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## The principles of sustainable architecture in traditional architecture

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### ABSTRACT

In architecture field, paying attention to environmental hazards and their destructive affect on health and human life, emphasis on personal health protection and its profound connection to environment and human pleasure of life in the buildings which support his security, welfare and health, caused to formation of the sustainable architecture. In the stable architecture we can see that the building as a part of the environment and its surrounding nature not only does not waste energy, doesn't make any environmental pollution and doesn't have any bad effect on human health but also moves toward achieving the goals of sustainable development by energy saving and efficiency, having materials consistence with the climate and being in ecology cycle. The object of this study is to recognize the methods to reach sustainable architecture as the principles of climate design has been forgotten nowadays and the society has encountered unpleasant difficulties so our try is to recognize the principles and concepts of sustainable architecture and using them efficiently to reach a sustainable house. In this study the consistency of the patterns used in the architecture of old houses in with the principles of sustainable architecture is verified. Studying methods, library researches such as books papers and websites were used to gain pleasant results .we can conclude that the sustainable buildings please both physical and spiritual needs and actually they are systems which indicate sustainable development in the community on the basis of human health, efficiency and welfare.

## **1. Introduction**

Sustainable architecture is an inclusive concept that its major concern is related to environmental issues and it uses all trends pertaining to material reduction and energy saving. Sustainable architecture is based on using local materials which its main point is to design sustainable buildings, reduce its negative effect on the environment, energy resources and nature. Thinking more about traditional architecture principles indicates that the concept of sustainability has being rooted in human ancient norms and means respect to nature in traditional life. Human complicated relations with nature has caused significant changes and various functions in traditional houses and has created harmony with nature ,environmental conditions and has made a response design which has been the framework of architectures but suddenly stopping the architectural creative process of the past and consequently easier solutions provided by modern architectures , forced us to forget all the eco-friendly methods so it is necessary to consider the past architecture more, learn from it and apply its intellectual background in new architecture and building technology.

### **1.2. The research object**

The main goal of the research is to renovate sustainability patterns in traditional houses and how we benchmark from these subjects for architectural designing as a useful method in sustainable architecture, the new architecture form of our country.

### **1.3. The research questions**

1. How can the components of traditional sustainable architecture are used in accordance with the new technology of the world in Iranian architecture.
2. Has the Iranian architecture been committed to its past values?

### **1.4. History of the research**

The UN General Assembly decided to hold a meeting on the environment in 1968 and the UN's first conference on the subject of Environment held in Stockholm in June 1972 and consequently we can consider sustainable development which introduced in the early 70th century in the communities around the world as a result of greater awareness of global environmental issues .on the basis of this background the sustainable development concept made in line with these objectives.

## **2. Research theoretical framework /definitions**

### **2.1. Literally concepts of sustainability**

Sustainability means stability and durability literally and in Persian dictionary it means being sustainable and stable and for the word sustainable the following words suggested by Datelson and Kent lab: stable permanent and resistant

### **2.2. Lexical root and terms in English**

Sustain: support, provide for, finance, sustenance, and life stability process

Sustainable: stability, what describes the thing that provides peace, food and life and result in life durability (SHAFIEE, 2007).

### **2.3. The sustainability concept**

This concept first was introduced in 1986 by the global environmental development committee as encountering with the present generation needs without endangering the future generation resources and is being enhanced by the time to present a suitable strategy for the world communication.

**Table 1**

The main sustainability conditions.

the sustainable system definition	the ability of the system for stability and sustainability is inevitably depends on the situation which the system gain from the external .A sustainable system needs good internal function and consistent relation with environment and in other word needs internal and external sustainability (in relation with the environment) in order to operate as a sustainable system.
The main condition of sustainability of the systems	<ol style="list-style-type: none"> <li>1.The systems should be compatible with the local and environmental conditions</li> <li>2. The system should be in consistence with temporary needs and desired goals.</li> <li>3. The systems should be conformable enough toward changes and should be fixable when it is damaged.</li> <li>4. The progress of the systems should not damage the protective systems for human life like climate soil and biologic systems.</li> </ol>

Sustainable architecture is a method in designing which concerns to reduce the consumption of nonrenewable resources and optimize the consumption of renewable resources and claim that we can achieve what we need for survive from the nature (Azerbaijani 2003). In other words the architecture which is responsible for the environmental and place conditions and characteristics and it use its basic abilities profitably in order to make desired environmental conditions i.e it has the least damage for the environment and is conformable and sustainable toward the changes, needs and conditions and in other word it is a unique architecture which is consistent with its basic natural an ecologic (Golshanimanesh: 2009:1)

**Table 2**

Sustainable architecture.

