Contents lists available at Science-Gate

International Journal of Advanced and Applied Sciences

Journal homepage: http://www.science-gate.com/IJAAS.html

Eco hotel Design principles and its role in sustainable development of tourism

Fatemeh Ghiasi [1,*], Kambiz Ghazizadeh Maragheh [2], Jafar Khezri [3], Peyman Jasemi Nia [4], Mahshad Hossein Panahi [4]

[1]*Department of Architecture, Soore University, Tehran, Iran*
[2]*Department of Architecture, Municipality district 2, Tehran, Iran*
[3]*Green Space Engineering, Young Researchers and Elite Club, North Tehran Branch, Islamic Azad University, Tehran*
[4]*Environmental Design Engineering, Young Researchers and Elite Club, Islamic Azad University, North Tehran Branch, Iran*

ARTICLE INFO

Article history:
Received 2 December 2015
Received in revised form
23 February 2016
Accepted 24 February 2016

Keywords:
Eco hotel
Sustainable architecture
Sustainable tourism
Masuleh

ABSTRACT

As natural and human variety is combined under the control of time and history, living models are formed as unique. Masuleh is a good example of this habitat of human history as registered as a national work in 1975 No. 1090 in national works of country. This historical city in its thousands years in wonderful consistency between human and nature is a good example. What distinguishes Masuleh from other historical textures is the presence of people and continuing life in this texture. In order to revive its own prosperity, Masuleh needs visitors' presence. This study attempts to have review of the source of sustainability in architecture and analyzed Masuleh as an example of traditional cities in Iran. Also, we found that Masuleh was a sustainable city and based on sustainable architecture principles, we can design a building as Eco hotel as one of the requirements of Masuleh to eliminate the concerns of tourists residence in this pretty village.

1. Introduction

Sustainable development is a new way to achieve ideals with keeping facilities for future. In recent decades, one of the basic principles of sustainable development is achieving urban sustainable development and various studies and planning are performed to find the applied solutions in urban development plans and sustainable urban development is one of the wide aspects and investigation in development at national level. By investigation of views, definitions and recommendations in this regard, the purpose of sustainable urban development is achieving sustainability of urban communities. The process its aim is creating or improving sustainability features in economic, social, cultural and environmental life of city. The followers of urban development with emphasis on logical projects attempt to consider all economic, social, environmental and physical aspects and to achieve ideal city, the interaction between mentioned sectors is considered. Based on the importance of sustainability in development goals of cities, a wide set of social, economic, cultural, ecological and physical needs are taken into attention to sustainability as defined in the form of sustainability indices of city. In sustainable development and sustainable architecture, each building should have interaction with the natural surrounding environment and it is turned into an obvious issue. The challenging issue is establishing interaction and type of measurements. This issue has been used by the residents of this country with special skill and applied it by implementation of special rules and techniques in optimal use of energy and natural resources namely sun and wind and consistency with climate and by ignorance, it is forgotten. These measurements are not only observed in environmental fields but also in other dimensions of sustainability as socio-economic dimensions (Zandie and Parvardinejad, 2010).

Sustainable development is a wide concept with different meanings and the result of this frequency is different reactions of theorists. Sustainable development is establishing balance between development and environment. For the first time, this concept was raised formally by Brundtland (1987) in the future common report. In this report, the aim of sustainable development is fulfillment of the needs of present generation without eliminating the abilities of future generation to eliminate their needs and human needs are considered based on ability of future generation in receiving needs. The result of this new definition is a document of UN conference in environment and sustainable development as the sustainable development plan in 21th century (Sheikholeslami et al., 2009). Another definition of green architecture is using earth as the best form for future generation as authoritative as an

* Corresponding Author.
Email Address: fatemehghiasi24@gmail.com (F. Ghiasi)

important legacy. Three principles of environmental, economic and social sustainability are sustainable development principles.

2. Statement of problem

The relationship between human and nature was formed since his existence on earth and besides affecting nature, he is also being affected. As a good model, nature has fulfilled the needs of human being and has learnt his own rules. The mutual relationship between nature and architecture is the moment in which human being selected cave for residency or applied the leaf of tree for making a shelter. Thus, three items of human, nature and architecture are in mutual effect. Today, over the centuries and increasing growth of science and technology, not only the effect of nature on architecture is reduced, also it is considered more and it is also associated well.

