Rural Architecture: Case Study of Amirkola Village

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Abstract

The diversity of environmental condition leads to the formation of different construction material and the techniques in usage of this materials cause to the formation of different housing types. Such diversity in the construction materials and housing types in appropriation with environment can be seen in Iran which has different climate areas and weather unstable conditions. Before the finding of new materials, the use of local material regarding to the capability with environment, availability, being economical and the most important reason, being the only present material resulting from environmental condition was common among the rural. Considering the fact that the major part of our population lives in the countryside and also the importance of domicile as one of the basic necessary of humor and the benefit of local material for rural and environment, study in this field is inevitable. The aim of this study is to identify local materials and house making techniques in Amirkola village by means of measurement methods based on visiting, observing and gathering information from the village to study housing types, benefits and shortcomings to present practical strategies for wise usage of the potentials.

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1. Introduction

Iran is a semi-rural country, thus half of its residence is based on local and traditional architecture and to say clearly rural architecture. All the elements of this kind of architecture have its root in rural material and spiritual needs. The base of this architecture and housing is linked with natural condition, living issues, progress of social life creation and technical power, as well as artistic taste, social critera, family relationship, tradition and believes, human internal thoughts produce an especial design in different place (Zargar, 1999). The use of environmental equipment and its compatibility with nature can be seen clearly in local architecture. In this regard, the local architecture is the opposite of modern one that has coexisted with nature of confrontation with it (Sartipipoor, 2009).

In a nutshell, it can be said that as opposed to modern buildings, our traditional buildings are not only harmless for the nature but also they were placed in coexistence with the nature (Ghobadian, 2005). Glancing to the counties of Mazandaran province such as Amirkola village placed in Savadkooh, is representative of wisely used available materials more than ever by rurals to satisfy their house building needs. The main reason of rurals is to reduce the expenses related to the building and to avoid unnecessary transportation and the use of nonnative materials and to increase capability and durability of local materials for buildings and to make a safe place for the family and a suitable place for production staffs and products. From the rural idea, each of wood, stone, soil, reed, local plants, thorn bush, etc. is a kind of housing material and if they can be used in a correct way, will play a useful role in making a comfortable place (Zargar, 1999). Local materials: stone, sand, wood, lime, mud-brick, clay can build houses which are resistant against earthquakes and weatherized, even if they are high-rise buildings (Zomorshidi, 2006). Also the use of these materials can be beneficial for rurals in respect of homogeneity with environment, economic and biological (environmental). Since there is no accurate research to identify and improve local materials and buildings, and also because of the appearance of new building materials and some other problems, there are some limitation in the use of these materials in building the rural house. The trend of investment to identify and to use local materials in a suitable and new way can be economical and technically considerable in some of the villages of Iran (Zargar, 2000). It can be claimed that there would not be a stable and dynamic change in our homogenous rural system unless the adopted policies, strategies and administrative action be in accordance with the understanding of rural housing and their interconnection. It is not possible of course to return to the past housing methods and surely our forefathers' life style wouldn't be suitable for today's living condition and also it should be said that learning and teaching of traditional architecture doesn't mean that we are imitating the old form but the reason of this

old shape must be learned and used.

Geography is a science, based on empirical studies, which requires data collection from various sources. Thus, to fulfill the objectives out-lined primary and secondary data were collected. This project is practical in objective and descriptive in method. It means that the major information was collected from different organizations in province and city and then categorized. The survey was based on visiting and observing the villages and examining the data. AutoCAD software was used to draw the maps.

2. Natural Features of Savadkoh

Savadkoh is a town located in south part of Mazandaran province (Figure 1). Its environmental condition in terms of

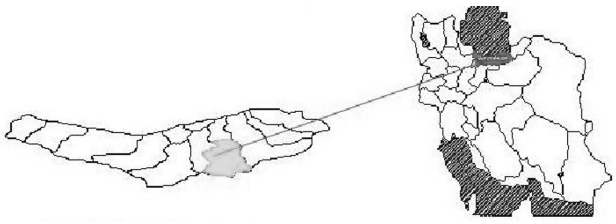

Figure 1: Location of Mazandaran territory in Iran

geographical situation and the height of area is different and the existence of Height mountain of Alborz in the ultimate east part and the existence of clouds bring a moderate weather and wet condition. The area of this city is about 2078 km^2 (Liaghati, 2001) lying at 52°59'44'' longitude and 36°14'54'' latitude.