Exerting environmental protection

Ecologic construction

Making correlation between building and the environment in its neighbor

Making the possibility of continuous selection of construction and productions processes

Least destructive effect on the site

#### 2.4. The principles of sustainable architecture

Charles Jenkins presents 6 general principles in accordance with the triple goals indicated in sustainable architecture (environmental, economical and social) and believes that the sustainable architecture can be gained by observing these 6 principles. Jenkins principles are as follows:

##### 2.4.1. The First principle-energy protection

it means that the buildings should be built in the way that minimizes consuming fossil fuels.

##### 2.4.2. The second principle -Working with the climate

The buildings should be designed so that they can use climate and local energy resources

##### 2.4.3. The third principle-reducing use of new resources

it means that the buildings should be designed in the way that they minimize using new resources and at the end of their useful life creates a resource for the other structures.

##### 2.4.4. the fourth principle-respecting the users and fulfilling the needs of residents

Traditional architecture in warm and dry climate of Iran has fulfilled the needs of its residents.

**2.4.5. The fifth principle-respecting the site**

The structure should be put in the site calmly and should be compatible with its surrounding and in other word there be a mutual interaction between the structure and the site.

**2.4.6. The sixth principle-holism**

All of the principles of sustainable architecture should be embodied with a complete process which leads to building a healthy environment (Masoud Bani 2009 p206).

**Table 3**  
The sixth principle-holism.

Sustainable architecture	Energy protection Working with climate Reduction of new sources consumption Respect the site Holism
Iranian housing	Reducing consumption of nonrenewable resources Natural environment development Elimination of poisonous and dangerous materials from the building industry Energy protection Consistency with climate Reducing consumption of new resources Fulfilling the inhabitants needs Coordination with the site Holism (Zandie ,Mehdi and others)
Iranian traditional architecture	Minimizing consumption of nonrenewable resources and using natural and renewable energies Improving the quality of environment and developing the natural environment Minimizing consumption of polluted material Protecting the cultural and native identity Promoting healthy life Using land properly and the harmony of the building shape with the environment. Economic construction using alternative technologies Harmonizing the building with the environment and the construction with local materials

**2.5. Sustainable designing**

Common tendencies in sustainable architecture have been considered as a grand behavior in designing and not as a scientific knowledge in which making the skills for the methods of changing life style in counter with local and global environments is important and the development and implementation of the environmental designing is necessary .in order to develop the environmental sustainability, the building should make a balance between 3 principles of the sustainable architecture in construction, operation, fixing and protecting, recycling and reusing natural resources. This attitude helps designers to find solutions by themselves not just the sets of solutions be presented to them in other words to observe these main goal we can use the following ten principles derived from the concepts in building designing:

**Table 4**

sustainable architecture.

10 principles derived from the concepts in building designing	<ol style="list-style-type: none"> <li>1. not using fossil fuels</li> <li>2. 50% decrease in energy consumption for transportation</li> <li>3. 60% decrease in home energy in compare with English homes</li> <li>4. 90% decrease in thermal energy needs</li> <li>5. using recycled energies</li> <li>6. 30% decrease in water consumption</li> <li>7. decrease in wastes and encouraging recycling</li> <li>8. using local materials and productions brick ,recycled steel and concrete(in the radius less than 60 km)</li> <li>9. local resources producing( agriculture for local food)</li> <li>10. developing ecologic diversity in natural environment</li> </ol>
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### 2.6. Methods to reach sustainable architecture

Sustainable architecture, like the other types of architecture has specific rules, which has 3 steps: economizing in resources, design for returning to life cycle and designing for human that each of these has its own specific strategy. Recognizing and studying about these plans help architect to reach a better understanding of the environment which he designs.

**Table 5**

steps to reach a sustainable architecture.

