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Vernacular Architecture as a Strategy Toward Sustainable Building Design

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***Abstract*--In the current research, not only contemporary needs are considered, but also future needs are not forgotten and are tried to be fulfilled by inspiration from vernacular architecture. In conjunction with that, in most of the developing countries, the concept of sustainable architecture is not extensively considered yet, although these countries have a priority for resolving many prevailing problems. While many professionals and scholars criticize the quality of current architecture and energy consumption in the world, vernacular climate responsive constructions seem to be on appropriate patterns. Consuming technology and material of their own time, these constructions provide their users with environmental comfort conditions along with minimum ecological footprint and energy consumption. Therefore, this article has aimed to understand the solutions used in vernacular architecture in Iran, with an emphasis on hot and dry regions of cities such as Esfahan, Yazd and Kashan. Three factors were found to have significance: effect of climate on building form in arid-hot regions of Iran; constructional patterns based on climatic designs, for instance in basements, courtyards, Ivan, domical ceilings and porches; widely ranged behavioral patterns as intelligent responses to climate, seen in former lifestyles. All factors were analyzed since they were worthy evidences of lifestyle and knowledge used in order to overcome hot summers in considerable parts of the country. Hence, the investigation goes on finding the ways on which these solutions can be carried, and how they can be implemented in the current low energy designs. In current building design, only following the formal elements is not enough, then their thermal rules should be looked upon as well so to take advantage of the logic behind them. Hence, the methodology of the study is based on a theoretical approach supported mainly by the outcomes of the literature review and case study analysis. Apart from that, the research involves fieldwork, and more specifically deskwork studying, as a form of qualitative method of data collection. Finally, results support a better design to overcome the current global energy crisis as well as maintaining a high level of self-consciousness.**

Key words: Sustainable Architecture, Vernacular Architecture, Climatic Elements, Energy Efficiency

I.INTRODUCTION

Regarding the socio-political and economic aspects, as well as technical advancement, lots of historical practices and vernacular architectural solutions have revealed high amounts of environmental and social sustainability. However, emphasis was given to the stylistic approach and vernacular architecture typologies in most post-modern revivalist movements, and the focus of exploration was on the cultural and stylistic authenticity. Hence, functional, climatic and socio-spatial aspects were given little attention at the time. In contrast, via a constant course of straight revivalism, only a restricted fundamentalist approach was revealed by the functionally oriented contributions for vernacular architecture (1). Many other huge potential of the vernacular buildings are still needs to be concerned. As an instance, replying the requirements by means of the environmental energy is another criteria could be revitalized(1).

In addition to advantages earned by looking back to the vernacular architecture, scrutinizing this type of architecture via the glasses of energy can bring about many other energy benefits, especially with nowadays' requirement and consumption of huge amounts of energy in addition to the climatic changes and energy crisis. "As a result of industrialization and population growth, consumption of energy has upraised in developing countries. It is a worldwide belief that in any country, over one third of the whole energy consumption is attributable to heating and cooling of buildings "(2).

Reaching optimal efficiency in construction solutions requires deep study. Among these solutions, vernacular climate responsive constructions seem to have appropriate patterns. It must be acknowledged that human beings were more familiar with the concept of sustainability prior to Industrial Revolution. Since climatic boundaries are not related to political ones, climatic characteristics for people who live in similar regional areas will pose similar problems. Although solutions found by people in arid-hot regions around the world for meeting the climatic problems are different in shape, they can be considered similarly in terms of notion. In areas with arid-hot climate, such as Iran, where the most inappropriate climatic conditions have affected the living of residents, it can be observed that patterns have played a crucial role in creating thermal comfort and are worth for analysis. Despite the outdoor harsh conditions during summer such as heat storms and

wind flow with dune sands, their construction design method is such that it is possible to create an appropriate environment for living. Moreover, these constructions designs have been carried out without any dependence on other equipment and that is why they are presented as low energy consumption designs(3).

