or separation of spaces with no change in the area is achieved if the house has changeability. The feature of changeability allows adapting the house to the changes in the family size and expansion and reduction of activities due to the changed plan size, benefiting from the spaces adjacent to the house, dividing the house, and separating it if required (Kiaei et al. 2019, 65). In addition to responding to changes in the family pattern, the separability of the housing pattern has other advantages. For example, in some cases, it makes it possible for the family to rent the house to enhance the family economy, or to provide a place of residence for the children after being married (Gharavi Al-Khansari 2018, 35) or to consider the house a place of work, warehouse, workshop. In fact, the changeability of space allows integrating and separating different parts of that space according to the users' required functions.

#### 5. METHOD

The present study is applied, descriptive, and analytical research. In the present study, first, the literature on architectural flexibility was reviewed through a library study. Then, using the literature and field studies, three general manifestations of flexibility (diversity, adaptability, changeability) in the micro-spaces (entrance, courtyard, porch, room, and barn) of rural houses in Tazareh Village, Damghan were investigated with analysis and deductive reasoning. To identify the research context, first, 6 characteristic rural housing patterns in Tazareh Village were extracted using field studies and a sample house of each pattern was selected, as described in Tables 3, 4, 5, 6, 7 and 8. Next, village and then from each model, a house as a sample is presented in this research, the documents of which are in Tables 8, 7, 6, 5, 4, 3 are expressed. Next, the manifestations of inflexibility in these 6 patterns and their micro-spaces were analyzed and compared.

#### 6. INTRODUCTION OF TAZAREH VILLAGE

Tazareh is a village in Damankuh Rural District, in

the Central District of Damghan County, Semnan Province, Iran (Fig. 1). This beautiful village is located 45 km northeast of Damghan. It is one of the best summer countrysides in Semnan Province. It has mild summers and cold and dry winters and water plays the greatest role in the formation of the village. The village has a stepped and compact texture. It is zoned by three

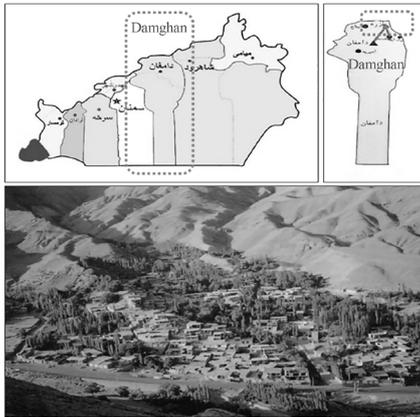


Fig. 1. Location of Tazareh Village in Damghan County and Semnan Province

## 7. THE GENERAL MANIFESTATION OF FLEXIBILITY IN THE MICRO-SPACES OF RURAL HOUSES IN TAZAREH VILLAGE

Rural housing generally has micro-spaces including entrance, courtyard, porch, room, and barn, in each of which there is a manifestation of flexibility. So, in the present study, first, the general manifestation of flexibility in the micro-spaces of rural houses in Tazareh village was studied (Table 1). Next, the manifestations of flexibility in six characteristic rural housing patterns in this village were analyzed and compared.



Animals



Individual

Fig. 3. Variety of Passage through the Entrance

### 7.2. Courtyard

In the houses in Tazareh Village, the courtyard is a kind of connecting joint. It is an element shaping the interiors of the house. It forms a desirable living space through the provision of daylight, ventilation,

Tazareh, Bandarz, and Langar rivers and has been developed along them (Fig. 2). In the past, the main economic activities in it were agriculture, horticulture, and animal husbandry, and later, the coal mining industry has also influenced the livelihood of the villagers (Tazareh Village Guiding Plan 2009, 2-22).

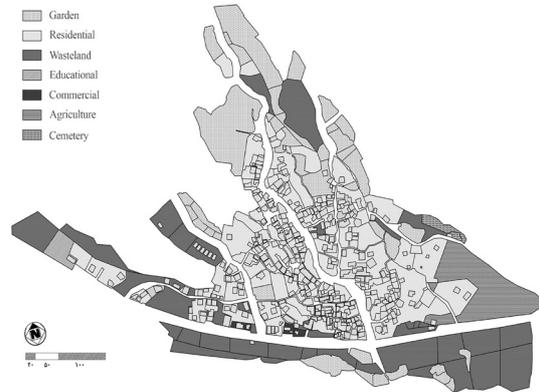


Fig. 2. The Land-Use Map of Tazareh Village

### 7.1. Entrance

In Tazareh village, the house entrance includes different parts including portal and vestibule, and the building is accessed directly or indirectly (through the entryway). The houses have one to three entrances, depending on being used by humans and livestock, as well as the number of families. In cases where there are several entrances, it is possible to separate the entrances. So, there are adaptability and changeability (Fig. 3). Moreover, in cases where individuals and animals used a common entrance, due to the variety of passage, diversity can be observed in this micro-space (Table 1).

and thereby thermal comfort. A variety of activities take place in the courtyard, some of the most important of which are including cooking, processing horticultural and agricultural products, entertaining guests, holding religious festivals and ceremonies, washing dishes and clothes, growing garden and non-

garden trees, planting vegetables, children playing, sleeping and resting, eating and drying clothes. So, among the manifestations of flexibility, diversity and adaptability can be seen in it (Fig. 4). Moreover, in

cases where there are several courtyards, it is possible to separate the courtyards. So, there is changeability in these micro-spaces (Table 1).

