

Introduction of Panjeh Ali Bazaar and Ahangarha Bazaar of Yazd of Iran with an Analytical View of Sustainability Concepts

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ABSTRACT: Today the concept of sustainability is considered as one of the important concepts in the world. In this concept, particular attention is paid to a comprehensive and general approach to the association of the three factors of society, economy and the environment. In some developing countries, environmental and technological aspects are considered regardless of social and economic factors. The concept of sustainability or any other concept which is entered in country literature should be interpreted in accordance with the customs and traditions of the country to make it possible for the community to understand and digest in the Iranian culture. In line with the requirements outlined above, this paper intends to investigate comprehensive view of the ancient Persia toward the concept of sustainability, in Panjeh Ali Bazaar and Ahangarha Bazaar of Yazd, while the buildings are analyzed in terms of social, economic and environmental factors. Thus, the study of Panjeh Ali Bazaar and Ahangarha Bazaar of Yazd indicates that environmental strategies used are associated with social and economic aspects, also that the principles and rules used in its sustainable architectural design are derived in a way so as to be useful and usable for today's world and familiar for Iranian community.

Keywords: Panjeh Ali Bazaar and Ahangarha Bazaar of Yazd, Society, Economy, Thermal comfort, Natural ventilation.

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INTRODUCTION

The concept of sustainability first appeared around half a century ago in developing communities, while the entering of this theme in literature and architecture is associated with a significant delay in developing countries. The inquiry in this field has emphasized on comprehensive view and has considered the relationship between the three factors of the environment, society and economy that are three main top of the sustainability prism (Figure 1) (Joachim et al., 2010). In some developing countries, lack of attention to the correlation between the three mentioned factors has brought certain problems in cultural conditions necessary for general acceptance of this concept and applying efficient management tools for its implementation in society.

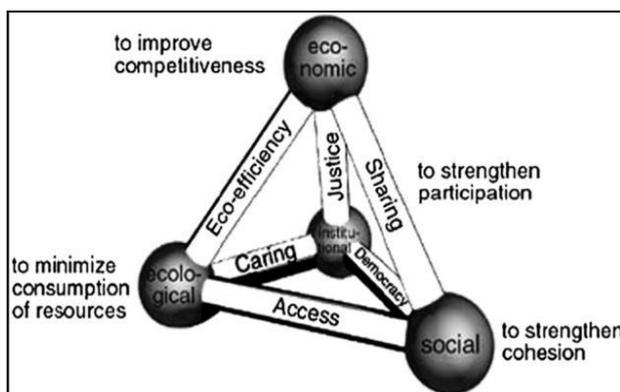


Figure 1. The Prism of Sustainability

Iranian people have a glorious civilization and ancient traditions, and during the history, they have never done the wasted work (Meimarian et al., 1992). Iranian predecessors employed the concept of sustainability in the total mean; therefore, not only the relationship between the environment, society and economy was obtained, but also these three factors were inseparable and inextricably interwoven in the case (Kazemi et al., 2012).

To explain this, we introduce Panjeh Ali Bazaar and Ahangarha Bazaar of Yazd. Later, these areas are studied in terms of environmental, social, and economical factors and the relationship between these three factors is investigated to achieve a comprehensive vision and to shape design ideas for contemporary sustainable architecture.

The method used in this study, is "Field Harvest" from available status. Then harvests were analyzed by library studies.

Introduction of Panjeh Ali Bazaar and Ahangarha Bazaar of Yazd

Yazd Bazaar is located in the south, outside the gates of a castle and Traditional downtown of Yazd; today, space is covered between Imam Khomeini Avenue in the East, Molla Ismail Street and Labe Khandagh neighborhoods in the West, historic city walls, Shahzadeh Fazel and Darolshafa neighborhoods in north and Godale Mosalla and Hashem Khan neighborhoods on the south (Olia, 1991; Pirmia, 1969) (Figure 2).

It should be noted that in the past, subterranean water has been used in Yazd Bazaar, and since most Qanats were running south to north, the Bazaar had been ranged from south toward the north (Sarae, 2010).