The focus of this research is mostly on identifying the buildingcomponents which are environmentally friendly, and are shaped over the centuries, based on vernacular climatic designs. Iranian architects were creating masterpieces for centuries, by getting use of the temperature difference between day and night, and also wind flow, so to be able to bring about thermal comfort unsupplied with energy consumption in their constructions located in hot deserts. To do so, they were using some elements such as courtyard, wind catcher, underground cellar, Ivan, domed roof, and basement design. These construction patterns are abundant, however, considering the fact that there is a tendency in modern architecture to eliminate using some of these elements, this paper has sought to revitalize these essential elements which can be used based on thermal rules and be applied to climatic design, offering solutions for energy crisis in the world today. Besides, these construction patterns own some kind of comprehensive behavioral patterns ranging from intelligent responses to climate observed for climate design.(4)

II. VERNACULAR INSPIRATION AS A KEY ELEMENT TOWARD SUSTAINABILITY

In developing sustainable architecture models, techniques are used with ethical and functional principles which also govern its creation. These principles, without pursuing stylistic considerations or aesthetic expression, reflect a sort of functional utilitarianism and honesty, from outer part of such a functional and technical setting. Nevertheless, sustainable features were able to be more imitative and much linked to the social shared retention and the regional heritage. For instance, many of these elements can be found accordingly all through the idealistic history of Islamic Architecture (4) (Fig. 1).

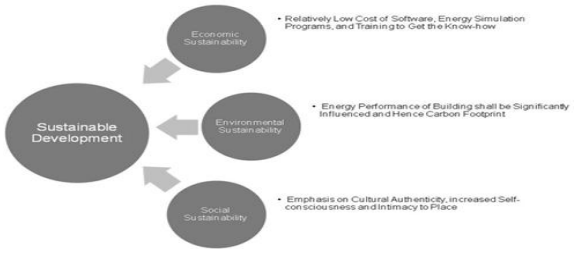


Figure 1: Predicted Influence in the Integral Context of Sustainability (Source: Wael, 2012)

III. PERCEPTION OF VERNACULARISM

"Vernacular architecture is abandoned due to its being considered insufficient, uncomfortable" (Karaosman, 1996). Here, some questions regarding the reevaluation of vernacularism are insisted on. These questions concern the nature of vernacular architecture in relative to passive environmental resolution and human action. Of these questions are: "What is the relation between human action and vernacular architecture? Should an understanding of the fundamental nature of architecture be derived from an analysis of the built environment based on passive environmental response? Or theory about human nature" (Turan, 1988). Efforts done by Hassan Fathy, who was of the founders of this field, was certainly significant in this regards. He tried to present an environmentally acceptable architecture which was recognizable locally and rationally plus being sensitive to regional traditions as well as economic situations. Hassan Fathy employed inherited traditional features with the least cost and using the most accessible materials, in order to create environmentally friendly buildings (see Fig. 2).

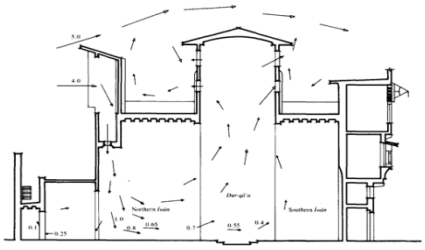


Figure 2: Cross-Section of the Airflow Pattern and Cross Ventilation, Qa'atMuhib Ad-Din, Cairo (Source: Fathy, 1986).

"The economy of vernacular architecture related to raw materials and energy. It profits from local materials and techniques, moreover comprises a long lasting process of experimentation of human being connected with spatial and temporal context" (4). However, owe to the absence of propagation and official support as well as bearing a symbolic sense of poverty, his sustainability perspective was not recognized culturally (4).

It should be noted that reviewing the basic ideologies of regional architecture is essential. Regionalism was always concerned with preserving functional sustainability; replying to the environment, while expressing identity within a distinct regional expression. Regional architecture's basic ideologies are meant to mediate the impacts of imported styles plus preserving a high level of self-consciousness. "By way of general meaning we can say that it upholds the individual and local architectonic features against more universal and abstract ones" (5). Kenneth Yeang (1997) conferring to regionalist design purposes has expressed that these purposes are related to contextual architecture which replies to the local circumstances self-evidently. Accordingly, regionalist design, rather than relating principally to international impacts and inclinations, relates to more perceptible realities and profounder awareness of the place (5).

IV. CLIMATE CONDITIONS OF CASES CHOSEN IN IRAN

Iran is located in a warm climatic region which lies between 25°and 40° latitude. Dry deserts of northern Africa and Saudi Arabia extend from the Atlantic Ocean in western Africa going across Iran and finally end in Afghanistan and Turkmenistan (6). The current study has selected two regions: firstly, the region mostly located in the central part of Iran, with arid-hot summers and cold winters; secondly, the borders of the Central Desert with its extreme hot-arid summers and nearly cold winters. In these areas, achieving human comfort, especially in hot season, can be very hard. In addition, the air temperature in these regions ranges between maximum of 40–45°C and minimum of 0–5°C. Precipitation in these parts is very low, and relative humidity is under 30% with a clear sky during the summer days. Moreover, dusty wind is an important factor in these regions which is very unsteady.

