

An Evaluation of Space Planning Design of House Layout to the Traditional Houses in Shibam, Yemen

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Abstract

The aim of this paper is to evaluate on how good traditional house design is able to give residential satisfaction levels and could contribute towards habitability in Shibam, Yemen. House design in this study is a subject dealing with efficient space-function design of the house layout which shows cultural aspects of the community. Houses in Shibam typify the traditional architecture which reflects to the structure of family, and social and cultural realms. The houses comprises mid and high-rise mud brick house types, considered as one of the earliest high-rise house type built in the world. Today, the city of Shibam with mid and high-rises mud brick house types is recognized as one of the heritage sites under UNESCO's World Heritage Lists. The literature study is conducted to understand the definitions of the title, which is important to identify the measurable factors for the research analysis. The study finds that *diwan*, dining area, bedrooms, bathrooms, corridor and storage, courtyard and balcony, and the composition of the rooms' layout are important measurable checklist's factors under category of space planning and function. There are two types of the research analyses which are qualitative and quantitative analysis. The qualitative analysis is a study by the researcher based on the researcher's observation on the house design during the site visit while the quantitative analysis is from the respondents' answers (300 respondents) on their satisfaction level from the research questionnaires. With high average scores of 94% in qualitative and 90% in quantitative analysis on satisfactory level, it shows that both results of qualitative and quantitative analysis support the research assumption. In that light, within the ambit of this study, the house design in Shibam can and does serve as a reference.

Keywords: House design, Space planning and function, Shibami houses

1. Introduction

This paper discusses space planning and function of the traditional house design in the city of Shibam at Hadhramout region, Yemen. The study will look on how the Shibami house design can serve as model of habitability. The city of Shibam is named after its King *Shibam bin Al-Harith bin Hadhramout bin Saba Al-Asghar*. This area is about 600-700 meters from the sea level. It had played a crucial role as a capital of Wadi Hadhramout in the fourth B.C. (Damluji, 2007). This city is built on a small mound or on a podium. The present city of Shibam is situated in the core of Wadi Hadhramout above the ruin of the ancient city of Shibam. The city of Shibam today (Figures 1 and 2) is one of the cities in the world that is recognized as World Heritage site and placed under the UNESCO World Heritage lists since 1982 for its uniqueness of its house form and design (Lewcock, 1986). The houses are mid and high-rise mud brick house types. The house units for generations are dwelled by households with extended family system with their parent's, son's, daughter's family units.

This tradition has been widely practiced in Shibam, Yemen especially among the low and middle income families (UN-HABITAT, 2002) where it has shaped organization of space planning and function in the house layout. This sustenance has been seen to permit the development of the local culture, religious values and

promotion of regional identity of the traditional architecture. Considering these, a study on the traditional house design of the mid and highrise (from 3 storeys to maximum of 9 storeys) houses in Shibam (Figures 2) is deemed important as well. The result of this study will be able to serve as a reference to the present and future development of house design.

2. Literature study

This section discusses definitions of the terminological terms used in this study. These important definitions are house design, space planning and function, and Shibami houses as follows:

2.1 House Design

The Arabic dictionary *Al-Munjid* (Al-Balabki, 1987) states that a house (*al-sakan*) means a place, "...to settle down, relax, become calm, calm down, reside in a place, and house unit." In *Oxford Dictionary* (Allen, 1987), a house is defined as "...a building for human habitation." It covers the "...dwelling of houses as a provision of shelter or lodging." The United Nations (United Nations, 1977) defines a house not only as a shelter but also as a mean of the creation of communities. House design means the quality of the house layout in terms of the organization and the allocation of living space areas relative to the key functions that a household requires which is space planning and function. Such a layout always sets to measure the quality of a house. It has been suggested by Caudill (1978) that an adequate layout always takes care of both the current and the future needs; and such needs may be evaluated on the basis of quality rather than the cost, size and building that make up the physical environment that the residents interact with. Therefore, the living space in house design that man creates should meet a kind of needs, and the design adequacy calls for the ability of the designer to put all the required elements within a defined and cleared relationships.