Steps to reach a sustainable architecture	<ol style="list-style-type: none"> <li>1. economizing in resources: this element on one hand proceeds exploiting resources and nonrenewable energies like fossils fuels in order to decrease consumption properly and on the other hand proceeds to control and utilizing renewable resources seriously (Gorgi Mahliani, Yousef and others 2010:41)</li> <li>2. Designing to return to the life cycle: the second principle of the sustainable architecture is based on this idea and concept that material changes from a useful form to another without damaging the usefulness of that.</li> <li>3. designing for human: the principle of designing for human</li> </ol>
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### 2.7. Sustainable construction

This issue is defined as (a clean management on the bases of effective efficiency and ecologic elements).the object of building designing is to decrease its damages on the environment, energy resources and nature which include the following rules:

1. Environment development
2. Elimination or decrease of poisonous and concussive materials for nature in constructions

So the sustainable building can be defined as: the building which has the least nonconformity with its surrounding environment and with the region or even the world. The building construction techniques try to supply an integrated quality, socially, economically and environmentally. So a reasonable use of natural resources and good management of building construction helps to protect finite natural resources and decrease in energy consumption and cause to improve the environmental quality.

**Table 6**  
the principles of sustainable construction development.

Sustainable use of ecologic resources	Using various resources Preventing the destruction of an special type of energy resource
Using renewable resources	Reasonable using of renewable resources Using the resources in rapid renewability
Protection of ecologic diversity	Proper protection of ecologic resources People participation in the survival of ecologic diversity

### 3. Traditional architecture definition

In defining traditional architecture there is no a specific and definite definition. 3 characteristics of the traditional architecture are as followings:

1. The traditional architecture is the productions of the traditional method in designing and construction

2. The traditional architecture is the reflection of the patterns which are derived from the culture of the society.

3. The traditional architecture is related to holiness and is a valuable and meaningful type of architecture (Sadeghiphey 2005,14) and is basically concentrated on the attitude toward nature and its association with holiness.

### 3. Traditional architecture

Art and beauty have been expressed in all aspects of life of traditional human from a safe and peaceful house to temple or mosque, from market business to cultivation farm so that the inclusion of art of philosophy and mysticism is more in traditional life. Traditional life is a precious fund of spiritual life for thoughtful people and is a valuable opportunity to recall the divine truths.(Nasr 1996 p190).

How God has been manifested and descended from that high stage of unity to the existing universe, had been a mystery for Muslim architects which can ascend from it(Borkehat 1986 p87).In Islamic architecture the unity is never the result of the continuity of the components but it is inherent and all the subsidiary forms results from it.(Borkehat 1986 p87).The howness of emerging unity in multiplicity and returning of the multiplicity to the unity for Muslim artist means monotheism and is the most important mystery.(Avani 1996 p340).

According to the divine command, Islam has appointed the nature, Muslims worship so the traditional Muslim architect changes nature-the creation of God- to a sacred architecture. Islamic sacred architecture by this way shows the unity, harmony and peace of nature in architecture and even in the reach of big and small cities in other words these qualities expands in the whole urban environment.( Avani 1996 p42).so the root of sacred architecture found in Cleansed and sanctified nature again by traditional architecture who is aware of his innate relation with his God. The Islamic architecture is also rooted in the relationships between architecture and universe according to Islam view with the principles of cosmology which is described in holy Quran gloriously and is explained in the history of Islam by the sages.( Avani 1996 p44).

Traditional architecture specially Islamic architecture) uses simplicity to create the human life environment and ignore rebel uprisings against the creation system which is the obvious characteristic of Prometheus human and his artistic creativity in the same way the traditional town following the nature emerges from the ground ,use the nature resources efficiently and returns to the nature again when was emptied of habitants.(Nasr 1996 p57).the real feel of Muslim traditional architect toward the intrinsic nature of any object and loyalty to it which is not apart from sanctifying world order again by holy Quran, is expressed in the balance of traditional building ecology and The whole atmosphere of the traditional cities. Therefore traditional architecture not only is not against the nature but also is in harmony with the nature. in addition to this ecologic harmony, Islamic traditional architecture is not merely the product of ecosystem and economical and rational thinking(Molavi 1358 p56)but it is the result of the spiritual nature of traditional Islam. The traditional sociality lives within a moral system which seeks perfect

harmony and appropriateness quantitatively and qualitatively .the creators of it such as architecture sources from comprehensive worldviews which make the creative force of human, guides it into an extremity and unify the society.

### **3.1. The mysteries of traditional architecture persistence**

Mystery is different aspects of the existence of an object .a mystery is something which makes sense of an object in its general level of existence. Some mysteries of traditional architecture are concentrated on the followings:

### **3.2. Identity and nature**

In this anarchic world, identity is an unattainable mystery. Identity is considered very much nowadays, (human identity, art identity and architecture identity) this is because the fact that the identity is lost and all is going to find it. In fact identity is a concept that connects an art work (like architecture) or a being like human to its rout and origin (Borkhat 2002:11). In the view of a traditional person , human is a creation of God and the world which human lives in belongs to God. So human and the world is routed in a metaphysical origin therefore human should approaches to nature, an identity close to its identity.(Nasr,1996:41). The presence of human in nature means its closeness to its creator and origin. This closeness has signs an indications .its signs are the signs of the nature .the signs are the mysteries of nature .therefore the more human and its indications like art and architecture be natural they are closer to its original identity (Akrami 2010;33).