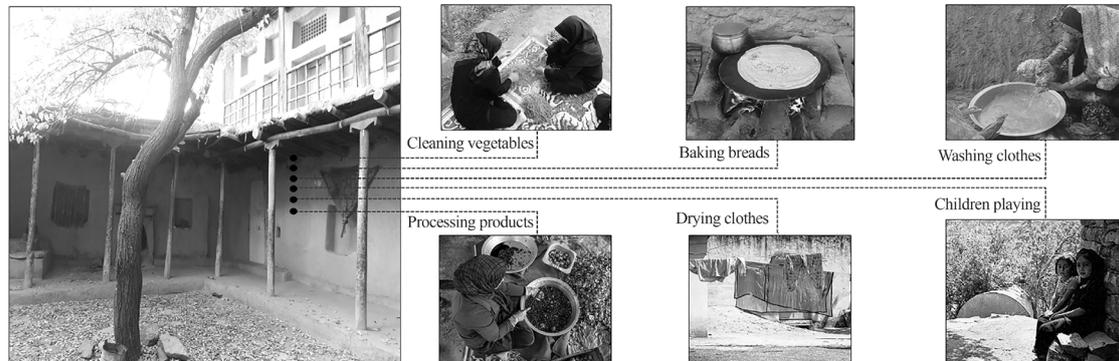


Fig. 4. Variety of Activities Taking Place in the Courtyard

### 7.3. Porch

In the houses in Tazareh village, the porch is a kind of connecting joint. It provides the interiors with landscape and allows daylight, ventilation, and thermal comfort for the interiors. A variety of activities take place on the porch, including sleeping in summer and resting, cooking, drying horticultural crops and

agricultural products, eating food, drying clothes, children playing, gathering and dialoguing, and doing daily activities such as cleaning vegetables (Fig. 5). Therefore, diversity and adaptability can be seen in this micro-space. Moreover, in cases where there are several porches, it is possible to separate the porches and as a result, there is changeability (Table 1).

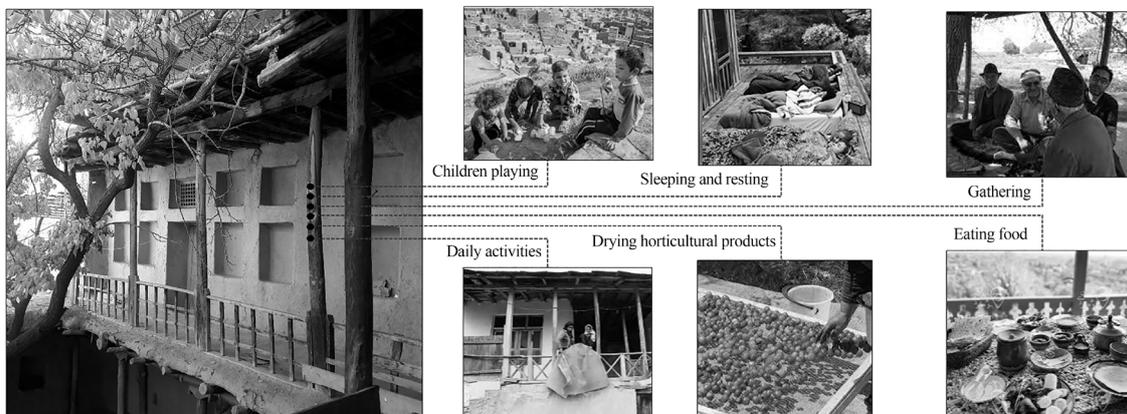


Fig. 5. Variety of Activities Taking Place on the Porch

### 7.4. Room

In the houses in Tazareh village, the room is defined with different uses and, except for a few cases, it is not originally designed for a specific use. Bedroom, living room, kitchen, and drawing room are the main parts of the living space in a house and various activities take place in them, including sleeping and resting, eating food, studying and doing homework, gathering and dialoguing, watching TV, entertaining

guests, children playing, cooking, praying, drying horticultural crops and agricultural products, holding ceremonies, a place for korsi (a device that has traditionally been used by Iranians to warm homes in the winter), storing utensils, dishes, bedclothes, clothes, and food (Fig. 6). Therefore, diversity and adaptability can be seen in this micro-space. Moreover, in cases where there are several rooms or the room size and plan allows separating them, one can perceive changeability in them (Table 1).

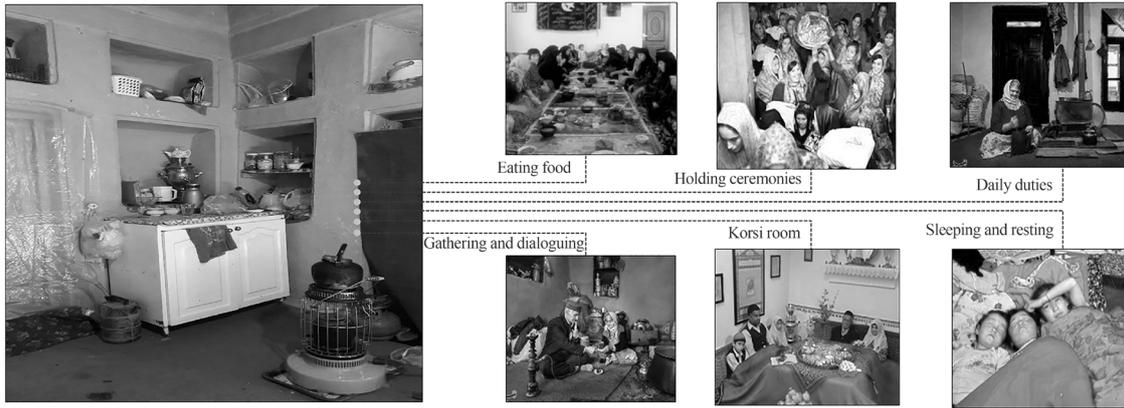


Fig. 6. Variety of Activities Taking Place in the Room

7.5. Barn

In the houses in Tazareh village, the barn has different conditions compared to other micro-spaces due to being used for the protection of livestock. This space is used for protecting poultry (hens, roosters, and ducks), and livestock (cattle, sheep, and goats), and keeping tools and equipment (Fig. 7). So, one

can see diversity and adaptability in it. This micro-space is usually located in the basement or in a separate courtyard to be separated from the human space. Moreover, in some houses, according to the family conditions, this micro-space was turned into a storeroom or straw storeroom, implying the presence of changeability in it (Table 1).