The plan is organic, if the coordination organizing between components regarding the whole is based on matter structure and its application and with this definition, there are no unnecessary decorations but the beauty is considerable.

The architecture is organic if the spatial decoration of room and city is planned for physical, mental salvation of human being. Thus, organic is based on social idea not our visual idea, we can call architecture as organic, if being human is targeted before being human-oriented.

3. Study method

This study is done in theoretical literature, an empirical study and in field studies; it is a survey with data collection as observation and taking photo. After theoretical literature and collection of field data, design process is started that by designing an eco-hotel in the requite site, we achieve the study goals.

4. Definitions and terms

4.1. Sustainable development

The concept of urban sustainable development was raised for the first time in global literature in 1997 with the publication of environment and development of UN organization and report of World Commission on Environment and Development as called our common future. This report is called Brundtland report defines sustainable development as followings. Sustainable development is the one fulfilling the present time needs without endanger the ability of future generations in fulfillment of their needs. Based on the above definition, the following features are considered for sustainable development (Taghizade, 2008). It is not achieved in short-term and it is based on justice and balance. It has a balance and uniform approach, it has common goal but it is achieved by various ways. Nature is not considered only as a source for development and it is the source of human development. The Fig. 1 shows the concept of sustainable development:

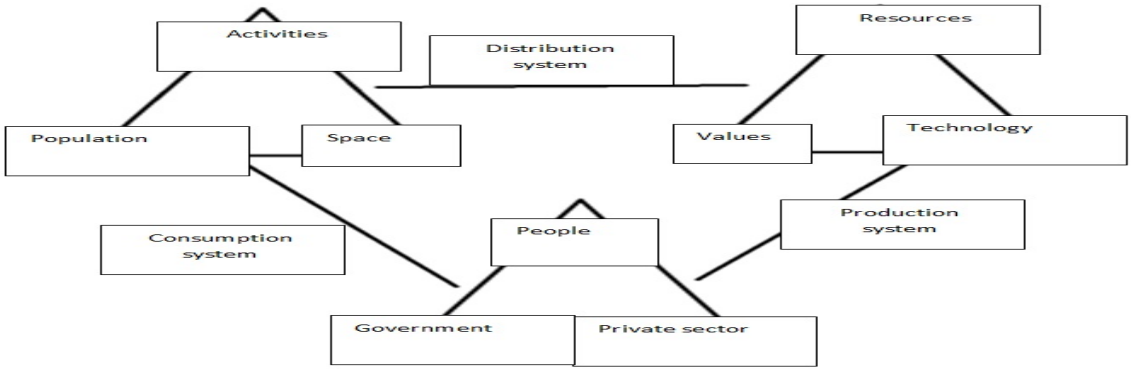

Fig. 1: Concept of sustainable development

4.2. Green architecture

Green architecture or sustainable architecture is one of the new approaches of architecture as considered in recent years by many contemporary designers and architects in the world. This architecture is based on sustainable development concepts and tries to coordinate with environment as one of the basic needs of human being in present world. The goal of creating green buildings is improving weather and avoiding adverse effects of construction on environment. Green architecture is a type of architecture design attempting to minimize the damage of building to the surrounding. The advent of green architecture movement as its current form dates back to 1960 of Europe and public information on that time. The examples of these plans are found in Scandinavia. Later, new construction techniques were formed leading to creative progress of concept of designs and construction materials. Indeed, green projects could include various factors including intelligent use of materials, exact evaluation of performance, weather conditions and geography place of plan with success into architecture field.

4.3. Eco hotel

Eco hotel is the hotel or residency as constructed in nature with the aim of reducing environmental

effects and using clean energy. In an eco-hotel, environmental protection and energy are obvious mostly. In the past, these residencies were only constructed as simple huts in the forest. Today, with the increase of importance of tourism and environment protection, these residencies are of great importance and are designed based on various natural climates and based on the features of each environment.

4.4. Using existing energies in nature (green architecture) in design

Before creating a green building, a creator is needed more than anything. This issue, creating green building helps the individual health as living in it and surrounding environment and also this increases their satisfaction and usefulness. This issue requires careful use of confirmed energies in architecture: Using durable nature and source of adequate materials based on sun for thermal use and electricity and daily lighting and using the wastage, etc. can generate a constructional uniformity of these strategies. It is required that architects attempt to guide public taste in social constructive methods instead of following in famous trend. Architects can make people believe that climatic and environmental plans are not lower than common present pretty decorations. Via architecture, the society is aware of great economic and environmental value of energies as called harmless energies; the energies that are called beautiful instead of any other thing from the view of artists and architects. The future of the world is hidden in pretty aesthetics.