### **3.3. Beauty**

Traditional architecture is beautiful and pleasant. Because the creator of it thinks beautiful .the beauty of traditional architecture is not in exhibition in means that the creator has not intended to create beauty but the beauty origins from the his intuition and cognition from the divine and universe. Because following what has been created from the origin the more he has supreme cognition from the universe the more beautiful he creates. So the mystery of traditional architecture is in the amount of cognition from the universe. Every one with any opinion admires it when he encounters with it but not all of them know the reason. To find it out, insight is needed.(Akrami 2010:33).using colors purposefully creates a manner that without it the spectator ,messes up. Color understanding in architecture and art indicates clever awareness about qualitative and quantitative unity. One of the main resources of this unity is in the nature.

### **3.4. Unity and coordination**

The aim of art is to benefit human environment and the world from the system that indicates the divine unity as direct as possible. Art makes the world clear and bright. It helps the soul to release from the intensity of tendency for affairs and return to the infinite unity.(Borkhat 2002:12).in traditional architecture all houses( not being the same) combines with each other in a unit system and make an integrated and harmonic texture.

## **4. Traditional house**

God says in the Qur'an: God put your house a comfortable place for you. Considering this verse ,in a period of time house was not only a place of inhabitancy but it was also a place to relax and it was a basin for thinking and contemplation and this interprets human as a mortal creature on earth and states human exists as far as he settled(Hydger 2007,6).in continue it points to the synonymous of habitancy and existence and says that the mortal humans reside while accept the sky as the sky. And in period of time house was just a shelter to human and moral and religious aspects are evident in every step of building the house from the beginning of constructing to residing in it and using it.(Barati 2003,25).but Coper consider house as a sign of human. "house is the reflection of how the human sees himself"(Coper 2000,54).and considering this fact that a house has two main regions ,the internal region that includes inner and private rooms and the external region that includes an open, outdoor and public rooms .He writes about this" house may seen as two ways: first, a clear manifestation of itself\_ which flows mental

messages into a visual symbol and second as discovering the evidences of the essence of "ego" which in this case the messages return from the visual symbol to itself. (Coper 2000, 57,59).

because house is one of the most important rooms in architecture which communicate with the man itself directly so the mundane aspect of house responses the human needs and dimensions and its divine aspect responses the residents beliefs. This aspect of house should be in consistence with the divine aspect of inhabitants which is shaped on the basis of god-centered.the religious human inherently has desires which guides him into divine perfection(Motahhari 2001,72) and house is called traditional house when it responses to these two human bases. As the main purpose of human is perfection, so the components and wholes which are related to any object and helps it to reach its purpose , should be considered carefully. Paying attention to this is important because it aware human of the sequences and results of his panning and practices. The feature of traditional architecture is that to be in consistence with the tradition nature and this consistency can be seen in its main manifestations like the architecture of holy places and as mentioned before the art life and traditional architecture trend to the beauty for among attributes of God which manifested in the universe, this reminds the absolute existence more.