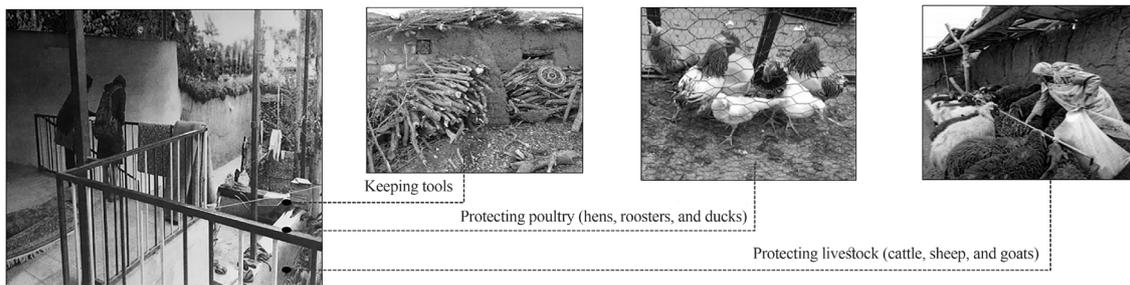


Fig. 7. Variety of Activities Taking Place in the Barn

Table 1. General Manifestation of Flexibility in the Micro-Spaces of Rural Housing in Tazareh Village

| Micro-Spaces  | Functions and Activities  | Manifestation of Flexibility   |
|---|---|--|
| Entrance<br>(Including Portal and Vestibule)        | Passage of animals and humans   |  |
| Courtyard<br>(Including Millstone and Tannour Room) | connecting joint, an element shaping the interiors, provision of daylight, ventilation and thermal comfort, cooking, processing horticultural and agricultural products, entertaining guests, holding religious festivals and ceremonies, washing dishes and clothes, growing garden and non-garden trees, planting vegetables, children playing, sleeping and resting, eating and drying clothes | - Diversity<br>(In some cases)<br>- Adaptability<br>- Changeability<br>(In some cases) |
| Porch<br>(Semi-Open Space)                          | connecting joint, provision of landscape, provision of daylight, ventilation and thermal comfort, sleeping in summer and resting, cooking, drying horticultural crops and agricultural products, eating food, drying clothes, children playing, gathering and dialoguing and doing daily activities such as cleaning vegetables and holding ceremonies  |  |

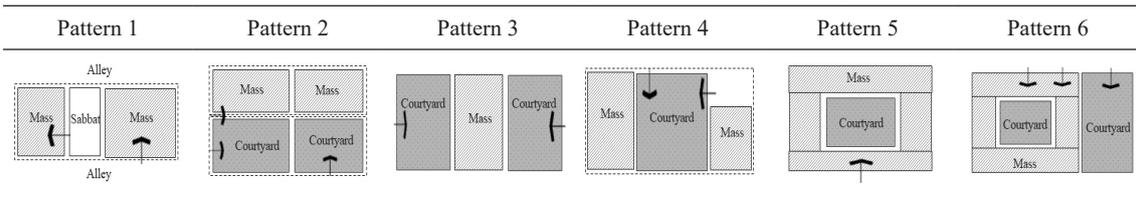
| Micro-Spaces  | Functions and Activities   | Manifestation of Flexibility   |
|---|--|--|
| Room<br>(Including Bedroom, Living Room, Drawing Room, and Kitchen) | sleeping and resting, eating food, studying and doing homework, gathering and dialoguing, watching TV, entertaining guests, children playing, cooking, praying, drying horticultural crops and agricultural products, holding ceremonies, a place for korsi, storing utensils, dishes, bedclothes, clothes, and food | - Diversity<br>(In some cases)<br>- Adaptability<br>- Changeability<br>(In some cases) |
| Barn<br>(Storage Space)   | protecting poultry (hens, roosters, and ducks), and livestock (cattle, sheep, and goats), and keeping tools and equipment  |  |

### 8. MANIFESTATION OF FLEXIBILITY IN THE CHARACTERISTIC HOUSING PATTERNS IN TAZAREH VILLAGE

There are various housing patterns in Tazareh Village due to geographical and climatic conditions in it. Such conditions have allowed various factors such as topography, land slope, economic and livelihood

conditions, cultural and religious structure to play a role in the formation of these patterns. To investigate flexibility in the housing patterns in Tazareh village, among various patterns in it, 6 characteristic rural housing patterns were extracted through field studies (Table 2). Then, it was attempted to investigate flexibility in the patterns and their micro-spaces .