3. Wooden Building in Humid and Mild Weather

Suitable weather condition and rains cause fast growth and overgrown plants all over Savadkooh city and Amirkola village which had a great effect on the selection of material for traditional buildings. Since there is a huge amount of wood in this area, the body of most of the buildings is wooden which is covered by sharp steep metal or pottery sheet and their skeleton is mostly based on the trunk and is high from the ground. In the local architecture of this area, the walls and spaces are built in a way that has a technically good air stream and at the wind-blowing side a closed area without any window and airing, for being careless about these principles will lead to the ruin and collapse of the building (Zomorshidi, 2006).

4. Local Materials of Amirkola

The environmental condition of Amirkola makes it possible to use every kind of construction material such as wood, stone and herbal fibers available in the locality (Table 1).

5. Housing Type

As mentioned, environmental condition makes it possible to use local materials for diverse construction. In fact the combination of these local materials and the effect of environmental condition cause the diversity in housing type in Amirkola as described below.

Table1: Local materials of Amirkola village

Materials	Explanation
Wood	Trees existing in this region that are used as building materials are: *Zelkova carpinifolia*, *Tilia caucasica*, *Alnus subcordata*, *Buxus hyrcana*, *Diospyrus lotus*, *Pterocaria fraxinifolia*, *Parrotia persica*, *Fagus orientalis*, and *Carpinus betulus* (Sabeti, 2002)
Stone	Stones are obtained from river or mine existing near the village
Kamal	Kamal is dried plant of wheat used as final cover of roof in the past
Hay	It is used to cover the wall mixing with mud and water
Nenge	Hay that is not chopped
Asalma	Natural fibers used as connector
Bandeshel	Thin branch of Parrotia persica tree. It is very flexible and used for joints such as Asalma.
Bark of *Pterocaria fraxinifolia* tree	It is used for connections such as Asalma and Bandeshel
Erdale	A plant used as final cover of roof in small structure

5.1. Kali house

Kali house is one of the oldest kinds of house in Amirkola village. In the past, all the locks and connections were made by the natural fibers (plants such as Asalma, Bandeshel, and the bark of large tree) and later when the nails were made, the fibers were not used anymore as it was common in the past.

5.1.1. Different parts of kali house

Peka

It is the base of building that is a circular leg with 20-70 cm of thickness and usually made by wood but sometimes made of flat and enduring stone and all the weight of the building is transported to the ground by it (Figure 2). Woods used as peka are usually of *Tilia caucasica* tree. Sometimes peka is made of a two-branched wood (in Y shape), rurals call it as deghale. Pekas are driven beneath the ground by 75 cm and by putting stone and soil around pekas, they are made firm. It must be pointed that to prevent peka from getting rotten, rurals half-burn it which prevents it from the permeation of moisture. Pekas are placed in the four corners of the building and also in the spaces between the two pekas. *Kal*

The horizontal woods that lay on the peka and made the walls of the building are called kal (Figure 3). Every kal is connected to the lower one by a groove. The first kal is set on peka. If the peka is flat (not in Y shape) rurals will make some seams for