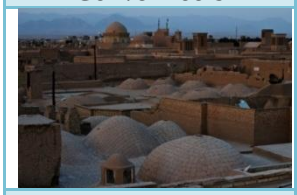
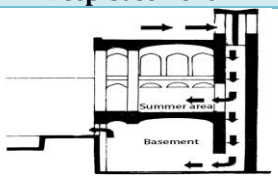
Figure3: The four cities located in center of Iran.(Source: URL1, 2012)

A. The Effect of Climate on Building Form in Arid-Hot Regions of Iran

According to the analyses, the main principles of the construction form in Iranian vernacular architecture in a hot arid region are flat and convex roofs, inward-outward oriented buildings, deep basement, and central courtyard using brick or occasionally adobe. Most buildings are built using thick walls in this region.(6).

Buildings forms in this region are something in between the forms used in southern coastal regions and the ones in central plateau. The reason is that the building forms in this hot and dry region have a sense of owning a central courtyard like the construction in central plateau. In addition, they have various openings both around the central courtyard as well as in the exterior walls of the constructions located in the southern coast region of Iran. Consequently, buildings in this region are mostly designed based on the semidetached form. Semidetached form assists the construction to reach the appropriate level of thermal comfort during the hot months of the year through cross ventilation. Moreover, buildings in these regions are mostly built on the ground level. In other words, most of the houses in hot and dry regions have a Shabestan (basement) and a Shuwadan (deep basement). The majority of the constructions has flat or dome roofs and most of the roofs are built with brick domes or vaults. Rubble and brick are common materials used for walls in these regions(7)..

Table 1: Principles of form in the Iranian vernacular construction in hot-dry regions

OVERALL FORM OF THE VERNACULAR BUILDING IN HOT-DRY REGIONS IN IRAN		
Convex roofs	**Inward-outward oriented buildings**	**Deep basement**
		
Central courtyard	**Construction a material brick, adobe and mud**	**Thick walls**
		

B. *Construction Designs Compatible with Climate*

inhabitants of these areas, climatic difficulties have been of the chief serious subjects they deal with. As a outcome, over the course of time, persons found answers for decreasing the worryingfeatures of the climate while surprisingly using its suitabilityfeatures. Passive approaches used in this respects in hot and dry regions have led to construction designs. Construction patterns, in contrast to conflicting with nature, do interact with it, and as a result, reduce the amount of artificial cooling and lighting loads. Whatever that helps the vernacular architecture to become consistent with the environment and climate, such as climatic elements or construction patterns, has a substantial role in reducing energy consumption levels(7).

It was reported in a related study that basement was one of the most important spaces of the residence under study in Yazd city and passive cooling strategy was considered in the climate design of the house. Wind catcher has defined the room temperature to be 28°C in midday in Yazd. Ghobadian (2003) has also stated that the cellar temperature was 24°C, in hot hours of Kashan. The central courtyard and main spaces in Esfahan houses which have been determined by Khalili (2011) were defined as being in the thermal comfort range. Evidently, in such hard climatic situations, excellent solutions consistent with those environmental situations were planned for providing thermal comfort. For instance, the decrease of interaction with the summer heat and solar radiation, especially providing a shade, had a main role in the composition of compact and closed construction sets. Construction orientation, method of communication with ground, introversion and closure, wall thickness, height of rooms and applied materials have also been of such patterns. Followings are the most essential architectural provisions initiated in the buildings located in those regions which play a significant role in providing comfort for the resident:

C. Courtyard

In Iranian traditional architecture as well as in other hot-arid regions, courtyard has been used for long. Other than its assistance for the socio-cultural events, security and protection, a courtyard generates a cool, small and humid climate inside the building, which decreases the cooling energy needed. Different architectural spaces also are organized by the courtyard, in the way that all windows and doors are opened into it (7) (Fig. 4).