2.2 Space Planning and Function

According to Caudill (1978), a space is a room which consists mainly of several spaces. Some rooms are interlocking and some are distinguishable. That is, some spaces are restricted with no openings and no space for movement. A static space may be created by closing up the bedroom at night, drawing the drapes, and shutting the doors. Citing Schulz (1971), Zevi (1957) holds that architecture is the "art of space" without defining the nature of the space itself. Here, the concept of space is immaturely realistic as is the case with the researchers in this field who look at it as a uniform extension of 'material' that can be 'modeled' in several ways. Awareness of *Shariah* (Islamic Law) principles and references by the architects while designing the house design integrated with social aspects is lacking. *Shariah* law provides an essential body of legislation to enhance the social life of people, including the built environment: it encourages people to live peacefully and to share responsibilities to enhance their social and urban life (Akbar, 1992; Allam et. Al, 1993; Ibrahim, 1994; and Eben Saleh, 1998). Many studies have been done which suggest the importance of spatial layout in house design. Here are some of them: As quoted by Sheikh Alalbany (2007) in one of the *Hadiths* that Prophet Mohammad (peace be upon him) said;

"Contentment comes from four: good wife, spacious dwelling, kind-hearted neighbor and obedient riding animal. And four sources of unhappiness: bad neighbour, bad wife, narrow dwelling and disobedient riding animal."

3. Factors of House Design in Space Planning and Function in Shibam

This section will identify the factors by space planning and function of house design of the traditional houses in Shibam. These factors comprise five important topics as follows:

3.1 Space Planning and Function

According to Al-Shibany and Al-Madhajy (2000), the layout of interior space and function becomes an important factor by the local master builders when building the traditional Shibami houses. Nagib argued this spatial design has preserved the local culture over the years. He also noticed that the design is relevant towards the sustainable development. In Shibami house design, the space planning and function consists of five important factors which are as follows:

- a. *Diwan*, dining area, bedrooms
- b. Bathrooms
- c. Corridor and storage
- d. Courtyard and balcony
- e. Compositions of the rooms' layout

3.1.1 'Diwan', dining area, bedrooms

In Shibami house design, *diwan*, dining area and bedrooms are closely related to each other. These three factors cannot be described into separate entities as they cover interrelated social activities. The *diwan* consists of the following spaces: (a) living room, (b) visitor room, and (c) furniture setting. The dining area consists of the following spaces: (a) dining room, (b) kitchen, and (c) top floor room/terrace. The bedrooms comprises following features: (a) master bedroom, (b) bedroom for the males, and (c) bedroom for the females. Damluji (1992) argued that the main reception room or (*Majlis* or *Diwan*) (Figure 3 & 4) is accessible through a door located at the entrance of the shorter side. According to her, until the last century, these doors were not higher than 1.2 meters. The frames are carved deeply and the surfaces are decorated with long iron nails with huge heads (5cm) varnished with lead. He also noted that on both sides of the door, wooden chests are placed that are used to place sleeping mats and pillows during daytime. In addition, these chests are studded with brass or tinned iron ornaments that are considered as the only furniture in the room.

Damluji (1992) noted that in the first floor there are several *mahadir* (the singular is *al mahdarah* which are the house main living and reception rooms. The '*mahdarah*' is a large room split by four columns or (*ashum*) (plural of *saham* meaning arrow). There is a smaller room or (*mahdarah*) which is adjacent to the larger one reserved for reception or sleeping place during the winter time. In addition to *mahadir*, there is a house stairway to the second floor (Damluji, 1992). Damluji (1992) noted that the second floor consists of the living rooms reserved for woman and for carrying out ceremonies such as weddings. These living rooms are divided in the same or similar way as the *mahadir*. A large reception room divided by four poles or columns opens onto small, windowless, locked room known as *al maghululah* which contains more than one niche and used for several purposes such as sitting room in winter or to store utensils and clothes. He adds that a kitchen and a toilet (*taharah*) are located on the third floor. This is a common house layout design among the traditional houses in Shibam. The toilets and the kitchens are built on top of each other next to the service well that contains the disposal openings and the canals. The third floor is called *al marawih* or *tarawih* (Figure 5). There are rooms where business, social activities, and reception of male strangers are carried out. Other private rooms are reserved for daytime activities for women and children. On this floor there is a series of roof terraces. The fourth floor is reserved for women activities. It consists of a large *mirwah* with a small *marawih* on top of them that open out towards the roof or the sky called *raym* (plural is *ruyum*). They are similar to terraces but more like patios in design and function and are used for living and sleeping during the summer season (Damluji, 1992).