As it can be seen in Figure 2, Panjeh Ali Bazaar is prolate along the North-East to South-West. So Khan Square is at the Western Side of the Bazaar and is parallel to it. This Bazaar is along Tabrizian Bazaar. Panjeh Ali Bazaar has more variety of shops, and the local people do most of their shopping there. Sadat Sara and Ali Agha Sara are businesses centers belonging to this Bazaar that the various commodities such as rice, wheat, lentils, beans, fabric, carpet and valuable carpets were firstly supplied to these, then were stored or distributed.

As it can be seen in Figure 2, Ahangarha Bazaar is situated on the northern side of Hazrate Abbasi Bazaar, southern side of the Lard and eastern side of Panjeh Ali and Tabrizian Bazaars. In the past, all the shops have belonged to the Ahangarha; however, only a small number of those continue to work now.

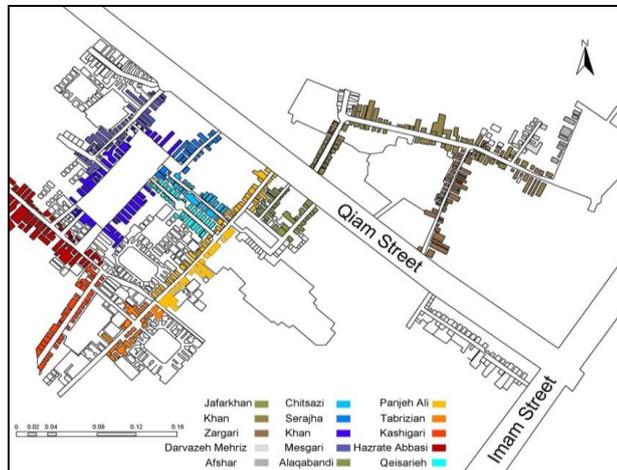


Figure 2. Yazd Bazaar

Roof covering of Panjeh Ali and Ahangarha Bazaars

In Panjeh Ali and others Bazaars, There are a variety of roof covering that can fit in several categories. One Karbndy has been set up at the top Chaharsoogh. It should be noted that Karbndy is a technique to cover the roof which serves as a structure.

Other is vault and Tavyzeh that cover the top of Bazaar. These Tavyzehs were implemented via Par technique; however, the Implementation technique is Roman for the Tavyzehs under Karbandy. On Tavyzehs trenchancy, most ceiling mounted four sections. These are shown in 3-7 Figures.

light of Panjeh Ali and Ahangarha Bazaar

When people entering Panjeh Ali and Ahangarha Bazaar, from intensity of sunlight are entered gradually into the softer light get that this notice to enter its privacy (Figure. 8) The Bazaars are lightened with light from available Hornou in the ceiling and upper walls that shines on the floor or walls. (Figure. 9) Intersections and Chaharsoogh get light from pores in the Karbndy. Most of the shops are also lightened from available Hornou in the ceiling.