Table 2. Characteristic Housing Patterns in Tazareh Village

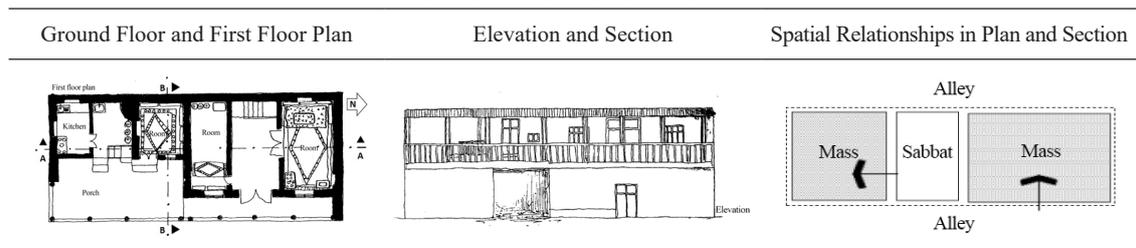


#### 8.1. Flexibility in Pattern 1

The sample house representing Pattern 1 is located in Bandraz neighborhood of Tazareh village and is 40 to 60 years old. It has a wooden structure. In this house, the service-livelihood space (barn and storeroom) is located on the ground floor, and the living space on the first floor. This building has two separate entrances that were designed on the same level. The eastern entrance faces the alley and the northern entrance faces Sabbat (covered passage). About the eastern entrance, after passing through it to come into the house, there is a closed space and then, it is connected to the living space by passing

through the stairs. But about the northern entrance, after the closed space and stairs, there is a porch, which is then connected to the living space (Table 3). Due to the presence of several entrances which make it possible to separate the building into two parts and assigning them to two families, one can understand changeability. The porch of this building is located on the eastern side and the southern porch of this building is separated from the northern one through a different level, so changeability can be understood in it. On the other hand, both porches show diversity and adaptability, which are higher in the south porch, due to its larger area. Moreover, there is functional and spatial diversity in living spaces.