3.1.2 Bathrooms

There are two types of bathrooms: (a) bathrooms for male, and (b) bathrooms for female. According to Damluji (1992), the main part of the toilet generally is an open canal leading to an opening in the wall; and it extends to an elevated platform on each side to stand on. Sometimes it is accompanied with a system of earthenware pipes, or cylinders completed of burnt clay and known as *qasb*, which are fitted after being painted with lime (*Nurah*) on the inside. Generally, the conventional arrangements for disposing of waste water depend on a network of openings in the back or side walls, open canals flowing along these walls and the ground at the back of the constructions and on pits (*habisah*) combined by a number of adjoining and connected thin constructions (Damluji, 1992).

3.1.3 Corridor and Storage

This factor consists of the following spaces: (a) corridor space, (b) stairs space, and (c) storage and basement floor. Leslie (1991) observed that there is only a single door which leads to the staircase from the entrance. A massive mud is created to leap around the staircase which runs throughout the height of the houses. For security reasons, there is no window built on the walls of the ground floors, except for a few openings on the ceilings for ventilation purposes. The ground floor (Figure 6) is usually reserved for storage purposes. In a ground floor, there are a number of *mayasim* (storages) that are used to store grains, dates and other crops. In addition they are also a place to store daily work tools. There are terraces areas to keep cattle at night. The height of the ground floor ranges from 4 to 5 meters (13-16 feet). Leslie added that there is a passage that leads to a staircase to the upper levels. Leslie (1991) further noticed that as they are not used for living spaces, and for ventilation purpose, there are either small narrow longitudinal or circular holes known as *al-Ukrah* in the upper parts of the facade walls constructed higher than the door's level.

Furthermore, Damluji (1992) noted that the ground floor consists of a vertical tunnel opened towards the sky called *manwar* or *shammash* built next to the stairwell, which stretch throughout the house floors, from the ground floor to the roof level. These tunnels allow the sunlight penetrates into the house through openings in the common wall, and they are also for air ventilation. He further noted that the stairwell is located centrally around

arus, a vertical column near the entrance forming the main support carrying the building loads. Damluji (1992) argued that sometimes (due to the nature of the terrain during the actual construction) there is one and sometimes two additional basement, known as *khann*. This space is to tackle the ground level's variation between the main street level and the level of the city's raised site. The construction of *khann* accommodates this gradient (between the lower ground point of the slope and Shibam's higher flat site); and the slope is leveled with a fortified base and additional foundation for the normal five or six storey above. The master builders do not count the basement floor (*khann*) as an additional floor, or as a separate storey, even if it consists of two floor levels.

In addition, the ground and first floors consist of the house main entrance that leads to a narrow corridor (*dacha*) or (*dayqah*). These two terms are derived from the Arabic language meaning "tightness or narrowness". Damaluji also noticed that this *dakhlah* leads to rooms called *al mayasim* (singular of *maysamah*) used for storing grain and *dhura* 'corn stalk'. He adds that in general, the ground floor is considered as the house main storage area or *diyaq* (plural of *dayqah*) which is used also as a shop. Most houses have their entrance off enclosed courtyards surrounded by fences whose walls have prickles on the top, (Figures 6 and 7). There is only one main entrance that opens into a central passage with windowless walls, leading to animal barn (for example, goats and sheep were often kept in the upper floor) (Damluji, 1992).

3.1.4 Courtyard and Balcony

In Shibami houses, courtyard is a spacious area which gives shades and protection from direct sun rays, wind and sand (Al-Bahar, 1984). This factor consists of the following spaces: (a) the courtyard space; and (b) the balcony space. Damluji (1992) mentioned that the houses in *Shibam* have been built with practical expansion in mind in that the house designs are vertically; hence the houses have been built very close to each other. In the house design of the top floors (*ruyum*, and *tayarim*), there are potential expansions at different locations and at varied dimensions. For example, to compensate for the traditional courtyard, the builders instead provide the required alternative spaces that are exposed to the sky. This feature preserves the privacy factor of the interior as it is contained in an enclosure within the exterior walls of the house design. There is no balcony constructed in this traditional house.