Fig. 4: A typical courtyard in Yazd(Source: URL1, 2012)

Possessing the knowledge regarding local and geographical features, architects of hot and desert areas have designed houses in order to disconnect the direct link with between the disturbing geographic factors and the house. Keeping the house exterior closed and building nonporous walls are some methods for restraining the sandstorms. Moreover, surrounding the exterior part of the building via walls in shade is also a significant solution for streets and sidewalks get extremely hot during the day and they redirect heat in large amounts into the building. As a result, based on all the mentioned reasons, a central courtyard can be mentioned as the best exterior space for this kind of climates(8).

In the courtyard, the cool night air, which is heavier than surrounding warm air, settles down and remains in it. Thus, there are cool piles of air which protect the building from the outdoor hot air(8).(Fig. 5).

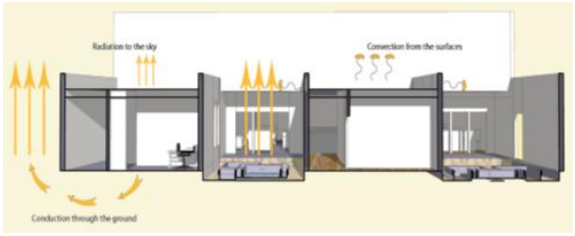


Fig. 5: Thermal performance analysis of courtyard at night(source:Haeri, 2010b).

The air inside the courtyard is cool at daytime, especially where there is not much sun. In small courtyards, where their width is smaller than their height, wind flow is not able to impact the storage of cold air inside. Hence, in various ways, small courtyards are known as the best thermal regulators for a building(8). (Fig. 6).

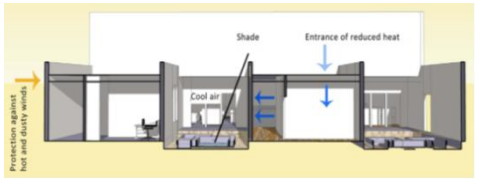


Fig. 6: Thermal performance analysis of courtyard during the day(source:Haeri, 2010b).

While water resources in this climate can moderate the temperature during day and night, they can also reduce the temperature fluctuation inside the building as a microclimate. One major reason for the presence of a pool of water, trees and plants in most courtyards in this region is to increase the air humidity which is essential in hot and dry regions for making indoor spaces more moderate. Moreover, direct evaporative cooling occurs when relatively dry air is blown on a wet surface. Consequently, when the breeze passes over a pool, fountain, or an irrigated area, it cools down before entering the house. Yet, there is the disadvantage of wasting and distributing cool air and moisture effect outdoor. Therefore, usage of central courtyard assists in decreasing the evaporative discarding of

fountains and green spaces in order to preserve cool and favorite conditions via surrounding areas. Measurement of houses in Yazd city of Iran shows that the courtyard's maximum temperature, calculated at noon time, was sufficiently lower than the temperature outside (8). Heidari (2010) also concluded that if the courtyard be designed small enough, it can be an efficient thermal regulator (8). (Fig. 7).

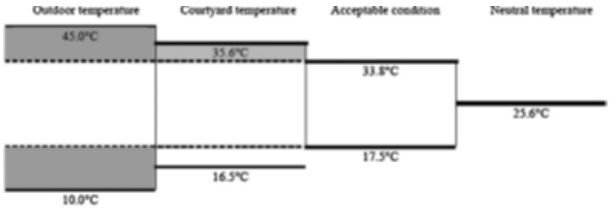


Fig. 7: A comparison between outdoor air temperature, courtyard air temperature, and acceptable conditions for people in Yazd, Iran (source:Heidari, 2010)

D. Ivan

Nowadays, closed areas in buildings are placed just after the outdoor area which can be a street or a yard. Conversely, traditional buildings link the closed areas to outdoor climate, environment and light through an interface, called a semi-open space (Roaf et al., 2005).(Fig. 8).

Fig. 8: Different types of semi-open spaces in Yazd and Kashan (source:Haeri, 2010b)

An "Ivanche" or arcade is the smallest form of such a space and is mostly placed in the lower areas of the construction, or is created between the courtyard and the rooms, in accordance to the area around the courtyard, or to windows and doors. The best known semi-open space is Ivan, which has one open side overlooking the courtyard, two semi-open sides and one closed side. The closed side is linked to "Shahneshin", which can be integrated into the main room by opening the doors or windows. The two other sides are mainly associated with transition areas (9). Concerning the spatial organization, Ivan is along the open and closed spaces which preserve the spatial hierarchy of the construction. Moreover, this vernacular Iranian element of architecture is climatically significant in creating thermal comfort conditions in adjacent indoor spaces. Facing south and east, Ivan can be more efficient in winter while more efficacies could be resulted in spring and summer when it faces north. North faced Ivan is used more frequently in most parts of Iran. As previously mentioned, converting an open space into a semi-open one results in a significant modification of indoor air temperature of rooms. Ivan has been mostly located in summer spaces of the construction, facing north and back to the afternoon sun and always shaded. Consequently, the temperature of one side of the construction would be lower than other sides and the courtyard(9).