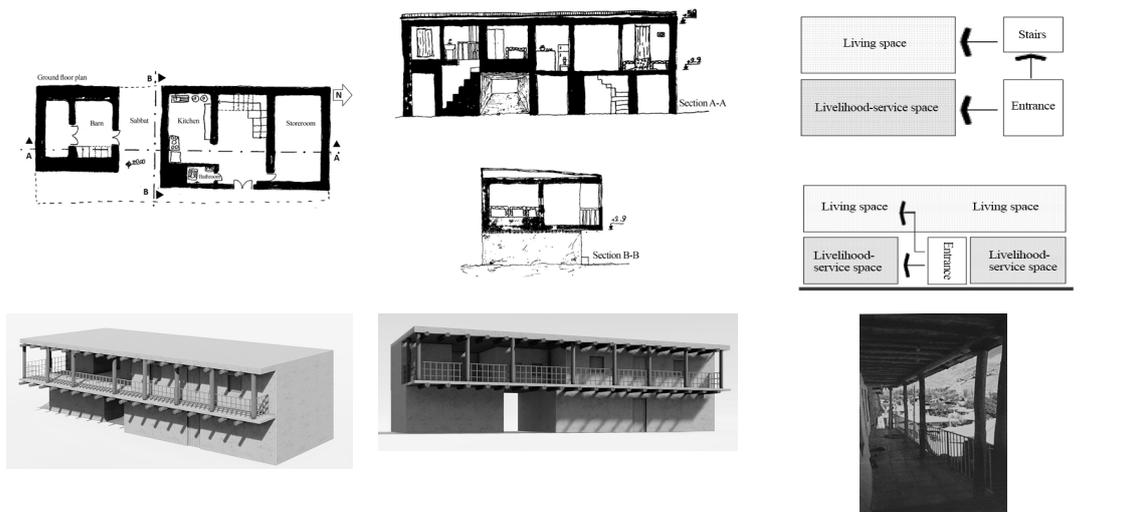
Table 3. Introduction of Pattern 1



Ground Floor and First Floor Plan

Elevation and Section

Spatial Relationships in Plan and Section

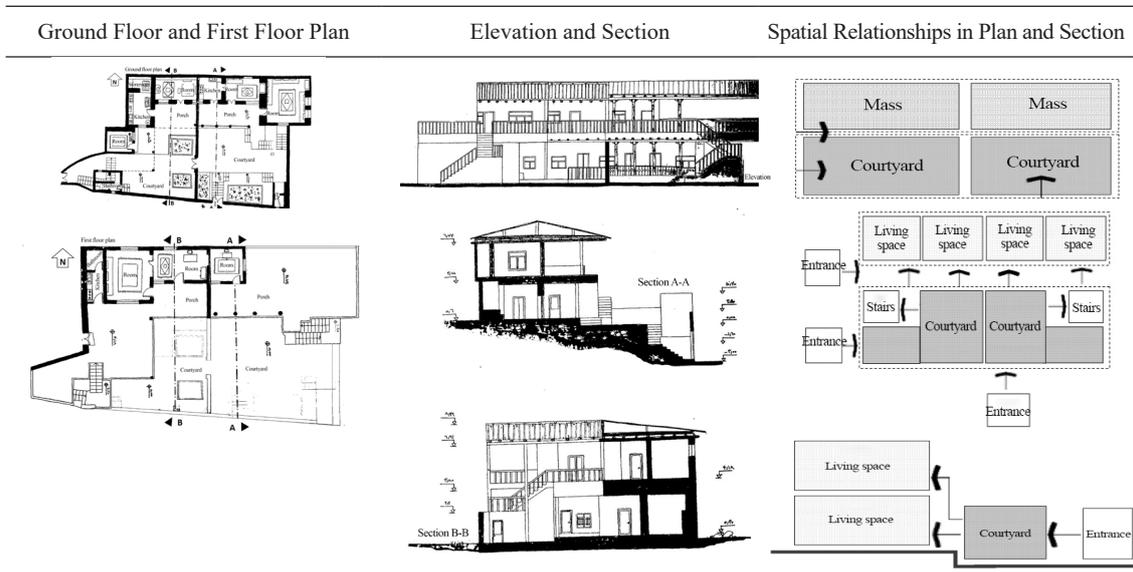


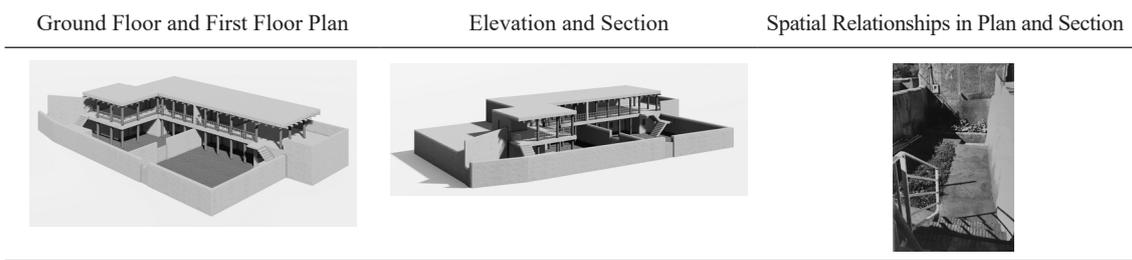
8.2. Flexibility in Pattern 2

The sample house representing Pattern 2 is 30 to 40 years old. This house has three separate entrances, two of which open to the first and second courtyards, and the third entrance, with a great height difference, faces the porch on the first level. In this house, there are two large courtyards with gardens as well as verandas (roofed, open-air porches) on the first floor. The veranda provides the house with the landscapes of the surrounding gardens. In the past, this house was integrated and now it is divided into two parts separated through a wall and a door. Also, the original courtyard and porch have been turned into two courtyards and two porches (Table 4). In this house, one can find changeability and separability (the separation of these micro-spaces) has been practically implemented by partially interfering in the original plan of the house (adding a wall). Also, according to the plan of the eastern part, it is possible to expand and

add space on the first floor. Therefore, in this building, in general (in eastern and western parts), a very high changeability can be seen. Moreover, the presence of several entrances (three entrances) has also led to a high changeability in the building. In both parts, the courtyards were designed at different levels, and such a level difference has increased the possibility of functional separation and thereby changeability in both courtyards. For example, in the eastern part, the lowest level of the courtyard was considered for the garden, and the higher part of the courtyard was considered for other functions. Moreover, in both courtyards, there are high diversity and adaptability. In the porches in both parts, in addition to the changeability (separability) mentioned, diversity and adaptability can also be seen. Diversity and adaptability can also be seen in the rooms, and in the rooms on the ground floor of the eastern part, due to the presence of niches, spatial diversity is more obviously perceived.