Ignoring and neglecting the concept of" life" in own worldview and culture and following this concept current in alien culture is one of the main issues which mislead the society and this is the unpleasant happening which has been occurred. in fact it is considered a lively region which the liveliness is that kind of alien one. this heuristic similarity occurs in two fields, one in the concept of life which is mostly material and is concentrated on physiological aspect of human life(Linch 2002 an Lokorbozie 1355). And the important point to verify the rooms as lively room usually the superficial aspect of life in rooms are considered and there is no attention to life existing beyond the walls. In fact the concept of Life in different countries and cultures, is different and have various reflections .in any thought and ideology the concept and meaning of ?????? is different or has different degrees of importance this fact specially in Islamic worldview which respects divine and spiritual life very much and pays prominent attention to it and even consider it a principle, is much more important than the society which concentrate more on the mundane aspect of life and despite considering the divine aspect of it pay no attention to it. In Iranian culture Liveliness is meaningful in any living region from the smallest to the whole city. According to this fact that house has lost its capacity as a place to live following the western life style, is changed to a dormitory and a place for probable family meetings. House instead of being considered as fatherland and home which motivates the feeling of dependency and patriotism and is an evident example of liveliness, has been changed to a product and a platform to immigrate to another field and in other words has been changed to a hotel or an inn therefore is not eligible of being "lively ".to explain the concept of liveliness clearly ,paying attention to the concept of" Life " is necessary .in Islamic teachings there are at least 3 domains: the divine domain ,the mental domain and the mundane domain. What explained and presented on the subject of liveliness these days is mostly about the superficial, mundane and sometimes mental aspects. even in the mental domain of human life there are quantifiable aspects and issues which are common in special cultures and it is natural that some of them are not able to be extended in other cultures (Naghizadeh 2007,414). Since in accordance with the domains of human life (divine, mental and mundane domains),his needs is also different ,house and its elements merely consider as a shelter and just supply the material needs of human but considering the qualitative features of house which supply the spiritual and mental needs of human is also necessary. The conditions of mundane life should be supplied in a way that facilitate the movement of society toward its ideal and does not outdate the afterlife and spiritual life in other words the soul of desirable life exists in Islamic thought and its spirituality and the role it plays in supplying the divine life .and if this soul be taken from life nothing will be remained but a corpse.(Naghizadeh 2007,410).The traditional house is familiar with human, being responsible to this innate nature so the traditional house cannot be described physically, geometrically and shapely but what is more important the meaning beyond them. The components of house has been configured on the basis of architectures Superconsciousness .traditional architectures visualizing and imagining the unshaped concepts in the forms of architectural shapes have expressed their imaginations and views from the universe and providence of God in buildings and artworks .the traditional buildings which mostly have been made in consistence with the living conditions of society, reflect some behavioral and social patterns and relations and how to use space. Wide and multilateral associations between human and his living space, has caused a more or less relation between human and his living



environment. Therefore every architectural room indicates some cultural and national properties which shows some social and individual thoughts beliefs and desires (Soltanzadeh ,1372,10).In other words most of the entrance spaces like the other architectural units were not designed and built just to supply the sensible and material needs but the cultural and behavioral patterns, spiritual and social values, have had an important role in their formation and the principles and goals in consistence with that building such as: maintaining the privacy of family members, were considered. And the entrance spaces of traditional houses following social and religious principles designed so that people don't enter the house room right away and suddenly and there should be no direct view to the house entrance space. One of the important goals of designing house entrances is not facilitating the movement but it is to control it and prolong the moving path from the outside to the inside.(Soltanzadeh ,1372,60).

In many houses which made up of two parts: interior and exterior (Andarooni and Birooni),two separate ways branches from the vestibule (Hashti) and leads to each of them and in some houses the interior part(Andarooni) has a separate door from the alley.(Kolor Rice 1987,129).

In the periods of time which people were not safe from alien attacks the entrance spaces were built simple and without any ornament avoid being attracted by the others .Sharden has declared about this “ the door of this house is small so that one cannot guess that behind that there is a big and beautiful house. It has been a custom for a few years in Iran that they use small doors and they ether do not use big doors or do not decorate it.(Sharden 1983,p170).the facades of houses have two platforms and the doors have two separate door knockers for men and women ,two corridors reaches to the vestibule(Hashti) one from the Andarooni (the interior part) and the other from Birooni(the exterior part).Andarooni is a room for family members and the aliens are not allowed to enter it and sometimes the room on the vestibule(Balakhaneh) which is closed to Andarooni used for guests .(Pirnia 1997,36).At the entrance of Iranian house there is a polygon room with beautiful and various decorations which is called “Hasht” which its shape is usually octagon but it doesn't mean the number 8 (Hasht is the word for number 8 in Farsi) because there are circle ,square and other shapes for vestibules which actually mean an outcropped space from the inner part and is the only part which linked outside. The purpose of this part is to cause a pause and create a spatial and place separation for the family members to be ready to meet guests and the entrance part had always been a good place to present guests and newcomers .this custom is respected religiously .the prophet of Islam says: it is good to present or see off a person who enters or leave the house and accompany him some steps”(Majlesi p243).

Abdollah Mostofi describes “Hashti” as : in the middle , the entrance door of the house is made and behind this door A Hasht was built.” The Hashti had right 8 sides, from the right part of the entrance was a door with a GHapouchi arch and the other door which lead to the stable and from the left side there was a stairway to the roof and the other door was the door of exterior yard and finally the opposite door was the entrance of the corridor which goes to a porch and reaches to the second part (i.e Andarooni ) by a turn and along porch so they had divided these 15×20 ZAR ( 1 ZAR equals to 104 centimeters) into two parts at the right part they had built a stable and at the left part they had built Andarooni.(Mostofi 1992 ,p171).