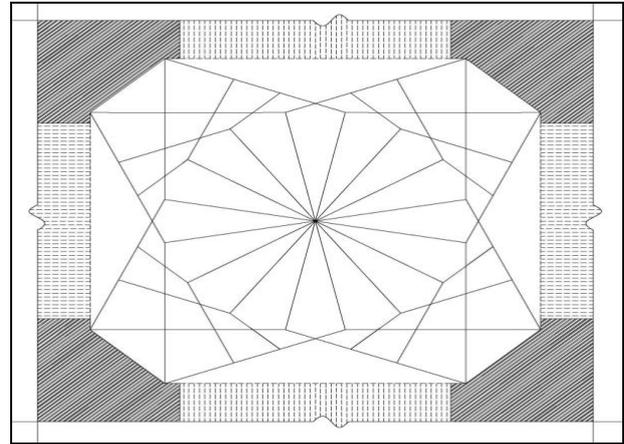


Figure 3. Karbandy in Panjeh Ali Bazaar

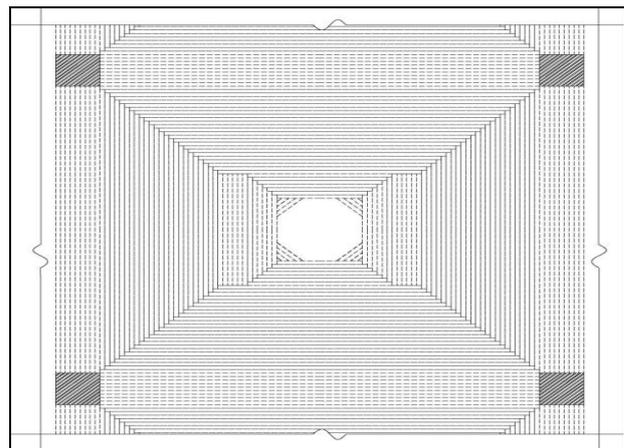


Figure 4. Charbakhsh Roof in Panjeh Ali Bazaar

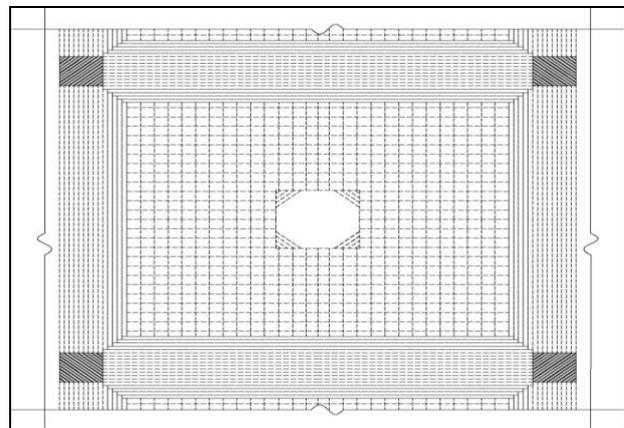


Figure 5. Chapiro or Ghomipoush In Panjeh Ali Bazaar

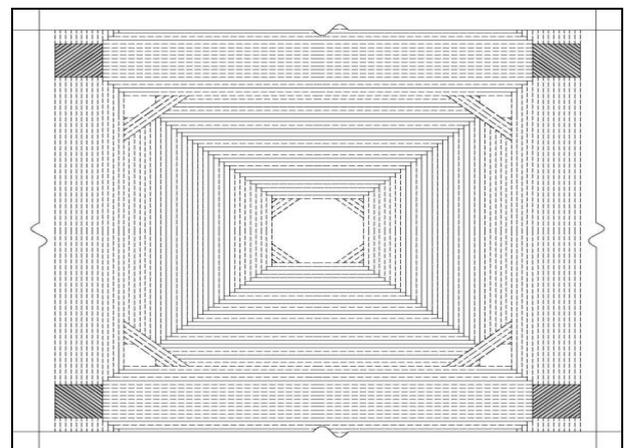


Figure 6. Charbakhsh Roof In Ahangarha Bazaar

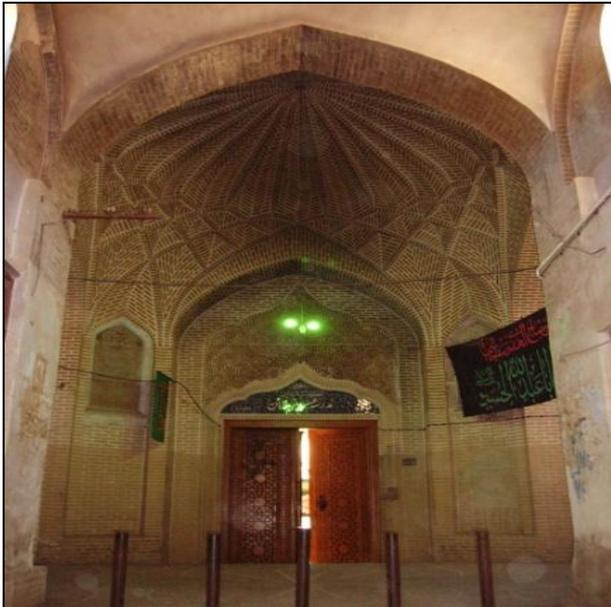


Figure 7. Seminary School



Figure 8. Panjeh Ali Bazaar

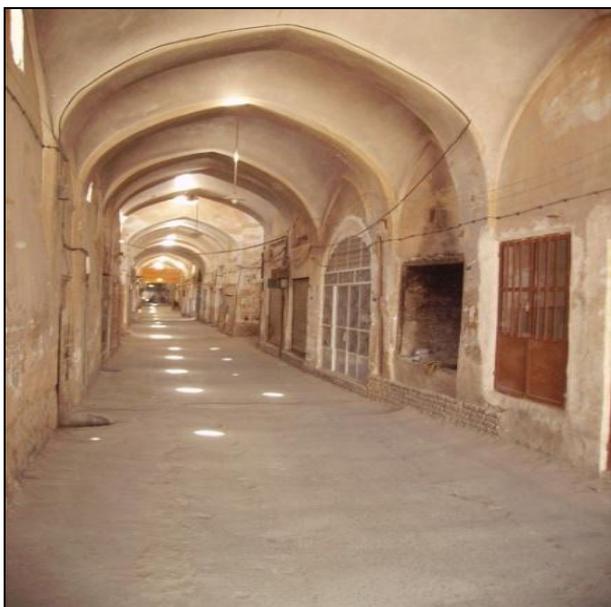


Figure 9. Panjeh Ali Bazaar

Sound in Ahangarha Bazaar

Noise caused by a collision of mallet with an iron is very loud and strident for ordinary people, but for Ahangarha, who have dealt with this for years, is pleasant and life music. Ahangarha coming together in the Bazaar that is located in the best position of city do not create a nuisance to adjacent spaces.

Noise of the Bazaar creates a spatial domain for it which can serve as an indicator for approaching towards the bazaar. It is noteworthy that the architectural design of this Bazaar takes advantage of the necessary measures for the absorption of sound including the selection of used materials and forms to minimize the intensity of the sound.

Social relations in Panjeh Ali and Ahangarha Bazaar

In the concept of sustainability, considering economy, as well as society and environment, is particularly emphasized. It is necessary to consider social element for getting acceptance of the concept of sustainability in order to implement it in the community.

Social relations in Panjeh Ali Bazaar

Panjeh Ali Bazaar, as briefly described in the Figure 2, is in vicinity of Tabrizian Bazaar in the south, Ghyam street in the north; from the west it is related to Khan square, that is parallel to it, through Caesarea and Chitsazi Bazaars; in the east, it is situated by Alaqabani and Jafarkhan Bazaars.

In the past, Long and Chadyshov (wrapper), that are products of Yazd, have been sold in this Bazaar. Beside the Bazzazi shops, there have also been grocery shops, butchers, bakeries and kebab stores. Now the bakery shops, Falodeh store, drapery, etc. have substituted those shops. Around the Bazaar, buildings Like Sadat Sara and Ali Aga Sara, home and school Malekotojjar and Seminary school have been seen.

Roll of Sadat Sara in Panjeh Ali Bazaar