3.1.5 Compositions of the Rooms Layout

The arrangement of the interior space layout in this Shibami house is organized based on the space-function design (Baeissa & Hassan, 2005). There is only a single entrance door which leads to a staircase. This door is always situated against the external walls, (Figure 8). A massive mud wall leaps around the staircase which runs throughout the height of the houses. The ground and the first floors are usually reserved for storage purposes. There are opened rooms at the central landing on each floor. There are also family rooms; and this area also can be used for eating, sleeping or to conduct business at different periods. On the upper floor there is a large hall called *diwan*, (Figure 9) which is not always used by the family. It is a place reserved for the guests, entertainment and special occasions. This room has small washing area at one corner and it is separated from the rest of the other spaces. It is also an area used for praying and dining, and a small part of the area is for ablution (Baeissa & Hassan, 2005).

4. Qualitative and Quantitative Analysis

This research methodology consists of qualitative and quantitative survey. In qualitative survey, the criteria for evaluation are on qualitative analysis from checklist factors as discussed in the literature review based on the researcher's observation on the house design during the site's visit. The answer "Yes" represents as satisfactory and "No" as unsatisfactory. For example, if the visitor's room is satisfactory, the answer "Yes" will be marked as 'x', but when it is unsatisfactory, the answer is "No" will be marked as 'x'. On the other hand, the quantitative survey is the answers from the respondents. There are 300 respondents who reside in Shibam involved in this survey. One respondent is selected for one building block. (mid or high-rise building). The selection is based on from the level of the house unit. For example; the first respondent is from a house unit at the ground level of the first building block; the second respondent is from a house unit at the second level of the second building block; and so on. The answers are based on their satisfaction level from questionnaires related to the same checklist factors. The measurable scale is based on five rating scales of preferences in which the respondent is required to identify only one for each question. These rating scales are: No. 1: worst, No. 2: bad, No.3: no comment, No. 4: good and No.5: best. According the Likert Scale (2006) an important distinction must be made between a Likert scale and item. The Likert scale is the sum of the responses on several Likert items. The objective of the quantitative survey in this study is to identify the factors of the level of satisfaction as perceived by the residents. The results of the qualitative and the quantitative analysis of the data are presented in subsection of space planning and function as follows (Table 1):

4.1 Discussions: Results of the Qualitative Analysis

The study finds that all results of the qualitative analysis are positive (except answers of balcony), which means that space planning and functions of the house design are relevant as a good model for a house type in Shibam. With respect to the category in space planning and function of *diwan*, dining area, bedrooms, bathrooms, corridor and storage, and courtyard and balcony, the only negative response in this analysis is in the balcony. The study finds that there is no balcony as a part of the house design in Shibami houses compared to other house types in Yemen. The study suggests consideration for a need to integrate balcony as one of the factors in the house design in the present and future development. Table 1 shows that the overall average result is very satisfactory with 94%. The result illustrates that the traditional house design of the space planning and functions fulfills the residents' needs and gives them satisfaction.

4.2 Discussions: Results of the Quantitative Analysis

The study finds that the quantitative analysis also has positive results as in the qualitative analysis. All results have cumulative answers by the respondents with more than 90% score except space planning and functions of *diwan*, courtyard and the house layout's composition. This analysis also supports the result from qualitative analysis that balcony is not part of the house design in Shibami houses. It shows that there is a need to emphasis on *diwan*, courtyard and the house layout's composition as important design elements for the upgrades on the habitability. The summarized results of this quantitative analysis are as in (a) through (g) as follows:

a) *Diwan*

Eighty eight percent of the respondents from Shibam are satisfied with the *diwan* (the living, visitors' rooms and furniture setting). In another words, generally the residents of Shibam satisfy with the *diwan* in their houses.

b) Dining area

The analysis finds that 96% of the respondents perceive the dining area in their houses as satisfactory.

c) Bedrooms

With respect to the bedrooms, 92% of the respondents perceive their bedrooms as satisfactory.

d) Bathrooms

With a score of 94% on this factor, there is no doubt that the respondents of Shibam are satisfied with their bathrooms.

e) Corridor spaces and storage

On this factor, with a score of 96% the respondents give the answer as satisfactory.

f) Courtyard and balcony

Seventy eight percent of the respondents give satisfactory answers of the importance of courtyards in their house design. The question on 'balcony is not relevant because there is no balcony as a part of the house design in Shibami house.

g) Composition of the house layout

Eighty three percent of the respondents have expressed satisfaction to the composition of the house layout.