This difference of temperature between the semi-open and open spaces leads to a gentle airflow from the courtyard, making Ivan a usable space in summer while providing indoor areas with favorable thermal comfort. Having conducted several measurements in Boroujerdiha House in Kashan, Iran, in the warmest season of the year, Haghparast and Niroumand (2007) indicated that the main porch of the house, at times, has a significant role in moderating the heat. Based on the presence of a favorable wind and the position of the earth, Ivans were built in front of the cold breezes in some rural areas and cities, such as Tabas. Same way out has been used in some coastal cities in Persian Gulf as well as some cities in North Africa where ventilators and Ivans are placed in from the the cold breeze coming from the sea. However, breathing in most cases is provided through the wind catchers as a reason of closed and compact texture (Fig. 9) (9).

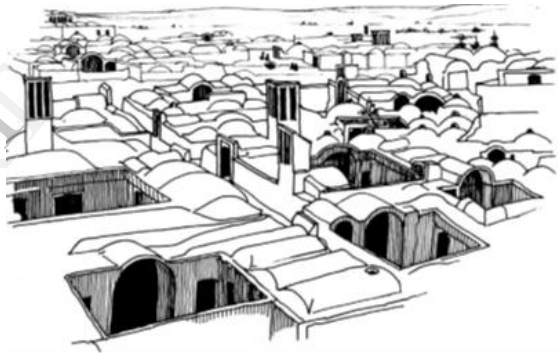


Fig. 9. All Ivans of summer rooms are back to afternoon sun, thus keeping shadedat the time (Source: URL2, 2012).

Ivan has been used to function as a place for living and resting during the day, sleeping at night, having dinner and breakfast, guest gathering, pass ways, linking rooms and also taking advantage of the view of sky and courtyard.

E. Cellar (Sardab)

A completely underground room where the roof is even few meters lower than the adjacent ground level is called Sardab or Cellar. In Sardab, the floor, walls, and roof have a quite lower temperature compared to outdoor one, and therefore, thermal comfort level is impressively met through the reflection of the residents' body temperature to the surrounding surfaces. In general, heat release into the soil and temperature changes of different layers of the earth follows two basic rules: first, the range of circadian variations (or annual) of temperature decreases versus the earth's depth. Moreover, its temperature is persistent in a specific depth of the earth, and there is almost zero variation in the temperature. In cellar locations underground, this rule is greatly observed(11) (Fig. 13).

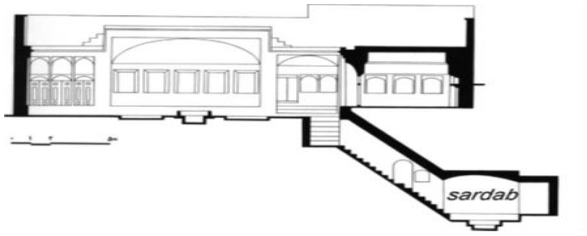


Fig. 12: Section view of a traditional building in Yazd; Sardab is located in 9 meters deep under the ground (source:Haji-Qassemi & Karbassi, 1998)

F. Basement

Dissimilar to Sardab, ceiling in the basement is located higher than the ground or the neighboring courtyard so that the windows be able to transfer the natural light into the area. While basement can be used around midday, in the first hours of the warm periods, it is the courtyard that the residents can use more efficiently. In a sequent way, movement can be observed from higher levels to lower ones during the day. In extremely hot days, it is the basement areas around the courtyard which can be used to live and work in first hours of the day and during the hottest hours, the occupants can move down into the deepest and coolest area of Sardab (11) (Fig. 13).