According to Mohammad Ali Soltani, known as Ali Dabbagh, who has been in the business for 55 years, and other Old businessmen in this Bazaar, traders from Shiraz, Isfahan, Kerman and other cities of Iran came to Yazd and used to exchange their goods with Yazd's traders in this Sara and other Saras. Yazd's traders exchanged Shirt fabrics, Shals, Drawers and such other products with curd and ghee (Cow and Sheep) and so.

In September, traders, whose products were ready for sale, used to travel to Yazd by camels, horses, donkeys and mules, and used to settle in this Sara for a short time (A few days) and were busy buying and selling. At night they slept on the floor of Sara and if that was not possible because of the coldness of outdoors, they used to rest in two rooms in the lower floors.

Interior space of the Sara and its residential areas called corridor that were intended for the barrier so that a 24-hour protection of the bazaar would be possible. On the top of these corridors, some rooms can be seen for cooking Broth and serving the traders who came to the Sara (Figures 10, 11).

These products were sold in bulk, and retail purchases were carried out from Panjeh Ali Bazaar that was supported by them.



Figure 10. Sarae Sadat



Figure 11. Sarae Sadat

Ali Aga Sara and its Roll in Panjeh Ali Bazaar

This sara has also been associated with Panjeh Ali Bazaar. Besides Sadat sara that would offer the cloth, shawl, etc., this sara supplied types of legumes such as lentils, vetch, etc. as well as tea, sugar, rice, pepper, turmeric, etc. This sara also has relationships similar to Sadat sara, so we avoid repeating it.

Seminary School and its Roll in Panjeh Ali Bazaar

One of the Seminary school's main entrance is opened in Panjeh Ali Bazaar, in front of which, there is entrance of Caesarea Bazaar. The remarkable thing is that a spiritual base, that is the center of theological educations, is opened to the Bazaar which is dealing with the materialistic life. This, besides the science of jurisprudence, provides clergymen with businesses and the lives of ordinary people and their joys and sorrows, and they know their own arises from people. Clergymen should also try to get Halal sustenance that is explicitly recommended by Islam. Carpentry shops that have belonged to the sublime can be seen in Yazd Bazaar.