Traditional architectural values and traditional of environmental values of traditional architecture of Iran have great values in various methods of optimal use of energy and ecologic use of different energies and namely the application of sustainable and harmless energies. Wind and air flow and breeze are the most common type of using harmless energies in traditional architecture of Iran. All philosophical and traditional four elements (climate, sun and soil) have excellent environmental use in civilization and architecture of old Iran. The type of materials and constructional techniques in the past namely what is used based on building sustainability and main bearing elements of building, the walls and ceilings or horizontal and vertical elements due to high volume and weight as automatically and natural compared to lightweight materials have high maintenance capacity and energy reserve and balancing of heat in artificial spaces. This feature doesn't mean that beauty of comfort of high sustainability and good environmental quality and innovations of optimal use of energy in Iranian architecture are not important and don't use the intelligence of creative power and knowledge. Despite exact investigation of Iranian architecture features as having much knowledge and awareness, intelligence in details of architecture is giving attention to creating comfortable space and internal comfort, aesthetics, lack of environmental destruction and environmental quality protection.

4.5. The goals of eco-hotel

4.5.1. The following goals are followed in eco-hotel

Consistency with natural environment of region , Ecological sustainability, Natural resources protection, Presenting educational plans and policies for environment protection, Respect and retention of culture of people in region, Creating economic benefits for local community, Increase of satisfaction of tourists, local people and employees.

The culture of using eco-hotel is considerably grown in the ten past years. By awareness of environmental problems, tourists attempt to find the hotels to minimize adverse environmental effects by using simple methods. For example, natural methods are used for ventilation. Low-consumption lamps, taps and showers are used; towels are changed with the agreement of passengers alternatively and use clean energy instead of electricity production. By using each of methods as small, we can reduce energy consumption considerably. Waste recycle is one of the necessary methods in eco-hotels. In this method, the generated wastes in kitchens are used to provide compost and their waste is used in other applications after treatment. The Eco hotels growing their products as natural or those using local products in their region, we are closer to sustainability. Hotel standards should be observed in all parts of hotel including rooms, lobby, public spaces, dining room, laundry room and administrative and executive sectors and social responsibility is one of the features of an eco-hotel. Eco-hotels should respect the culture and tradition of local people and be an entrepreneur for local residents. These hotels are obliged to hold educational courses in sustainable development and energy natural resources management for their employees.

5. Subject selection

Experts consider ecotourism as the best choice for nature protection as by observing international standards and regulations on one hand, suitable use of nature is provided for current generation and one the other hand, it increases public awareness and its result is maintenance of protected areas for future generation. Iran with two high mountains of Alborz and Zagros and natural pretty views of west and north areas and climate and cultural variety as traditions, language and music, clothes, handicrafts and living method of people in these areas, the greatest lake of the world in the north, 50 lakes in the country and Orumie lake as one of the 59 living reservoirs in the earth can be the main source of tourists in nature. The tourism attractions are not repetitive but to continue tourism attraction, we

need physical plans for tourists comfort and he is encouraged to stay and reuse of it for tourism. To achieve this important aim as one of the important factors of live texture, service and recreational spaces as hotel, motel, parking, restaurant, WC, park of children, hospital and etc. are of great importance. For example, Masule needs a good space for temporary residence of tourists of project of eco-hotel construction in Masule. This eco-hotel is designed based on existing examples, texture form, regulations and limitations of texture and standards and should fulfill the needs of tourists at highest level of a service space.

6. The studies of design ground

6.1. Site introduction

The historical city of Masule is located in Gilan province and in the distance 60km of west of Rasht town (province center), 35km of west of Foman town in the west most of Alborz mountain (Talesh mountain) with the height 3050m and in latitude 37°09′13″ and longitude 48°59′14″ eastern. Its area is about 16 hectare, in the height 1050m of sea level and there is more than 120m height difference between the highest and lowest point. Also, it is bounded on east to Foman, on west to Khalkhal, on north to Masal and on south to Tarom Olia.