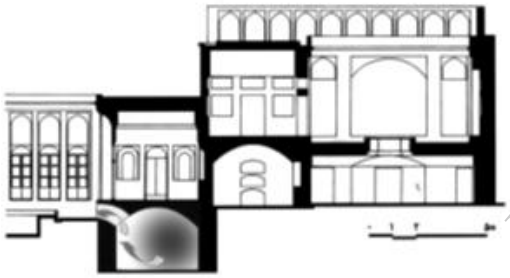


Fig. 13. The difference in height is owing to basement ventilation openings (source:Haji-Qassemi & Karbassi, 1998).

In some traditional houses of Yazd such as the ones considered, there has been a canal of Qanat below the building. In such a case, Sardab was provided with an access to the canal, or sometimes the Qanat water could enter the small pond in a space called Hozekhane which was a covered area with a central pool, usually elevating the water and lit it through the ceiling, leaving it from the other side. The pond along with entrance openings of the wind catcher in Hozekhane can also increase the humidity and cooling in this space. In order to enhance the basement efficiency, the floor of Ivan used to be two, three or even more steps above the courtyard, providing a surface appropriate for ventilator openings below the summer space of the building. According to the measurement data available for several houses in Yazd, Iran, the only building space which easily maintains its fixed temperature lower than the thermal comfort level is the basement (12).

The findings from the temperature variation recordings revealed that in all the selected case study houses, none of the ground-floor rooms could supply a comfortable indoor temperature throughout a typical hot summer day without using an electro-mechanical cooling system. The basement was the only space in which the temperature fell within (or possibly below) the comfort zone (Fig. 14). That is why basements and underground living rooms were traditionally used as alternative living spaces(Keshtkaran, 2011).

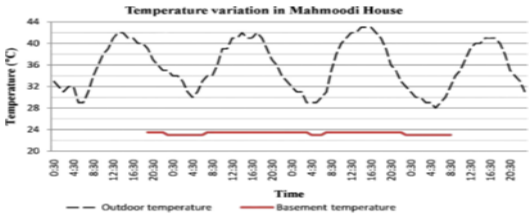


Fig. 14. Temperature variation in the basement of a traditional house in Yazd, Iran(Source: URL3, 2012)

As mentioned previously, basement space temperatures were constantly and noticeably below the mean outdoor temperature, suggesting that basements can be a permanent source of cooling and a place to seek comfortable housing during hot summer days. Nevertheless, in almost all the ground-floor spaces in which measurements were taken, the mean indoor temperature was below the mean outdoor temperature. Consequently, vernacular passive cooling systems assisted in the temperature reduction of the ground-floor rooms in the selected case studies, but the reduction was not adequate for bringing down the temperature within the comfort zone (12).

V.Behavioral adaptation

Just a quick look over the lives of people in Iran illustrates that our countrymen were determined about the location of their homes, going through displacements and migrations till recently, in order to live in suitable places and constructions. Hence, they had no obstacle in reaching thermal comfort. At the same period, there were families who lived in their winter houses in cities where they worked during cold seasons, and in hot and unfavorable weather, they traveled into places with mild climate and countryside near their town. That is why the tribes living around Zagros Mountain travel from hot Dezfool plains in spring, up to hundreds of miles over the place, to settle in northern heights of Khorramabad with cool climate in order to experience thermal comfort (12). During winters, this place is covered with a couple of meters of snow, but at that time, immigrants are settled in equable and desirable climate in lower plains. However, it was not possible for permanent residents settling in cities near deserts to experience seasonally immigration to places with mild and pleasant climate. Thus, they performed another type of immigration around their own houses. They lived in houses, which could provide them with comfort, and they moved throughout their houses by change of seasons. Doing so, the residents moved not only horizontally, but in a three-dimensional network, using height, in order to achieve their desired comfort(13).These spaces consist of the roof, courtyard, terrace and basement. For instance, in hot seasons, the fresh shaded courtyard was considered as a living place around

the beginning of the day, and then in the afternoon, they were moving toward the basement. Even the basement included two or three consecutive living levels, which became deeper and cooler (13). As a result, the basement levels close to the yard were chosen for the beginning of the hot days, and around the hottest hours, the residents were moving toward the lowest and deepest parts called Sardab or cellar. And then again, at night time, residents were going up to the roof area to sleep (Fig. 15).

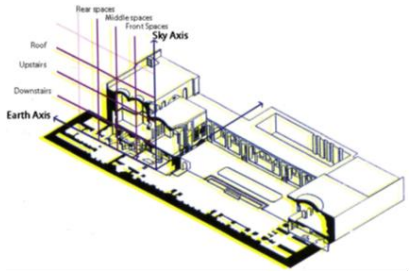


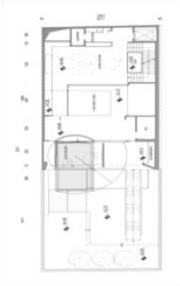
Fig.23: Movement in a three-dimensional network during a day(source:Haeri, 2010b).