The merchants could also be away from greed and avidity and establish spirituality in a material

environment with clergymen being present among them. The establishment of religious school was perhaps the most important and best of traditional city decisions that has made interaction between the material and spiritual possible.

Social relations in Ahangarha Bazaar

Ahangarha Bazaar is situated on the north of Hazrate Abbasi Bazaar, on the south of the Lard and on the east of Panjeh Ali and Tabrizian Bazaars. Although in the past all the shops have belonged to the Ahangarha, presently only a small number of those continue to work (Figure 12).



Figure 12. Ahangarha Bazaar and Lard, Yazd, Iran

Lard is a small field where the goods arrive from different cities and then are transferred to Bazaar. The direct relationship of Blacksmith Bazaar with the Lard causes hot the ordered iron and other requirements of the blacksmith can be transmitted to this bazaar in the least possible time and spending the least energy after arriving to the Lard. In this Bazaar, with working on irons, various metal products Like Na'chy and Chylon were produced. Major products were transferred to the main Bazaar for sale; however, some of them were sold in the same place.

According to what old Ahangarha say, their activities in Bazaar caused to benefit experience and professional know-how of other. They were each other's hands to produce the best and finest products.

Economic interests in shaping of Panjeh Ali and other Bazaars

The factor of economy is concerned in the concept of sustainability, as well as environmental and social factors. Implementation of the concept of sustainability, after the public interest, depends on the economical conditions. If architecture is designed based on the concept of sustainability and the need for renewable energy is at its minimum, however, its implementation would not be detected economic by people, the Plan will remain on paper and its implementation will not be generalized.

In Yazd neighborhoods, the clay is seen to a depth of two meters, and loading on it is impossible. After the clay, there is very hard layer called Chelo or Kereshk,

and the architecture of the past set the building load on it. Sinking into the earth to reach Chelo, the costs associated with the preparation of the soil for loading are removed. This is why the Bazaar level is below street level.

The harvested clay has been used to supply the needed materials for construction. The soil is applied for making bricks in the same place where the building was supposed to be. The bricks obtained in place were used for construction of building walls and ceilings and in this way, the cost of shipping and handling materials was eliminated from construction costs.

It is noteworthy that these buildings, after the end of their lifetime, were turned to soil through destruction and returned to the natural cycle. The resulting soil from the building destruction, due to having been exposed to the air and sun, was very suitable for agriculture. In the restoration of the Dolatabad garden the soil that has lost its power after several years of continuous planting is used for preparing needed materials for construction and also destroyed buildings were used to provide suitable soil for agricultural. In this case, in the cycle had not arrived any Impact to nature. However, in the concrete and steel buildings, despite their low life expectancy, remaining of building destruction do not return to the nature and even damage it. In addition to manufacturing these materials may entered many pollutants into the nature. In these saras, with no electrical or mechanical cooling in the hot summers of Yazd, pleasant conditions were provided for the transaction and It Would also prevent extravagant energy consumption that nowadays is applied for cooling purposes. This coolness was provided by the ground power and air flow passing through water; hence, there was no need for renewable energy.

Used environmental strategies in Panjeh Ali and Ahangarha Bazaar

Yazd Bazaar is a big collection for buying and selling where the environmental strategies used are mostly proper for summer. Trade boom and more business are in the summer which includes seven to eight months in Yazd.

In winter, due to the very cold and dry weather of desert, the amount of trading reduces, and on the one hand, in short days of winter, sixteen hours of light time in summer are reduced to twelve hours. Business in winter begins from nine o'clock in the morning which is two to three hours after sunrise and will continue about eleven hours and thirty minutes which is time of the noon prayer. After performing Congregational prayers, Market merchants go to their homes, and re-open the shop around five in the afternoon. But in the past at this time that the sun was setting and due to lack of electricity and its lighting in the place of business, shops remained closed until the next day. In this case, the useful work of bazaar merchants in the winter was 2.5 to 3 hours.