6.2. The applied materials in this eco-hotel

The surrounding forests of this region are covered with Beech and in some cases, oak, Quercus castaneifolia and Fraxinus excelsior. Due to frequency and availability of wood, it is attempted to use this matter at most (in the interior as furniture and in exterior as door and window). Wood has many other advantages besides its economics. In the environment with lot of wood, much comfort is used. Due to parasite in such environment, the noise is clear and this depends upon the wood acoustic percent. Wood passes heat and cold less and it is anti-electricity compared to metals or other solid and it absorbs humidity. The applied materials in various parts of building are different and a combination of wood and dried mud and all of them are local. In the façade of building, yellow flower is applied as found abundantly in environment and its use has caused that buildings are constituent with the natural environment color and it seems that architecture is a part of nature.

Soil is used in the design of this motel. Besides the good quality of Masule soil and its type of texture as this natural element is used in design, the philosophy of human nature humbleness is another factor encouraging me to use this matter in the building as final coverage of walls instead of modern materials as different wallpapers, various colors and other new coverage. Natural structure of human is of soil and his nature is based on soil and he returns to earth. The soil architecture physic based on human physics of earth is aroused from earth and he returns to earth. This consistency can lead to consistency of soil architecture with human nature; the principles of green architecture in the design of this Eco hotel.

6.3. First principle: Energy protection

Any building should be designed as its need to fossil fuel is minimized. The necessity of this principle in the past eras based on the construction method is unavoidable. Only due to variety of new materials in contemporary era, such principle in buildings is forgotten and by using various materials or different compositions, buildings, change environment based on the needs of users.

To avoid energy dissipation in this motel, some strategies are taken as followings:

- Blinding the western front as much as possible to cope up with showering of region and guiding unsuitable wind of climate in winter.
- Position of windows in southern front with the angle of south light
- Using double wall in western wall of building for building protection against current water
- Using green roof
- Using solar panels

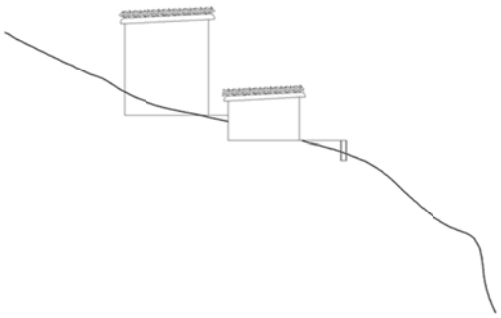

Fig. 2: Protection against showering

6.4. Second principle: Working with climate

The buildings should be designed as can use local energy resources and climate. The building establishment method and location of interior space can be as the height of internal comfort is created and via correct structure insulation, can reduce fossil fuel consumption. In this project, to optimize thermal energy in design of buildings, positioning and building form are proposed. To use solar energy, the building orientation is eastern-western extension. If we consider the main direction of building with deviation 30 degree from south to east, the building is established with a good method. If we don't observe the above item in building orientation, the building is very hot in summer and very cold in winter.

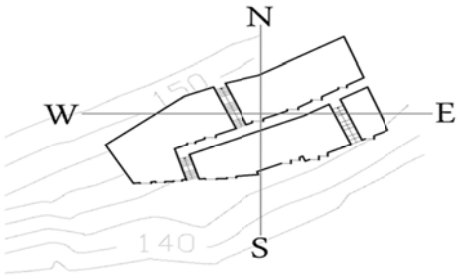

Fig. 3: Location of Eco hotel building

Solar energy is the most extensive energy source in the world. Not only the sun is the great source of energy, it is the source of other energies. Solar energy is one of the free, clean energy sources without adverse environmental effects as used by human being by various methods. Averagely, sun produces energy per seconds as 1.1*1020kwh. Of total energy produced by sun, only about 47% reaches earth. It means that the energy of three days of sun radiation to earth is equal to the entire energy of total combustion of fossil fuels in earth and we can say due to 40 days of sun radiation to earth, we can storage the required energy of one century. Location of a new plan is one of the basic aspects as effective considerably on low-energy design potential (reduction of energy consumption) including the building direction to enable it to absorb energy as active and inactive.