VI.Discussion

Modern architecture, regrettably, does not possess the essential lifestyle flexibility. Concerning thermal comfort, residents of those houses nowadays do not own the proper behavior for reaching thermally comfortable environments. One good reason can be that people do not try hard to achieve thermal comfort. Yet, the building should bear the residents' role as well for achieving the comfort.

These days, families are not allowed to use all the potential spaces inside their houses due to various conditions. In such situations, space is considered as a rigid material such as a brick or piece of iron. Spaces are not used based on their capability and adequacy anymore. By revising previous traditions, the emphasis on behavioral patterns for developing thermal comfort can be observed. Flexibility of spaces provided a situation for people to move and obtain tranquility. Since various spaces in indigenous architecture had different thermal specifications, comfort strategy was provided through moving from one room into another in different hours of the day. Architectural parameters and concepts of both original and modern houses have been compared regarding their temperature and thermal comfort in Table 2.

Table 2: Comparison of concepts and parameters of vernacular and modern houses (source:Mosavi, R. (1996).

Type of climate		
	Vernacular House	**Modern House**
Typical Plan		
Plan Configuration	1.Spatial organization of vernacular houses, itself, undertook the comfort supply by considering the use of open, semi-open and closed spaces and flowing air in all the components of the rooms, developing shadows, putting ponds for surface evaporation as well as observing energy saving	1.The responsibility and plan for comfort supply of houses are not included in spatial organization of contemporary houses. Amount of participation of spatial organization in providing cold, heat and ventilation seems little. 2. Change in the amount of utilizing semi-open and mediating spaces (porch, etc.)

	elements. 2.Existence of three types of spaces; open, semi-open and closed, with specific ratios for these three spaces proportionate to the climate.	leading to decreasing and omitting them as well as changes happening in the ratio of these spaces.
Quality of Space	Space flexibility for lifestyle dynamism, human behaviors, their status and allocating no space for special operations.	Domination of objects in house special organization, transformation of space into a rigid material resulting from space inflexibility
Thermal Comfort	Comfort providing elements such as wind-catcher, basement, shades, pond and courtyard in a uniform pattern were integrated inside the spatial organization and appeared in architectural displays 2.Convergence between residents' sneeds and demands with environment.	Architecture does not have any role in installing of factory packages (cooling and heating devices) in internal spatial organization. These devices are attached to the building as an accessory part. 2.In the spatial organization, there is no spatial response for achieving adaptation to environment and its changes and space response is replaced by technology in a divergent way.
Building Conection to Nature	House was not separated from nature, and existence of some natural representatives was mandatory in internal spatial organization of a house.	The spatial organization of a house does not consider the nature. Its facilities have not been used for providing residents' comfort, and relation of construction with nature in contemporary houses has been minimized to consumption of environment and weakening it.

VII.CONCLUSION

Traditional constructors in Iran were using developed techniques for controlling the climate despite their access only to limited resources as well as lacking modern technologies. Making use of only natural materials such as stone, earth, water, sand and plants, those builders were providing comfort situations. Moreover, wind and sun energies were amongst the most utilized sources for them. They constructed with restricted alternatives and had to understand the environmental elements and their features to make the best use of them. This current study has investigated the climatic design and passive techniques used in these constructions and figured out how these ideas and techniques can cause the inhabitants to have thermal comfort, using natural energy strategies. Understanding

these issues can make suitable circumstances for making novel techniques with a natural method aiming for energy optimization in construction. Nowadays, families are not allowed to make use of all potential areas inside the houses, due to various conditions. Hence, reviving the original knowledge,climate consideration and flexibility, space organization based on daily needs as well as recent requirements are of the important issues. In the past, however, without surrendering comfort, low energy consumption levels could be reached easily. However, it should be mentioned that the purpose now is not returning to the past, since it is unbearable and it might be just superficial imitating, but the aim is to understand the criteria of house designing based on adaptive lifestyle, leading to low energy consuming methods of living which can be achieved from the study of vernacular construction. Therefore, whether the present architecture has the potential of designing houses regarding indigenous architecture guidelines should be further investigated.

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