According to what was already mentioned, climatic strategies that are efficient for the summer have the priority, and since the architectural design performed by the Human insight is never perfected, response to priorities for summer sounds more logical.

Ventilation in Panjeh Ali and Ahangarha Bazaar

The first attempt to deal with the extreme heat and scorching sun desert of Yazd is making roof for the bazaar. The Bazaar cover has been made with the spring arches that are mounted on top of Tavyzeh that shapes the shops and therefore the height is more. It must be noticed that in desert regions, like Yazd, established ceiling height is more than the cold Regions, like Tabriz, Zanjan and Hamedan.

Ceiling of Bazaar is the single cover and this is contrary to the principles applied in traditional house of this area whose ceiling is a double cover. In this case, the dome-shaped Ceiling is taken out of the Bazaar roof.

When the wind blows, often from Northwest, brings a cool and good breeze from Isfahan, the part of the ceiling that is faced against wind is in areas of high pressure and deliverability and the opposite side is in areas of low pressure and suction. It causes that Bazaar air that is associated with carbon dioxide visitors exhaled and other available pollutants, is out from the suction area and the clean and pleasant air is replaced. The air Curran will be intensified with the Horaneh which is built on top of each shop.

In the absence of wind, hot air from a higher altitude bazaar is out and clean air is replaced by Horaneh of shops and in this case, air of shops and Bazaar will be ventilated.

In Ahangarha Bazaar, ventilation plays an important role because this Bazaar is filled with smoke from the iron heating furnace. In this Bazaar, Horaneh of ceiling increases from one to five. The number of inside shops Horaneh increases to three or four.

It must be noticed that the domed form of ceiling of the Bazaar causes that half of the ceiling of roof is in the shade during the day creating poor areas of low pressure and high pressure and has effective role in ventilation. The shadow reduces greatly the transitional heat from the sun (Figure 13).

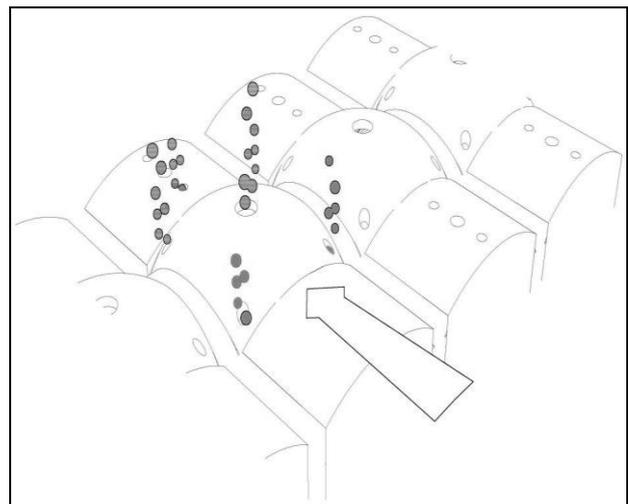


Figure 13. Ventilation in Bazaar

Sucking of air in roof covering of Chaharsoogh

After a few spring arches, is often seen a Chaharsoogh that is covered with Karbndy. The Karbndy height is more than the spring arches and is fitted more pore with a larger surface for it. The Karbndy for Bazaar

exactly plays the role of windward for traditional home. If there are no turning points in the Bazaar, its air will become static and heavy (Figure 14).

In this Chaharsoogh, there are some Bazaars like Caesarea and Chitsazi Bazaar with Isfahani run (Northwest-southeast), that trapped good weather from Isfahan, and after leading in the Bazaar route, by clashing with the closed wall in front of it, it flows in perpendicular Bazaar to it (like Panjeh Ali Bazaar). This helps to ventilate and exit polluted air from Bazaar.