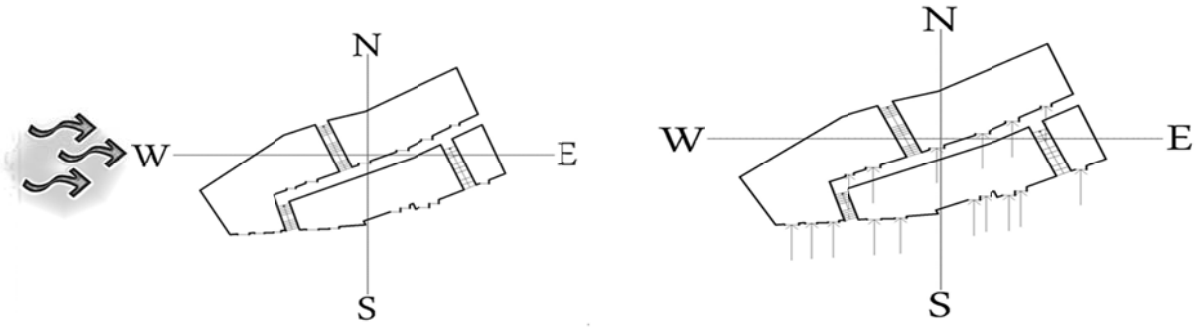

Fig. 4: The position of windows to provide energy

The plans with big southern façade are suitable for passive solar method. The direction of windows and spaces for optimal use of passive sun heating is designed. The design and providing the highest areas of window and glass in the southern angle of building to optimize thermal energy are the main factors.

One of the mentioned factors is wind. In cold season, to reduce thermal loss, due to wind, we can consider the following items. The situation and form of buildings should be as wind vortex is avoided. To reduce wind speed, green belt is used around the buildings.

In this project, it is attempted that the building of this Eco hotel is designed as avoiding western winds in winter, creating air flow and cold weather, the building orientation is as good wind of northeast in summer is used to create good ventilation between two parts of building. To achieve this goal, the western part of building is totally close and eastern part by a hallway accepts good wind of spring and summer.

6.5. Third principle: Reduction of use of new resources

Each building should be designed as new resources are minimized and at the end of their life, a source to create other structures is created. Like other principles, the orientation of this principle is to new buildings, it should be said that the existing resources in the world are used in the current artificial environment and improving the current building condition to reduce environmental effects is an affair with equal importance with creating new structures. We should say that there are not adequate resources to create artificial environments in the world as to renovate each generation of buildings, some of them are used. The re-use can be formed in using recycled materials or recycled spaces; the recycle of buildings and elements inside them is a part of architecture history.

As it was said, most of the applied materials in this plan are dried mud, stone and wood. All buildings of Masule have the same materials and as there are buildings without efficiency in this texture, we can use their recycling materials in the building of motel.

6.6. Fourth principle: Respecting the users

Green architecture respects all people using building. It seems that this principle has low relationship with pollution of global climate changes and ozone depletion. Green process of architecture including respect for all common resources in construction of a complete building, doesn't exclude human from this set. All buildings are made by people but in some structures, the presence of human is considered as respectful. In other items, the attempt to reject human dimensions in construction process can be observed. Much respect to human needs and labor force can be experienced in two separate ways. For a professional builder, it can be said that safety and health of materials and processes of building with the same importance for

workers or users are of great importance for the entire human community. Gradually, architects are aware of different toxics in constructional sites and insulation or using dangerous materials in building are forbidden. In this plan, fully natural materials are used for human being and texture.

In design of this Eco hotel, besides considerable attention to climate and texture, considering the type of use and users is other important factors of this project. To achieve this purpose, the following factors in this project are taken into consideration:

- The design of interior of each suit as each suit separately fulfills the requirements of tourists.
- Using handicrafts and architectural elements of north of Iran in interior space to make the space as pleasant and recognition of culture of north of Iran to tourists.
- Using fixed furniture in the space as it is considered as a part of architecture. For maximized use of space to provide welfare of tourists.
- Using local materials of north of Iran in the space as wood and soil, etc. to make intimacy between space, climate and users.

Green roof to respect the users has some advantages and the most important one is its effect on health and improvement of citizens. Based on the studies, access to green space directly reduces heartbeat and blood pressure and it is helpful on increasing health. The effect of green roofs on adjustment of building temperature is not good on health of residents directly.

6.7. Fifth principle: Respecting site

Each building should touch earth as light. The Australian architect Geken Morkat states that: The building should touch earth gently. This saying has a feature of interaction between building and its site as necessary for green process and also it has wide features. The building consuming energy greedily, produces pollution and is alienated with users and consumers. Thus, earth is not touched gently. An explicit interpretation shows that we cannot exit any building inside the site and renovate the conditions before building creation against in the site. This relationship with site is observed in traditional Arab tribes, the existing comfort among them is not hidden in touching earth only in movement of their house and it includes the applied materials and the assets they carry. The tent of tribe was generated from the wool of goat, sheep and camel. When the tents were established, by creating efficient area from aerodynamic aspects, its destruction against wind was avoided. The tent was supported by long strings and a few wooden beams were used in it as wood was a rare source in desert. Regarding the respect to site in this project, we can mention some important items in this design.