After that, there is Hashti porch which is a lidded and narrow room and its duty is to make a pause and avoid the sudden entrance of aliens to the private sector of the house. Considering the rooms which are at the beginning part of people entering it can be found that old architectures put these rooms to make a pause to avoid aliens entering to the private sector for the family members to prepare a hospitable place for the guests. After the covered and relatively long porch there is a luminous and paradise-like room, an exterior yard surrounded by “Orsi”(sash window) with small colorful and eye catching glasses by which the guests couldn't see inside easily. This room with its Iranian golden proportions and orientation supplies a pleasant and sanitary place for its inhabitants. After the small Hashti in the middle of the house we reach to a room called the guest room or “Panjdari” which is some small houses used as a seat. In the room there is an indent a little above the ground surface where seated by the quests who are respected more and is called “Shahneshin”. This element indicates that respecting adults or respectable people or other guests is important. Near Panjdari and Zemestanneshin(winter stay) is a kitchen which should be close to the guest room and is designed so that the household lady can cook easily and be private and be away from the view of strangers .After the set of rooms which are in the exterior yard or Miansara we move to a place called interior(Andarooni) yard or private sector,in the

beginning of corridor we enters Andarooni yard which is like Blrooni(exterior) yard apparently and after that there is a place called "Sedari" which is used by most of family members and is a place for family to gather together and they feel comfortable in this place and in the middle of the house there is a place for the wife and children to stay in and the decoration is so that they do not feel tired. Paying more attention to the traditional house we can conclude that they all follow definite and same principles and indeed the Iranian architect has manifested the concept of unity in diversity in the building well so that he by observing the beliefs and the principle of introspection has been able to present an unforgettable gift not only to the people of his own time but also to the posterity.

## **5. The evidences of Iranian traditional architecture according to the sustainability issue**

### **5.1. building orientation**

The building orientation selection depends on different factors such as :the natural state of the land, the amount of private space needed, sound control and reduction ,wind and sunshine.

The main point of building orientation selection in warm and dry climate is minimizing the intensity of the sun in summer and reducing the daily temperature in the inner part of the building and maximizing the intensity of the sun in winter. The best orientation for the building is the one which benefits the solar energy the most efficient .Among all theories presented on this subject, the best orientation is south orientation. By selection this the building receives the maximum amount of solar energy in winter and the minimum amount of it in summer. But in this theory the temperature in different hours of the day and the sun heat is not included and since these two factors have influence the heating condition inside the building it must be considered in this theory. In the warm and dry climate the best orientation is toward the southeast.

### **5.2. Introspection and using center-yard (Hayat markazi) system**

In Dehkhoda dictionary the word "Hayat"(yard) means enclosure or enclosed by walls, realm ,apron. Hayat(yard) in Iranian culture has the following meanings and usages:

The sign of the privacy of ownership

The Unifier of several elements of the house

The Connector of several spaces

Making a green and lively environment

Artificial vent to pass suitable winds

An important element in a safe privacy for family comfort

In the buildings with central yard, the yard usually can conclude some of the factors above but the earliest usage of the central yard is being a sign of ownership. This part is used to make a green and lively place and the pond in the middle of the yard helps air adjustment and approaching to the comfort zone. The pond and the plants in the yard compensate the lack of humidity and make shadow and fine air and also all openings of the building is toward the yard .brick is used to pave the floor in traditional buildings .this cause the yard to lose heat late at night because of the mechanical properties of brick such as thermal resistance by which the yard floor warms slowly during the daylight and lose heat late at night and avoid the yard to become cold rapidly.

### **5.3. The basement**

Climate factors and temperature fluctuations have a small impact on the basements and the earth crust keeps them safe from these changes and the wind and storm cannot enter to the building and this crust acts as a thermal insulation and prevents the transfer of heat into the ground. The more moving down underground the less change we see in the temperature because the soil layer becomes thicker. after the depth of 61 underground the earth temperature becomes constant. The temperature of any ground can be measured by measuring the temperature of the well water in that region. Taking the building underground is used even in modern architecture. If the site be inclined the building will be implemented in the south side of the slope and be exposed from the south part to benefits from the south sun.