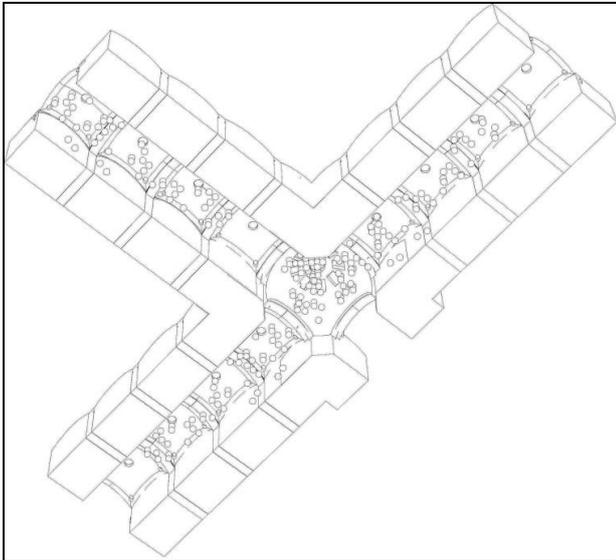


Figure 14. Ventilation in Bazaar

Role of heat capacity of used materials

Most used materials in the manufacture of Bazaar have been clay and bricks and also stick in shops. Used materials have relatively high thermal capacity and absorb heat from sunlight and other created heat in the Bazaar and due to their high thickness, in the evening pier sand roofs, after the closure of shops, gradually releases the absorbed energy. In this case, during the day, air temperature is equalized from outer space in Bazaar and the volatility will be reduced.

This problem is intensified in the blacksmith Bazaar. If the used materials were not selected such proportionate with climate, reflected heat from walls and ceilings would make it impossible to work in the shop and the temperature was so high that no one could get close to it from the distance.

Used environmental strategies in Sadat sara of Panjeh Ali Bazaar

In Bazaar saras are often seen the sunken garden, that not only had easy access to the water, but the soil obtained from excavation for building construction materials (Brick) has been used in the same site. Digging toward the heart of the earth was due to the presence of the clay to a depth of two meters in Yazd and reaching the hard ground Chelo or Kereshek that is appropriate for loading. This will be followed by using earth constant energy and reduction of thermal fluctuations during the day (Ghobadian, 1994; Kasmaie, 2006).

In this saras, a large pool and several gardens with large trees are seen. The moisture from evaporation of the pool water surface and the trees impact was used to

soften the collection air and lowering the environment temperature in summer. In this regard, could add that spray water will also effect on the first working day of the bazaar merchants.

It is noteworthy in the sara that the formation of building, unlike traditional house in Yazd and main Bazaar of Bazaar, Bazaar run (North-east, south, west) is instead of Isfahani run (Northwest-southeast). This orientation is also seen in some other saras and in saras, that do not have such orientation, the Yard is square; an example is Ali Agha sara.

The reasons for this particular orientation in Yazd can be expressed as what followed; first, sara, is not a habitat and only a few hours of the day, business thrive in it. Second, in the saras, there is no more horizontal or vertical migration and rarely happens that in these spaces is not subjected, such migration that occurs in Yazd's house from winter house to summer house and the reverse. Third, as mentioned, the Bazaar has been devised for the heat season, so behind Qebleh (Southwest Front), during the year and most of the day is in the shade; the main shop is dedicated to it. Fourth, in this sara or other, the substances store or is sold, need to cooling air. If carpets, wool or other textile materials in Bazaar set in a warm place, is rapidly attacked by termites and it called Willow. Foods required the cooling air to stay safe from rot.

CONCLUSION

In this concept, particular attention is paid to a comprehensive and general approach to the association of the three factors of the society, economy and environment. Iranian predecessors, in constructing Panjeh Ali and others Bazaars, employed the concept of sustainability in the total mean so that not only the relationship between the environment, society and economy is obtained, but also these three factors are inseparable and inextricably interwoven in the case.

The architects of this land have used environmental strategies like ventilation taken by spring arches, suction of Bazaar air by Karbndy on the Chaharsoogh and replacement of pleasant air, using the heat capacity of used materials in the Bazaar construction and being renewable of them, use the earth power by going into it, using moisture from evaporation of the surface of the pool water and sprinkling in the morning, orientation of buildings in both directions of Qebleh and perpendicular to it, etc.

It was such strategy that lives of individuals is associated with it and accepted by the community. Also, these strategies were formed based on the needs of the construction and going in the earth to reach hard ground was necessary to transfer the building load to it. With the soil from creating the space in the heart of the earth, construction materials were supplied at the site and costs associated with the transportation of raw materials were reduced. Required materials for construction of the buildings were taken from the ground, which caused to pollute human environment and after the destruction had become the soil and did not cause harm to humans and the environment.

Today in architecture, these ideas can be discussed, translated by new delicately because it is so tangible for people to be accepted by society and with respect to economic issues, way is open to the public to implement it, and generality.

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