- Construction of Eco hotel by architectural models of Masule as stepwise stratified and kitchen along the mountain slope to south and along earth topography lines, the main factor of design is as stratified. In the design principle, stepwise building is the best response to interaction with texture.
- The design of motel façade based on Masule buildings for good response to texture
- Using terrace in southern front of building for suitable view to texture
- Using longitudinal and transverse paths based on stepwise texture of Masule

The paths in Masule city are designed with stepwise urban texture as consistent with mild gradient of environment. Two types of urban access are possible. One of the paths is longitudinal and parallel and there are a few of these paths and second, transverse paths as high and circulation between urban spaces is provided at lower and upper part of city.

6.8. Sixth principle: Holistic approach

All green principles need participation in holistic trend to build artificial environment. It is not easy to find buildings with all principles of green architecture. Green architecture is not recognized well. A green architecture includes more than one building and it should include a sustainable form of urban environment.

If another method was taken in design of this Eco hotel, we don't achieve the good result. The building should be a part of total site and if we consider our personal taste and we don't consider architectural principles in Masule texture, it means that if we try to locate a building in another site in Masule, as an unsuitable note on music had adverse effect on view in Masule.

7. The introduction of building based on space

The earth is about 350m2 as 50% on topography gradient. Due to stepwise site, this motel is designed by gradient and as two separate parts including a one floor and another sector as two-floor. The climatic motels of Masule include 10 suites; one unit is double in two floors. This motel is with the aim of temporary residence of tourists and can accept 10 households in the hall. Other spaces of this motel are coffee net and open seasonal restaurant. Due to limited space, there are 8 units of two-person suite or two-bed and two other units as four-bedroom. The design of each suit is as it can fulfill daily activities of tourists as each unit separately includes bedroom, WC, kitchen, living room and dining room. The spatial dimension of single-bed units is averagely between 25 to 35m2 and double-units of one story are 43m and duplex bedroom in the first floor are about 60m and in the second floor as 45m.

The mean spatial dimensions of bedrooms is about $2\times3m^2$ .The mean spatial dimension of WC $1.5\times2m^2$ .The mean spatial dimension of kitchen $1.80\times2.40m^2$ .The mean spatial dimension of dining room $2.50\times2m^2$ .The mean spatial dimension of living room $2\times3.50m^2$

One of the considerable features in this motel is its seasonal restaurant. This open restaurant in

spring and summer can give service to tourists and it is located on roof of ground floor of motel.

In the design of this seasonal restaurant, it is attempted to create an organic space. To do this, not element stopping view for suitable view to Masule complex and to use green floor as restaurant, some places are used for sitting and food. The kitchen is also located on the roof and based on restaurants of Masule, only establishing a tent in presence of tourists can be used.

This climate motel is designed in a region with a low area, in order to express its effect on Masule economy; we should give a brief explanation in this regard. Based on tourism sector, if we assume each tourist try to live in this motel for one-week, we can say in each week, 24 tourists live in this motel and about 1270 tourists live in this motel. As it was said in ecotourism, each tourist in his one-week residence has averagely 1000 to 1500 dollar exchange. To perceive the effect of this climatic motel, we try to multiply this future by the annual number of tourists in Masule. 1500×1270=1270000

In order that this space is successful in tourism attraction, it should have some unique features to attract the tourists. It is attempted that the interior space of this motel as well indicates rich architecture of Iran. Putting wooden and brick platforms in the spaces for sitting, creating a space as central heating by inspiration from bakery furnace in the north of country, using hand-made carpet of women in Masule to furnish interior is one of the measurements as performed to identify local culture and architecture of Gilan. The most important message of this plan is using local materials and natural energy and minimum cost in construction of an efficient space and saving in non-renewable and polluting energy.