Table 4. Introduction of Pattern 2



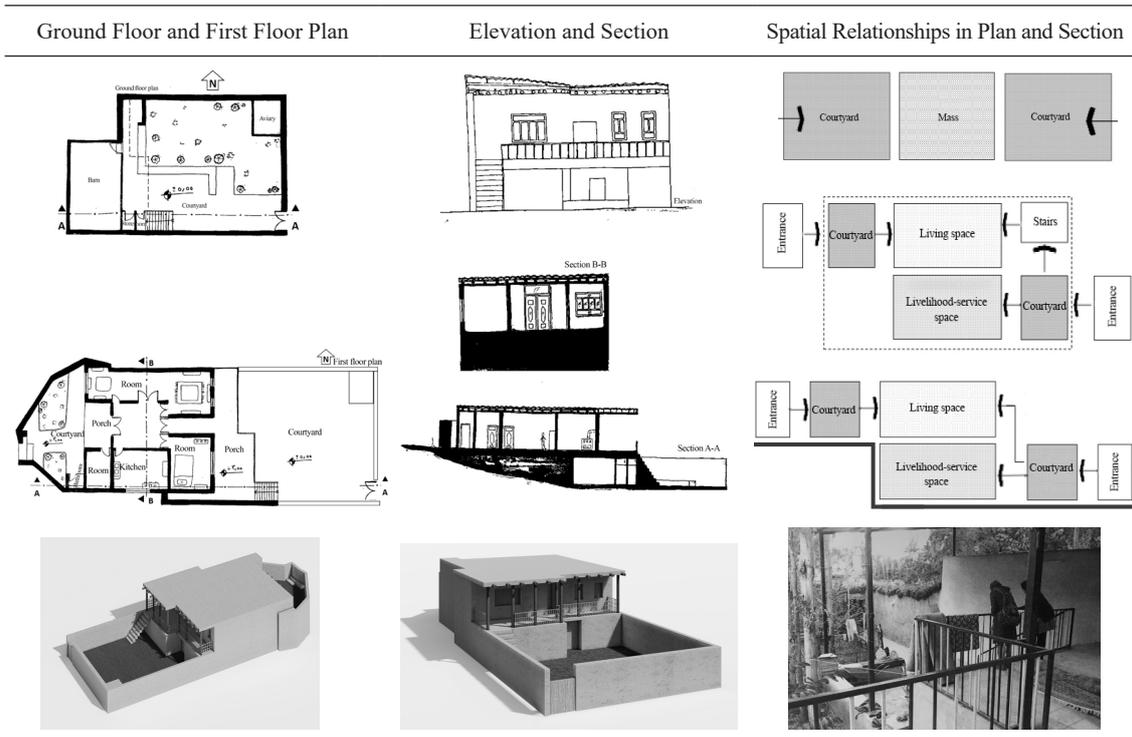


### 8.3. Flexibility in Pattern 3

The sample house representing Pattern 3 is 20 to 25 years old and the chief source of livelihood was livestock. This house is a two-storey building. It has two courtyards on the east and west sides of the building, with separate entrances, and on two different levels. In the eastern courtyard, there are a barn, an aviary, and a storeroom, and it is intended for livestock and services. In this house, livestock and service space is located beneath the living space, helping to keep the living space warm in winter. There is a garden in the eastern courtyard. This courtyard is connected to the entrance of the building through a porch. The western courtyard, which is located at a higher level, has vegetation and is connected to the living space through a porch (Table 5). Since the living and service-livelihood areas in the courtyard are separated, in terms of flexibility, there is changeability in the plan. This manifestation of flexibility (variability) is also true for the east and west porches and the two entrances of the building.

On the eastern porch, activities such as sleeping, resting, and dialoguing take place. This porch allows viewing the landscape, livestock control, provision of daylight and ventilation, and connection to the entrance. So, the diversity and adaptability of activities can be observed in it. The western porch, due to its location and smaller dimensions, acts as an entrance joint and is as diverse and adaptable as the eastern porch, but with lower degrees. After passing through the courtyard and the porch, one enters the living space in the center of the building. It acts as joint connecting other spaces. In the cold seasons when the courtyard and porch are less used, those activities taking place on the porch are transferred to the living room. In this building, the drawing room is L-shaped and elongated, and due to various spaces, such as those defined for korsi, sitting and dialoguing, dining area, entertainment, and guest bed in the drawing room, functional and spatial diversity can be seen in it. Moreover, the three entrances designed for this room make it possible to change it in the future through separation.

Table 5. Introduction of Pattern 3

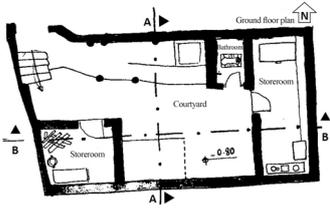
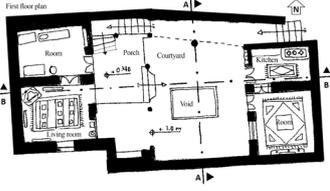
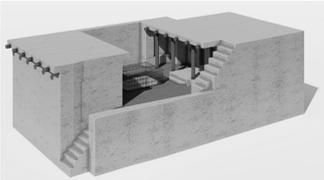
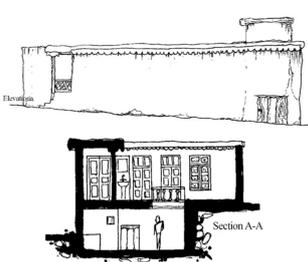
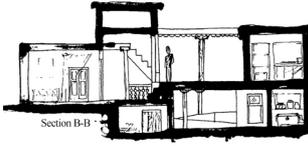
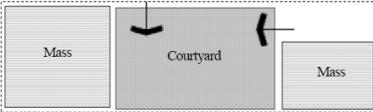
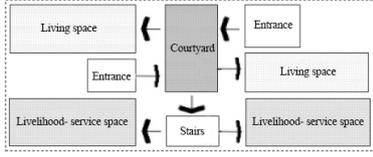
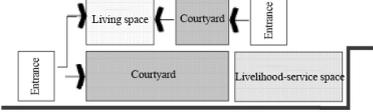


#### 8.4. Flexibility in Pattern 4

The sample house representing Pattern 4 was built on a land of 104 m<sup>2</sup> and is 30 to 40 years old. In this house, the courtyard is located between two masses and the micro-spaces are facing the courtyard. This house has two separate entrances at two different levels, due to the land slope (Table 6). Therefore, the presence of several entrances implies changeability in it. Moreover, it has two courtyards with two separate accesses and both of them are diverse and adaptable. In the courtyard on the first floor, there is an air shaft that provides daylight and ventilation for the

courtyard on the ground floor and visually connects the two courtyards (section A-A). The two courtyards are connected through a staircase on the north side of the building. Due to being separable, courtyards are changeable. This house is a two-storey building. The ground floor was initially defined for livestock and services, but in later years, the space designed for livestock was converted to the storeroom. Therefore, one can perceive the separation of the livestock and human areas, which has subsequently changed to the service and human areas. Diversity and adaptability can also be seen in porches and rooms.

Table 6. Introduction of Pattern 4

| Ground Floor and First Floor Plan  | Elevation and Section   | Spatial Relationships in Plan and Section  |
|--|---|--|
| <br><br> | <br><br> | <br><br><br> |

#### 8.5. Flexibility in Pattern 5

The sample house representing Pattern 5 is one of the oldest and most beautiful houses in Tazareh village, which is 200 years old. The entryway includes a wide corridor that eventually leads to a large door opening to the courtyard. This is a central courtyard house where various spaces and rooms are located around the sides of the courtyard. The courtyard on the ground floor is a dividing space and connects other rooms with different uses. On this floor, in addition to living spaces, there are two large storerooms, a barn, a feed storeroom, a tandoor (also known as tannour), and a millstone, and the service-livelihood spaces dominate living spaces. On the ground floor, the courtyard is connected to the mass through a porch and to the porch on the first floor and thereby other living spaces through three-way stairs (Table 7). Due

to the various activities taking place in the courtyard, the courtyard is diverse and adaptable (the presence of the tandoor and millstone has increased the diversity of the courtyard), but not changeable. However, in general, due to the presence of several rooms and independent floors and spaces, it is possible to divide the building between two or more households, so, it is changeable. In this house, on both floors, the porch is diverse and adaptable (the presence of shelves and niches has increased its diversity) and there is also changeability due to the possibility of separating the two floors. On the ground and first floors, rooms are diverse and adaptable (the presence of a fireplace in the rooms has increased their spatial diversity). Moreover, on the first floor, in addition to functional diversity, one can see spatial diversity in the rooms, due to the presence of several shelves and niches.