#### **5.4. The walls**

In this region thick walls are used in buildings and the average thickness is about 1 meter. This technique is considered as one of the sustainable factors in this region for it can save the heat energy from the sun during the daylight and use it during the night. It should be mentioned that bricks and concretes are not thermal insulations but they are able to save heat and transfer into the building gently. As general when the wall thickness is increased in order to increase the thermal capacity of the wall, the wall thermal resistance increases too and in result its influence on the thermal conditions of inside air increases intensively, (Kasaie 2003,69).the materials like concrete and brick heated late during the daylight and prevent heat penetration into the building and transfer the heat gradually by radiation or convection at night when the outside is cold and this creates comfort in buildings in this areas.

#### **5.5. Openings**

In warm and dry climate the windows are small and are on the top of walls and close to the ceiling .Applying large windows is prevented in these regions due to the heat influence of sunshine on them. Even if the sun penetration into the building is prevented using large windows will be prevented too because of the low thermal resistance of glass and window and the existence of voids and in result wasting energy.(Soflaie 2003,63). The sun shining on the windows has much influence on temperature changes inside the building. The thermal effect of the window is much more than the walls and because of this using many windows is prevented in the buildings in these regions.(Kasmaie 2003).even the external walls have no window and they open toward the central yard.(Soflaie 2003,70).

#### **5.6. Building materials**

The influence of sunshine on the indoor heat depends on the properties of the materials used in the external walls so while selecting the proper materials, paying attention to the factors such as: the availability of materials in the region, being useful and economical and climate functionality is important.(Houshyari 2006,45).the most considerable property of the building materials is thermal resistance and depends on the climatic and environmental conditions. The thermal resistance of the wall influences the heat transfer from the inside and the thermal capacity influences the internal temperature fluctuations of the wall and is related to the increased temperature of the external surface of the wall due to shining. The most important factor in selecting a proper material in desert regions is the maximum temperature and fluctuation domain of the daily climate.(Kasmaie 2003,87). Mud, adobe and brick are the materials which can be found intensively in the warm and dry regions and have been used much from the past and are available and cheap to supply. The benefit of these materials is that they become warm late during the daylight and they lose heat late at night and this balance the weather and temperature fluctuations in the building during the day9Ghobadian 1998,98).the other available materials are rock, gypsum, lime and wood.

#### **5.7. Color and texture**

The color of the external surface determines the amount of sun energy absorbed on the roof during the day, the amount of heat reflected by radiation of the ray with long wavelength at night, the pattern of temperature changes of external surface and also the amount of heat transfer between the indoor and outdoor air through the roof. for the roofs without thermal insulation and their indoor air is controlled by mechanical devices, the color of the external surface of the roof determines the cooling-load related to the roof area and in other buildings this color is the main factor to determine the temperature changes pattern of the roof and consequently the state of indoor air in compare to the comfort zone. When The color of the external surface of the roof is dark, its surface temperature increases up to 32 degree centigrade higher than the maximum temperature of the outdoor air while this increasing for a white surface is 1 degree centigrade. It should be noted that the effect of the external surface color of the roof depends on the thermal resistance and thermal capacity of the roof materials too. Increasing the thickness, thermal resistance and capacity of the materials used in the roof, decreases the differences in maximum temperature made by using different colors in the external surface of the roof(Kasmaie 2003).

#### **5.8. Vegetation**

Plants can have a good effect on balancing the temperature fluctuations and supplying pleasant ecologic conditions:

1. Plants due to water evaporation and humidity increasing have a significant influence on creating frigidity.
2. They cause shade in the summer which prevents overheating.
3. They cause decreasing and directing the density of the wind like short bushes
4. Prevent too much reflection of the sun like grass surfaces
5. They are effective on decreasing dusts, transferring sound and air purification.

Finally it should be noted that by planting Deciduous trees in the southern front while using shade in summer the sun shine can be enter to the building in winter the short bushes are also effective in directing wind(Ghobadian 1998).

## 6. Positioning recognition

The name of Shiraz consists of Sher in the meaning of good and Raz in the meaning of vine , shiraz vine is very famous. In the Dekhoda dictionary this possibilities of the rout meaning has come: the yogurt mixed with syrup in the bag(LOOR) which this meaning is irrelevant to Shiraz city although the word SHIR(milk) in shiraz maybe conveys this possibility that there would be milk in shiraz surroundings and had been effective in naming shiraz. for shiraz appellation we have:

Shiraz is one of the TAHmoores sons (one of the kings of Iran), whom was the second king of Pishdadi dynasty and they put his name on this city.