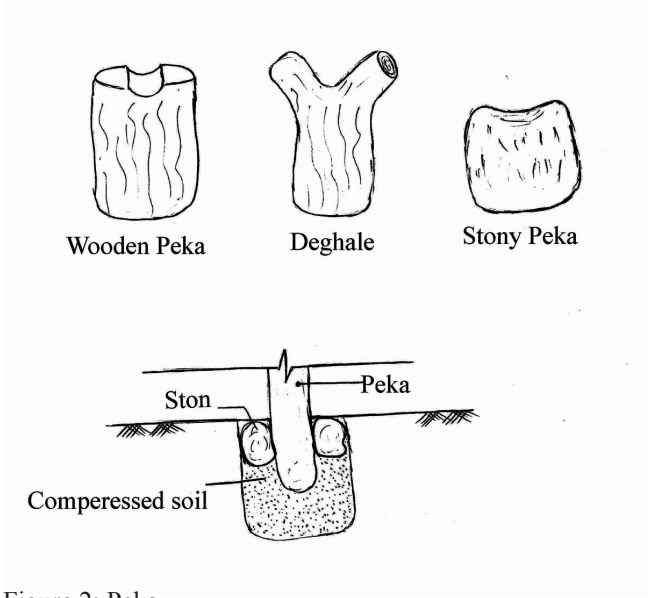

Figure 2: Peka

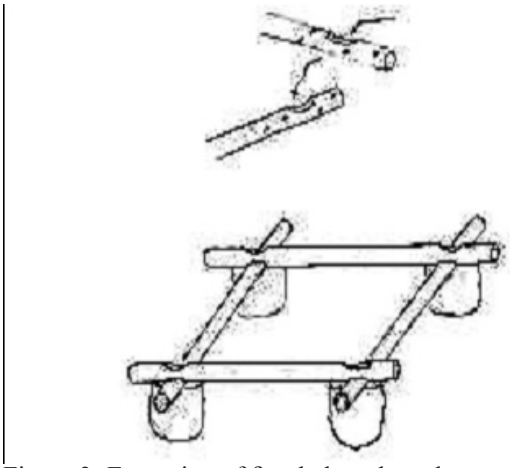

Figure 3: Execution of first kal on the peka

setting the kal on them.

Latepeka

The vertical woods of the same height of the wall which are set at the two sides of the kal prevent it from moving. To do that, the tip of the latepeka is sharpened and is driven into the ground at two sides of the wall and fixed by large nails (Figure 4). It is noteworthy that depending on the length of the wall, latepeka may set in one or two or some parts of the building. But it is always used at the setting places of door and windows (in the past herbal fibers named katoos were used for tying latepeka and kal, instead of nail).

Palver

Woods which have the thickness of around 11-12 cm, placed at the width of building on the lowest and highest kal in a parallel way at some distance to make the floor and roof of the house are palver (Figure 5).