5. Conclusion

The study concludes that the traditional houses in Shibam have a good house design with references to its space planning and functions. Both results of the qualitative and quantitative analysis support the research assumption that the traditional houses of Shibam can be considered as a model for the present and future development of house design in Hadramout region, Yemen, in parallel with Shibam's recognition as a traditional city under UNESCO's World Heritage Lists. Table 1 shows that it is quite apparent that the respondents from Shibam have rated high satisfactory level in all the factors. As such these high average scores (triangulated between 94% in qualitative and 90% in quantitative analyses) undoubtedly have served as expressions of much satisfaction towards the house design and the nature of the amenities there. In that light, within the ambit of this study, the house design in Shibam can and does serve as a reference. The study has used the layout of the house design of the traditional houses of Shibam as the reference model. At the end of the study, it is suggested here that the study has made the contributions with respect to people's perception on the habitability of house design for the low income group in Yemen in particular and some general ideas about habitability of house design in the field of architecture in general. It has provided the definitions of the terms 'house, designs and habitability' within the ambit of the perception of the residents in Shibam.

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Table 1. Summary of the results in the analysis from the Checklist Factors.

Factor	Space Planning and Function	Qualitative Survey		Quantitative Survey
		Yes	No	
a	Diwan			88%
	(a) living room	x		87%
	(b) visitor room	x		88%
	(c) furniture setting	x		89%
b	Dining Area			96%
	(a) Dining room	x		94%
	(b) Kitchen	x		96%
	(c) Top floor room/terrace	x		97%
c	Bedrooms			92%
	(a) master bedroom	x		91%
	(b) Bedroom for male	x		93%
	(c) Bedroom for female	x		92%
d	Bathroom			94%
	(a) Bathroom for male	x		95%
	(b) Bathroom for female	x		92%
e	Corridor and Storage			96%
	(a) Corridor Space	x		98%
	(b) Stairs Space	x		95%
	(c) Storage and basement floor	x		94%
f	Courtyard and Balcony			78%
	(a) Courtyard	x		79%
	(b) Balcony		NULL	77%
g	Composition of the rooms' layout	x		83%
N=17	Total	16	1	627
Total number of positive answers over the total number of items		16/17	1/17	627/7
Overall average answers in percentages		94%	6%	90%