### 6.1. The geographic and climatic position of shiraz

Shiraz is the center of Fars province and is the largest city in the mountainous south of Iran and is positioned in 29 degrees and 38 minutes north latitude and 52 degrees and 40 minutes east longitude .shiraz confines to the BAMOO, FAHANDEJH ,CHEHELMAGHAM ,Babakoohi, Mansourabad, Kooshtbibiche,Ramshekan, mountains in north and the Maharloo in east and to the Sabzpooshan and Derak in south to the golesan and KoohsorkheKalat in west. The shiraz plain is 1500 meters higher from the sea surface and is in the direction of northwest to southeast which has the slope toward the east while raining so some amounts of the wasting waters goes down to the Maharloo lake .this lake is in the city surrounding and in liked to the big airport of shiraz.

## 7. Rooms presentation in Shiraz traditional houses

The rooms here are the same as ones in other central cities like Esfahan Kashan and Yazd but here there are other rooms which are presented in here:

1. Entrance: according to the introversion in houses, the entrance is in the shape that there would be no sight and view into the house but the curve and turn in Shiraz houses is less that Yazd houses.
2. Porch (Hashti); mostly are in the shape of square and octagon. The porch of rich houses has the decoration of beautiful stalactites and tiling for example we can name the porch of GHavamolsaltane house.
3. Yard: the important element in organizing the rooms of houses specifically in traditional houses which has central yard. The yard shapes are various they are more like rectangles with symmetric sides but in some cases they are like oblong and in some places they are like two perpendicular rectangles. In the houses yards, we can see the pond and the garden .the trees are usually citrus and mostly oranges.
4. Tavile and Sartavile (Stable): Tavile is a room for keeping horses and donkeys and in front of the stable there is a place for keeping fodder and animal keeping tools.
5. Kitchen: it has had the function of the present kitchens and usually was located on the corner of the yard.
6. Sharbat khaneh( Syrup room): Shiraz has been famous for its distillates ,syrups, pickles and lemon juice and use of them has been common in Shiraz families so in the old houses there

were a place as Shrabatkhaneh (syrup room). This room is located near the kitchen or in the basement because of its cool weather.

7. Chah manbae (Well bank): after pulling out the water from the well and store it in the bank by clay water pipes, the water piped into the required place like the pond. Its considered that the level of the well bank be higher than the other parts in which water is used.
8. Rooms: the names of the rooms are the same as the ones in the other houses in central part of Iran, the names are: Dodari, Sedari, Panjdari, SHahneshin, Orsi, Goshvare and Zavieh. All of the names above except Goshvare and Zavieh are the same in name, shape and definition as rooms in central part of Iran. Dodari and Sedari are private rooms and Haftdari are living and guest room. Orosi in the forms of Dodari, Sedari, Panjdari and Haftdari had special role in Shiraz old Houses. Goshvare Which is one of the private rooms and because it is located on the corner of the yard is named Goshvare (earings). Zavie is another private room which is located is located on the corner but it is on the roof.
9. Pastoo: it is the room behind the other rooms and is a storeroom to keep tools. (Pirnia MOhammadkarim, 2007: p 356-5).
10. Hall and balcony (Talar): it is the same as the other rooms in central part of Iran in definition. Talar can be exist in both TAbestan neshin and Zemestanneshin (summer stay and winter stay). Because the roofs in Shiraz are covered with Beams and it is flat so to supply stability, in forepart of the Talar there were usually two or more columns. The balcony is smaller than the Hall which was usually located in forepart of the room. The Narenjestaneghavam has hall and balcony on two sides of the house.
11. Hozkhane (pond room): Hozkhaneh is a summer stay place which is octagonal and is the place for staying in hot summers in shiraz. Beside this role it has another role of linking different parts as in architecture and in plan designing it is called setting.

## 8. Conclusion

The architects and engineers attempts to reduce the human dependency on mechanical systems have had pleasant results and have resulted in invention and performance of new methods on improving the living conditions by applying nonrenewable energy resources. As an example we can mention the methods like air conditioning by refinery at night, blowing air from the bottom, controlling natural light, using green space and plants in which by observing and using these methods in the architecture of some buildings they have been able to use energy and natural sources such as: heat, sun light, wind, the energy of ground heat, water and rain. The architecture community has ignored the power of technology to solve the human problems but the sustainable architecture has brought the two goals (technologic and human) together and has presented the human relations a spiritual validation so it can be said that the sustainable architecture beside supporting humans physical needs has supported their spiritual needs too and in fact they are the systems which present the sustainable development in the community on the basis of human health, efficiency and welfare.

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