The floor coverage

If the houses are built in flat ground and there is no need for a

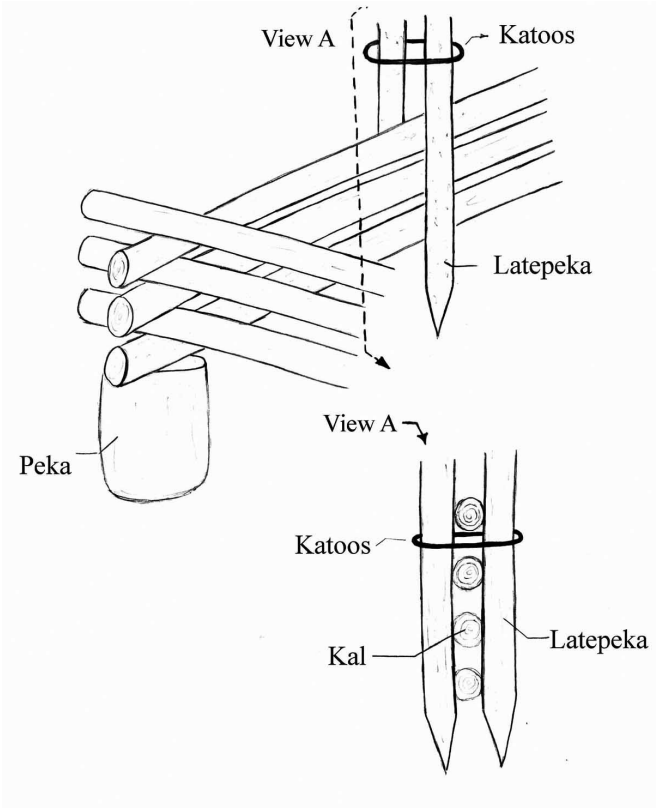

Figure 4: Confirming of kal with latepeka

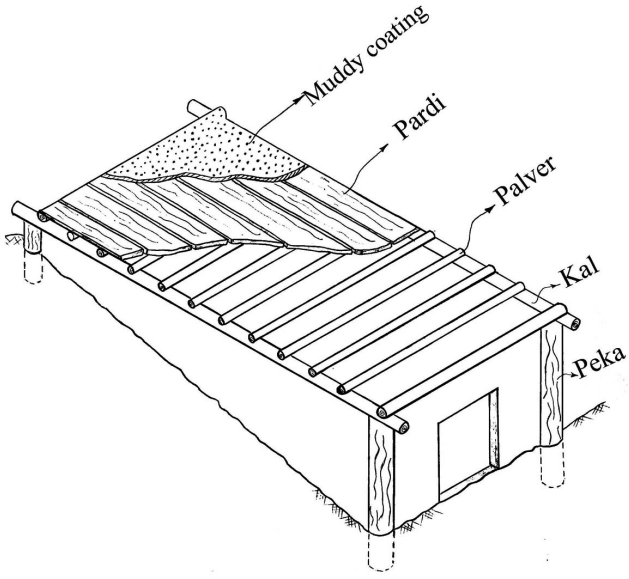

Figure 5: Setting of floor of kali house

basement, the distance between the lowest kal and the ground are filled by mud or stone fence and also mud is used for flooring of the rooms. This flooring mud is a combination of sifted soil, water and nenge which is kneaded a few times during 3 or 4 days to gain the needed stickiness. If the houses are on the slopes, the distance that is made as a result of the differences in height (from the ground) can be used as barn or a place for

keeping domestic animal. In this case, instruction is as follows: after setting the first kal, palvers which is 10-12 cm thick, by the distance of 50 cm, are set next to each other and then the woods are hammered on the palvers in a vertical direction and finally covered by mud (Figure 5).

Door and window

A section is made on the wall the same size of the door or window in a way that kals of the bottom and top of the section are used as the lintel. In addition, for making them fix, latepeka is used in two sides of the door and window, and the distance between the cut kals is filled by the stone (Figure 6).

The wall cover

First of all, a layer of mud mixed with hay is used to cover the wall, i.e. a mixture of soil, hay and water. As opposed to flooring mud, here the soil is not sieved, because it is used as internal cover and there is no need to seem fine. The next layer is muddy coating that is rubbed on the mud-hay mixture. The wall cover is the last one; it is the mortar of white and red soil. To make the mortar, after grinding and sieving, the red and white soil are mixed with water and then is rubbed on the muddy coating by stocking or sacking (Figure 7).

The roof

To make the roof, the procedure is as follows.

Palver: In kali house, after setting the last kal, the beams are set. In this kind of house, palvers are used as beams. They are put in parallel with the building width and nailed to the last kal.

Takhte rasm: It is a flat wood which is nailed in the middle of roof on the palvers and in line with the building length.

Small beam: The square cut wood (about 10 cm^2) which is nailed on the takhte rasm in certain distance is small beam.

Sarengen: It is a wooden wall-to-wall beam that is nailed on the small beam.

Helaneshin: It is wholly board which is nailed on the palver all around the building.

Cihela: It is the wood which is nailed to helaneshin from the head of the first beam at the 4 corner of the roof.

Hela: It is the wood which is nailed to helaneshin from sarengen along with each other at four sides.

Shish: It is the thin and tall wood which is nailed to hela in vertical direction to make the roof meshy.

Metal: At last, metal is used as the final cover to prevent from the permeation of rain and humidity. Details of kali house architecture are shown in Figure 8.

The cover of ceiling: At first, some board named pardi are hammered on the palvers in vertical direction and then they are covered by muddy coating (Figure 9).

5.2. Lardeei house

Lardeei houses were made after kali house and their materials are similar too.

5.2.1. Different parts of kali house

Peka

Same as the kali house.