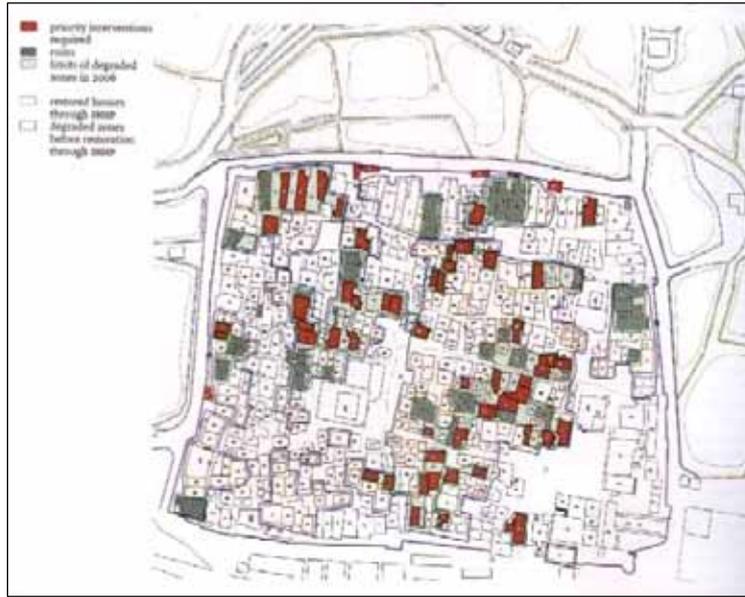


Figure 1. Old City of Shibam
Source: Aga Khan Award for Architecture

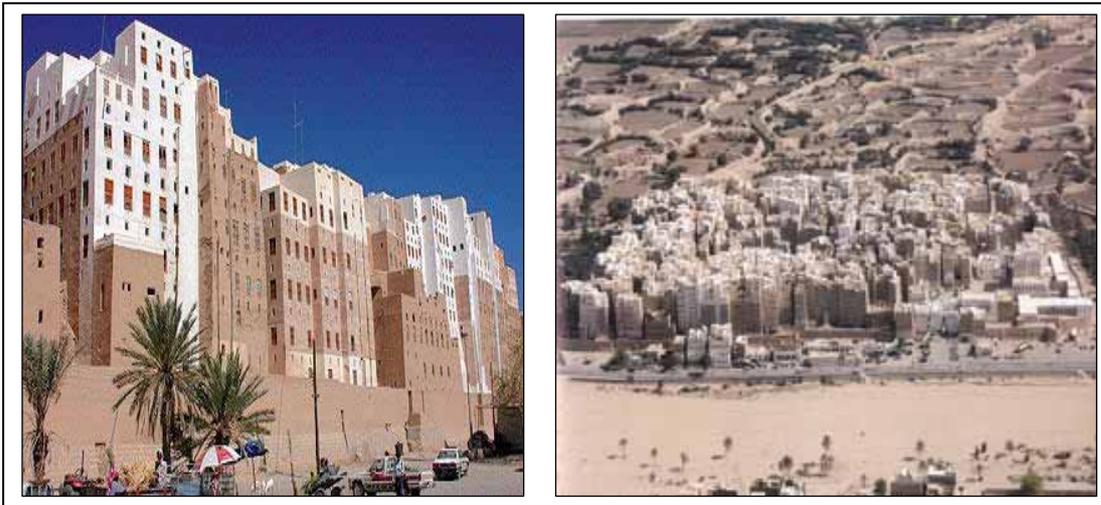


Figure 2. Shibami houses (mid and highrise buildings)
Source: Mukallatoday (2007)