**Table 7. Introduction of Pattern 5**

| Ground Floor and First Floor Plan | Elevation and Section | Spatial Relationships in Plan and Section |
|-----------------------------------|-----------------------|---|
|                                   |                       |   |
|                                   |                       |   |

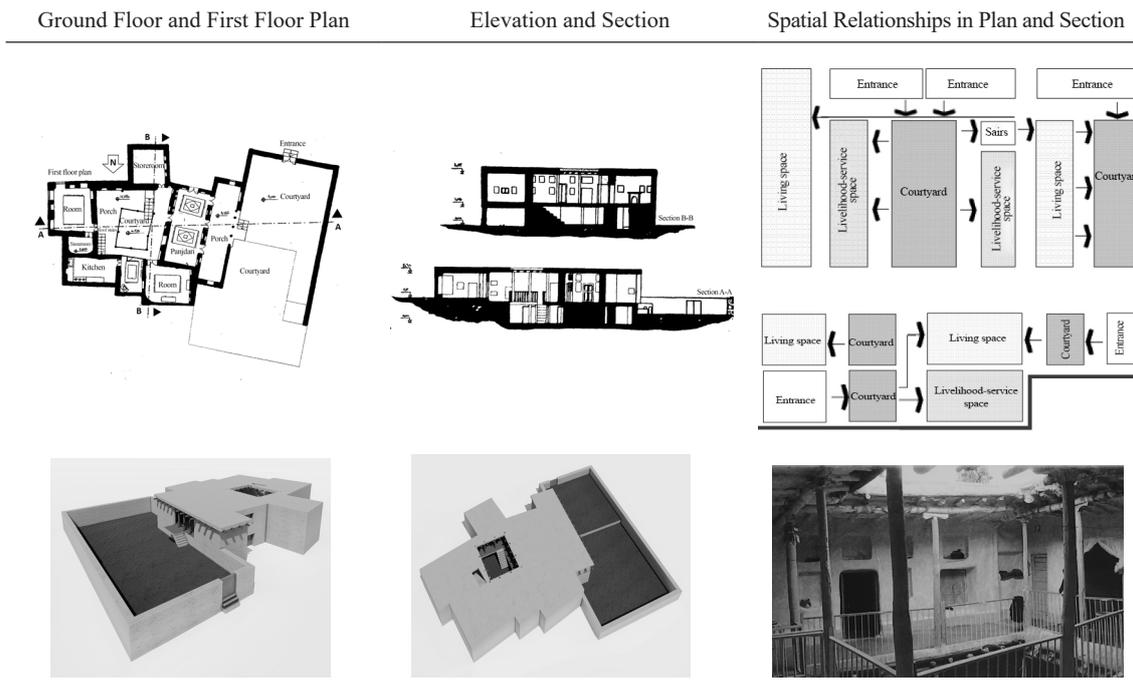
**8.6. Flexibility in Pattern 6**

The sample house representing Pattern 6 was built on a land of 400 m<sup>2</sup> and is over 150 years old. It has three separate entrances, all of which are located on the south side. Two of these entrances are located under the Sabbath, at the same level, and lead to the central courtyard, around which there are a storeroom and a barn. The third entrance is at a different level and leads to the western courtyard, which is in the form of a garden (Table 8). In this house, the human entrance, the animal entrance, and the garden entrance are separated. Due to the presence of several entrances and the possibility of separation, high changeability is seen in them. As mentioned, this building has two

courtyards, one as the central courtyard and the other as a garden next to the building. Due to the presence of several courtyards and the possibility of separation, changeability is observed in them. Since the central courtyard has more diverse uses, there are higher diversity and adaptability in it compared to the western courtyard. There are two porches in the building, one in the central courtyard and the other in the western courtyard, both of which are diverse and adaptable. In addition, the presence of several porches has provided the possibility of separation and changeability in them. Due to the presence of several rooms, the large space as well as several courtyards, one can observe separability and changeability in the building.

**Table 8. Introduction of Pattern 6**

| Ground Floor and First Floor Plan | Elevation and Section | Spatial Relationships in Plan and Section |
|-----------------------------------|-----------------------|---|
|                                   |                       |   |



### 9. COMPARING IN THE FLEXIBILITY

In the following, the degree of flexibility in the physical components of the housing patterns in Tazareh village has been investigated.

#### 9.1. Entrance

According to the studied patterns, the presence of several entrances in the patterns (such as 1, 2, 3, 4,

and 6) has made them separable, changeable, and adaptable. Moreover, in the patterns (such as 1, 3, 4, 5, and 6) where the livestock and humans used the same entrance, there was functional diversity (pattern 6 lacks space for livestock). In patterns (such as 1, 5, and 6) where the entrance was formed within the Sabbat or corridor, the spatial diversity of the entrance has increased due to the creation of a pre-entry space (Table 9).