Zirnal

Horizontal beams of 10 cm^2 size which are nailed to pekas are zirnal. The way of attachment to the corners is shown in Figure 10. If the building is long or zirnals are short, attachment of

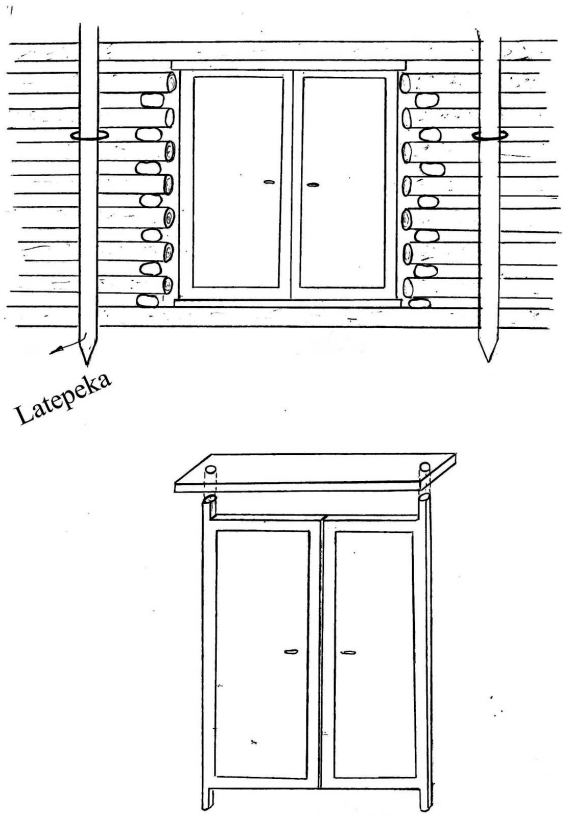

Figure 6: Setting of door and window

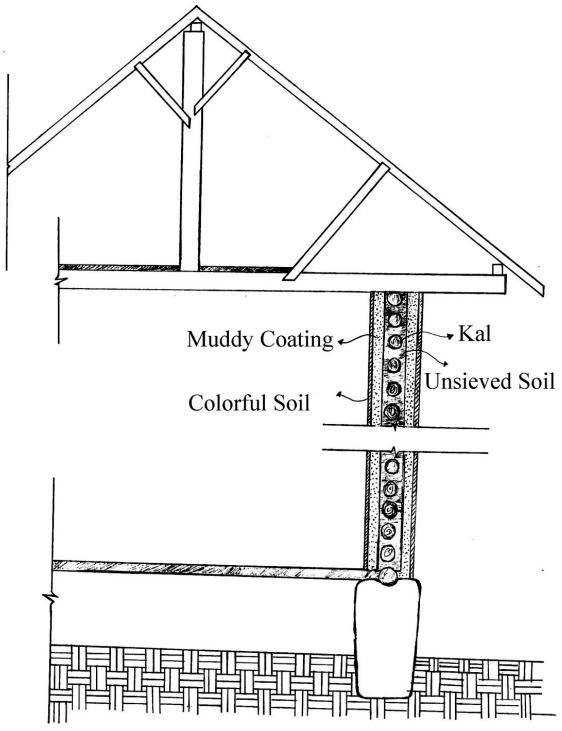

Figure 7: Wall section of kali house

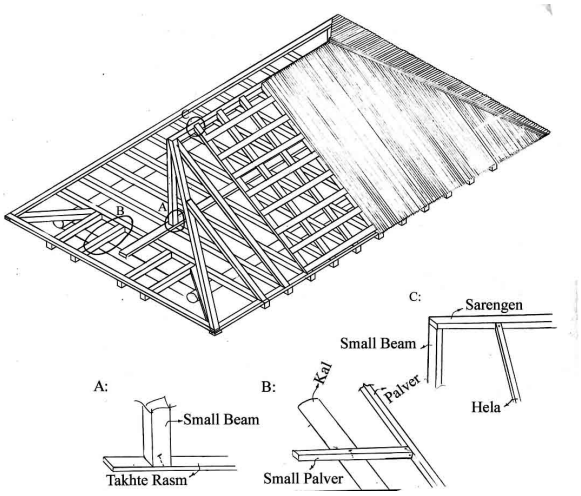

Figure 8: Setting of roof in kali house