Figure 3. Interior Space (Diwan) of Shibami House

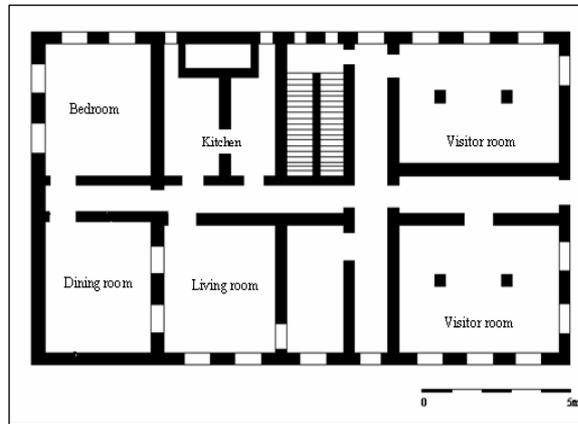


Figure 4. The first floor plan

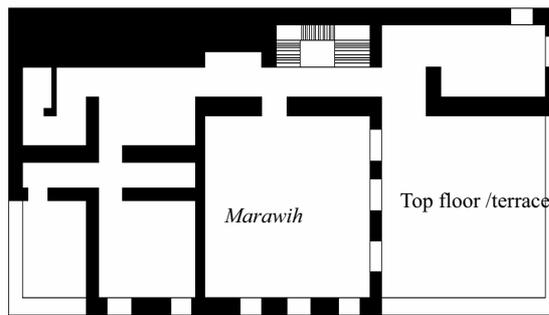


Figure 5. The third floor plan

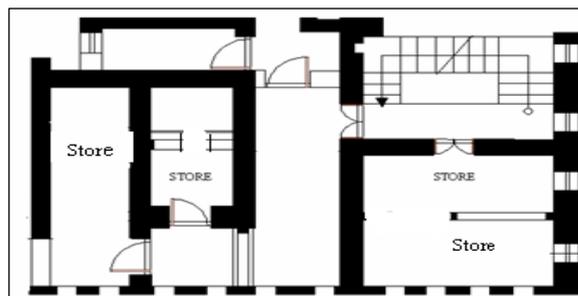


Figure 6. The ground floor plan

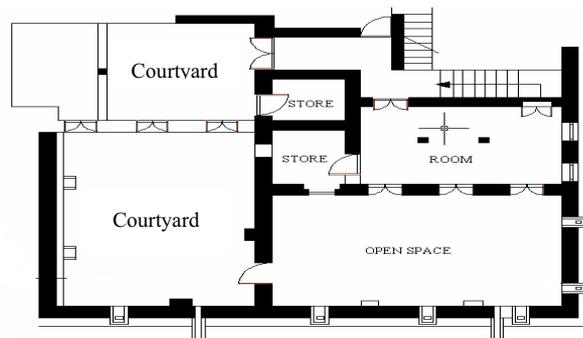


Figure 7. Plans of a Traditional House in Shibam

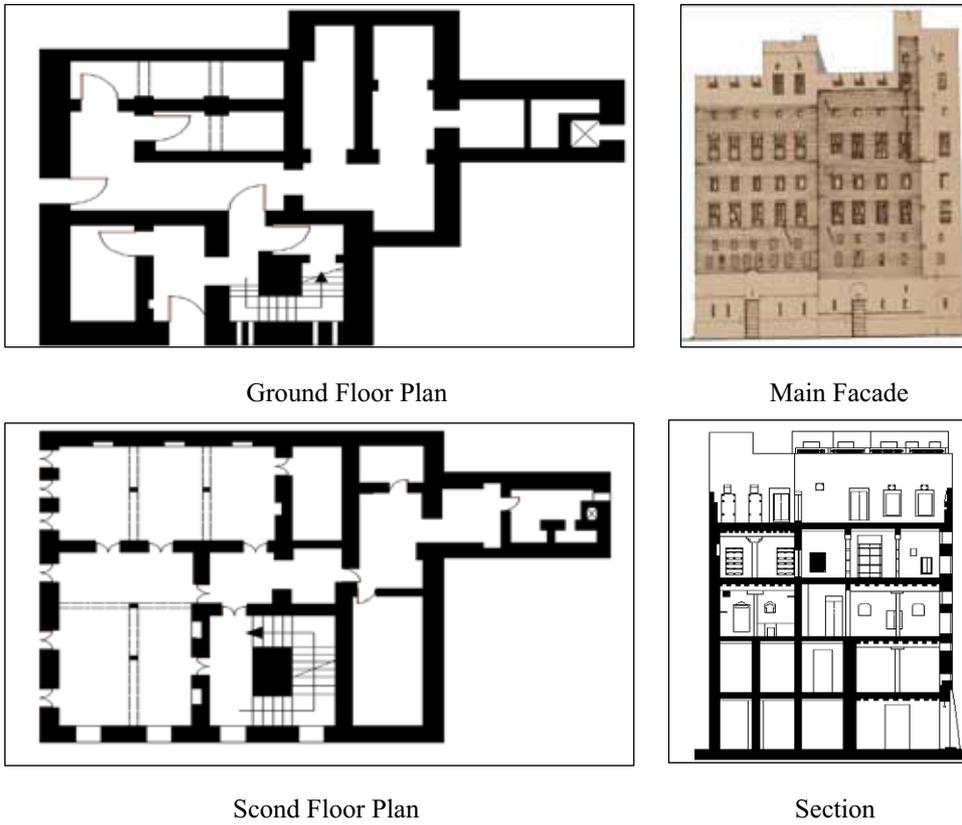


Figure 8. Interior space (diwan) of Shibami house

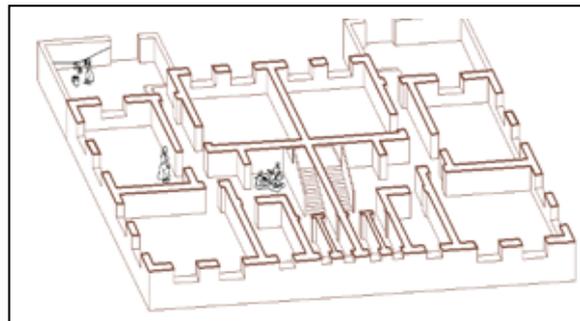


Figure 9. Circulation the interior space of Shibami house