**Table 9. Comparison of the Housing Patterns in Tazareh Village in the Flexibility of the Entrance**

| Space                                       | Pattern 1 | Pattern 2 | Pattern 3 | Pattern 4 | Pattern 5 | Pattern 6 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Entrance                                    |           |           |           |           |           |           |
| Flexibility: Diverse, Adaptable, Changeable |           |           |           |           |           |           |

#### 9.2. Courtyard

Considering various activities taking place in the courtyard, the courtyard is diverse and adaptable. In patterns (such as 5) where the courtyard is used by both humans and animals, the changeability of the space is reduced since the possibility of separating the livestock and human areas is reduced. In patterns (such as 3) where only the service-livelihood space is adjacent to the courtyard, there are higher separability

and changeability than those patterns (such as 5) where there is the living space in the vicinity of the courtyard, in addition to the service-livelihood space. Level differences in a courtyard (such as patterns 2 and 6) make it possible to separate functions in that courtyard, increasing changeability. In some patterns (such as 2, 3, and 6), the presence of several courtyards has provided the possibility of separability and changeability (Table 10).

**Table 10. Comparison of the Housing Patterns in Tazareh Village in the Flexibility of the Courtyard**

| Space       | Pattern 1    | Pattern 2                      | Pattern 3 | Pattern 4 | Pattern 5 | Pattern 6 |
|-------------|--------------|--------------------------------|-----------|-----------|-----------|-----------|
|             |              |                                |           |           |           |           |
| Flexibility | No Courtyard | Diverse, Adaptable, Changeable |           |           |           |           |

**9.3. Porch**

Considering various activities taking place on the porch, the porch is diverse and adaptable. In patterns (such as 5 and 6), due to the presence of many niches and shelves, one can observe spatial diversity in the

porch. Also, in patterns (such as 5) where the porch is adjacent to livelihood-service space (such as barn and storeroom), in addition to the living space, its functional diversity increases and its changeability decreases because such an adjacency reduces the possibility of separation (Table 11).

**Table 11. Comparison of the Housing Patterns in Tazareh Village in the Flexibility of the Porch**

| Space        | Pattern 1                      | Pattern 2 | Pattern 3 | Pattern 4 | Pattern 5 | Pattern 6 |
|--------------|--------------------------------|-----------|-----------|-----------|-----------|-----------|
|              |                                |           |           |           |           |           |
| Flexibility: | Diverse, Adaptable, Changeable |           |           |           |           |           |

**9.4. Micro-Spaces in the Mass**

In rural housing, micro-spaces in the mass (rooms) include two living and service-livelihood areas, the role of these two areas has changed over time according to the conditions governing that time and livelihood conditions of the family. Considering various activities taking place in the two living and service-livelihood areas in the micro-spaces, the micro-spaces in the mass are diverse and adaptable in all patterns. The dimensions of the micro-spaces, how to provide daylight and ventilation, the plan and

the number of entrances influence its flexibility. The larger the dimensions of the micro-spaces, the higher the diversity, adaptability, and changeability. Also, as the number of niches and shelves in the walls of the micro-spaces increases, the spatial diversity of the mass increases. The more independently the two living and service-livelihood areas in the mass are defined, the greater the possibility of separation and thereby changeability. For example, when the living and livelihood-service spaces are defined at two different levels (Table 12).

**Table 12. Comparison of the Housing Patterns in Tazareh Village in the Flexibility of the Micro-Spaces in the Mass**

| Space       | Pattern 1             | Pattern 2             | Pattern 3                         | Pattern 4             | Pattern 5                         | Pattern 6             |
|-------------|-----------------------|-----------------------|-----------------------------------|-----------------------|-----------------------------------|-----------------------|
|             |                       |                       |                                   |                       |                                   |                       |
| Flexibility | Diverse and Adaptable | Diverse and Adaptable | Diverse, Adaptable and Changeable | Diverse and Adaptable | Diverse, Adaptable and Changeable | Diverse and Adaptable |

### 9.5. Summary

In general, in the housing patterns in Tazareh village, all the micro-spaces of the courtyard, porch, and room are diverse due to the variety of activities taking place in them. The plan and area of the micro-space influence its flexibility. The larger the area, the greater the possibility of diversity, adaptability, and changeability. Also, the presence of several micro-spaces (entrance, courtyard, porch, and room) in different patterns was due to the land slope, the number of households, the type of family livelihood, economic status and needs of residents, allowing changeability and adaptability. In general, the presence of several floors, courtyards, masses, entrances, and various floor levels (due to the topography) are the main factors making the housing patterns in Tazareh village flexible.

### 10. Conclusion

This study investigated the flexibility of six characteristic housing patterns in Tazareh village, and

showed that all the studied patterns have a flexible plan and there is a manifestation of flexibility (diversity, adaptability, changeability) in all micro-spaces (entrance, courtyard, porch, room, barn) of them. In the patterns with several courtyards, floors, entrances, and masses, one can perceive higher changeability, due to the ease of partitioning the building and assigning them to different families or the ability to separate different uses. Also, as the functional and spatial areas in the micro-spaces increase, the functional and spatial diversity increases. In general, the presence of several courtyards next to the building mass or several masses next to the courtyard, several floors, and entrances allows the building to be partitioned for different families or different uses. So, one can consider them the main factors making rural housing flexible. In other words, the "changeability" component can be considered the main and efficient component of the flexible rural housing design that can adapt the body of rural housing to the residents' new needs.

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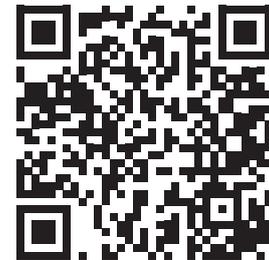
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