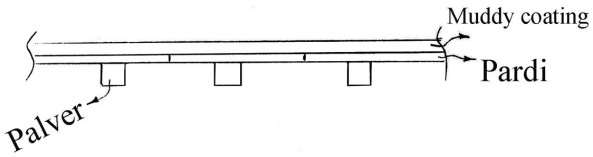

Figure 9: The layers of ceiling

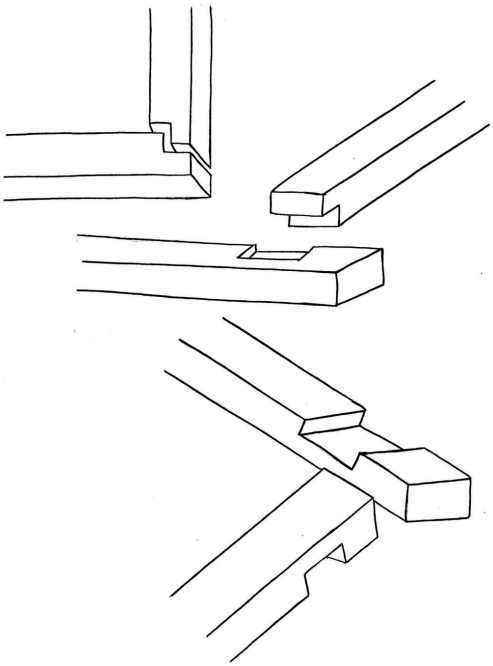

Figure 10: Different ways of connecting Sarnals in corner

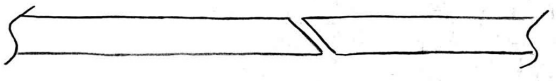

Figure11: Connection of sarnals in same line

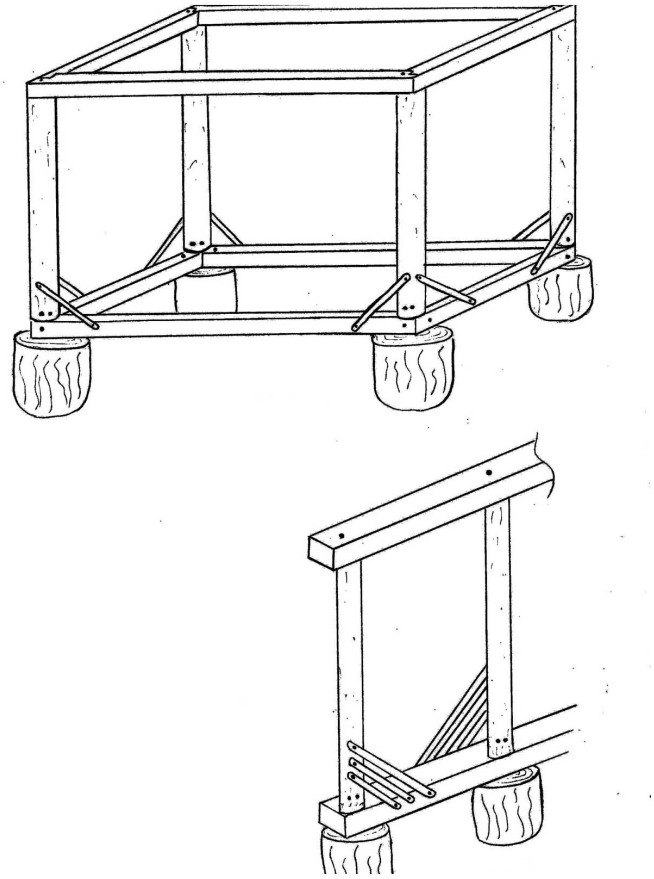

Figure 12: Setting of pillars to zirnal and fixing with chap dast

two or more zirnals is used, as shown in Figure 11.

Pillar

Pillars are woods of 10-15 cm thick which are nailed vertically on the zirnal and are fixed from two sides by the woods named chap dast (Figure 12). It is necessary to have pillars at the four corners and also some other pillars may be used between the other.

Flooring

Same as kali house.

Sarnal

These are wooden beams similar to zirnal which are lied at the top of the pillar and form the skeleton of the building.

Chap dast

The woods which are diagonally nailed from the pillars to zirnal, sarnal or between the two sides of the pillars are chap dast, and this work is done between the tow pillars. Chap dast are fixed at the two sides of the pillars. The steep of chap dast at the internal and external sides of the wall must be in contrary directions (Figure 12). So in this way, we have a good reason for the building resistance against side powers.

Door and window

What is noteworthy in setting the door and windows is that the pillars are used at the two sides of it. To set the window bottom

lintel, the two minor pillars of the same height of window are attached to the mail pillar and the lintel is laid on it. To set the top lintel, the square or circular cut woods are nailed to the pillars and the lintel is laid on it. The door bottom lintel is zirnal and to set the door top lintel, the same way is followed as for the window bottom lintel.

The wall cover

Same as for kali house.

The roof

Making roof is done in the same way as for kali house but there is a difference that palvers are installed on the sarnal.

6. Advantages and Disadvantages of Kali and Lardeei House

Kali and lardeei house which are built from local materials can be useful from different aspects such as economical, environmental, and so on. But there are some limitations in the usage of these materials. The following are some of the advantages and disadvantages of kali and lardeei house.

6.1. Advantages

1. Abundant materials are available in the village due to the presence of river and jungle.
2. There is no need to spend much money and energy for the transportation.
3. This kind of architecture does not follow the complicated commercial rules, but based on native and traditional rules.
4. The use of local architecture will result in keeping the life in balance.
5. It can provide a lot of job opportunities for the armature workers.
6. This kind of architecture that is compatible with climate condition can prevent from wasting heat and make temperature in balance and save energy to make the room cool or warm.
7. It acts better against earthquake because of the construction type and lightness.
8. Its combination with art and culture leads to the flourishing of wise and folk traditions.
9. The stabilization capability.
10. The housing and urbanization ministry ratified the laws about the materials' compatibility with environment.

6.2. Disadvantages

1. The wood becomes rotten at building's base as a result of high moisture and lack of appropriate weatherization.
2. Vulnerable to fire, termites and other insects.
3. The need to repair in short-time period.
4. Prohibition for the use of trees in construction.
5. Less stability of materials in comparison with new ones.

7. Tips and Suggestions

7.1. Technical tips

1. Supervising the accurate implementation of lardeei house in the village and improving the quality of building
2. Setting the rules and regulations in rural development plans considering the technical principles in relation with local houses and also local architects.
3. Increasing the quality of local materials by treating the wood or adding some materials with mud which makes it steady and consequently decreases the time gap of repairing local materials.
4. Removing the defects or stabilizing the attachment in the construction by the usage of new materials.

7.2. Managing tips

5. Considering the rules and regulations for conserving the local architecture and supervising the executive rules by the concerned organization.
6. Allocating some parts of the jungles around the village for planting trees which can be used in rural construction.
7. Encouraging the rurals to insure their houses against natural disasters and fire.

7.3. Training and promotional tips

8. Training of rurals for strengthening their lardeei houses.
9. Training of young workers on how to build local houses to prevent from forgetting this native knowledge.
10. Training of the students at university research center to become familiar with local building and to promote it.

8. Conclusion

The environmental condition helps appearance of materials such as wood, stone, straw, etc. and their presence at the same place and their combination procedure has formed two housing types in Amirkola village in Iran. This kind of construction has high stability by the use of local materials due to its execution techniques and also has economical efficiency for the rurals. As a result of their homogeneity with environment, local materials play significant role in the aspects of being weatherized and retrievable to the environment and also have a non-pollutive effect. So the study and planning in keeping the local architecture and utilization of its benefits is necessary for the rurals.

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