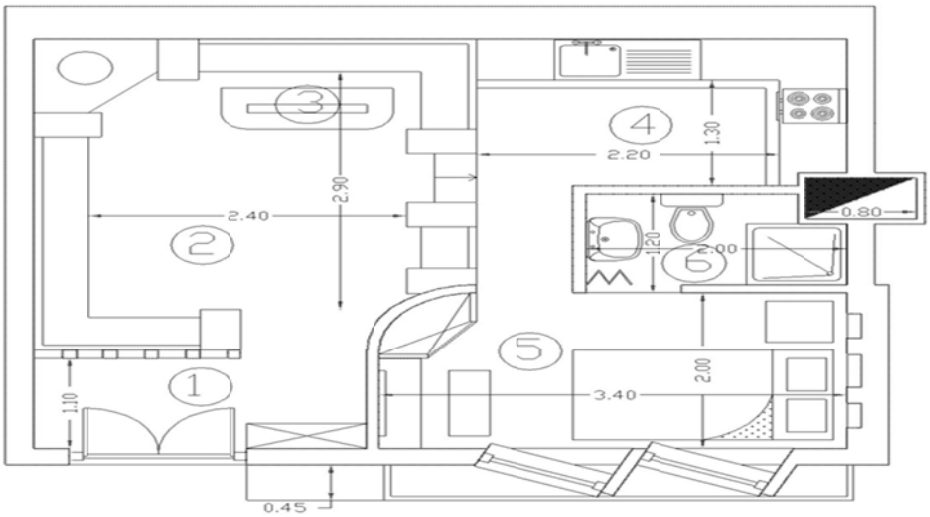

Fig. 5: One-bedroom unit plan

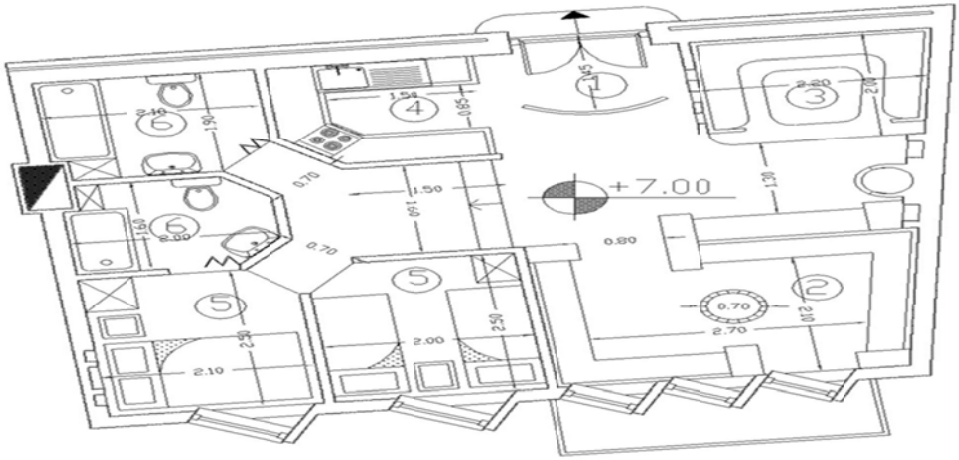

Fig. 6: Double-room plan

8. Design trend

As this design is performed in Masule texture, from the beginning, the main idea of concept is clear. The design in such texture should be stepwise and the building should be in interaction with texture not in contradiction with it.

For example, I know that architectural models of desert cities, dome ceilings cannot be used here as it is Iranian traditional architecture. Also, I couldn't use steep ceilings as I design in Masule and based on the same texture, climate and culture, the design was performed.

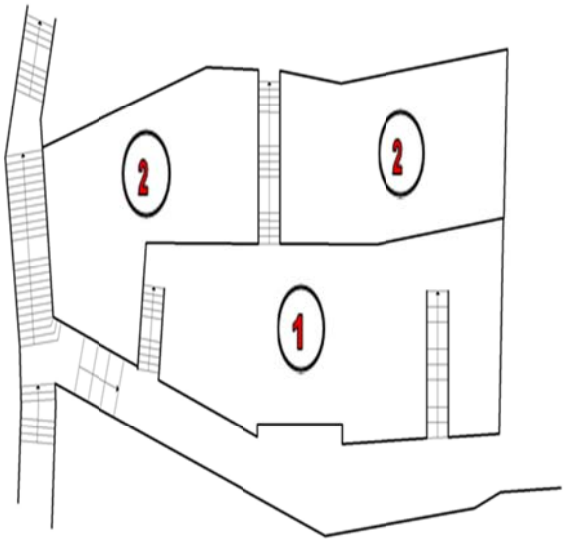

Fig. 7: The shortage of longitudinal and transverse paths and volume uniformity

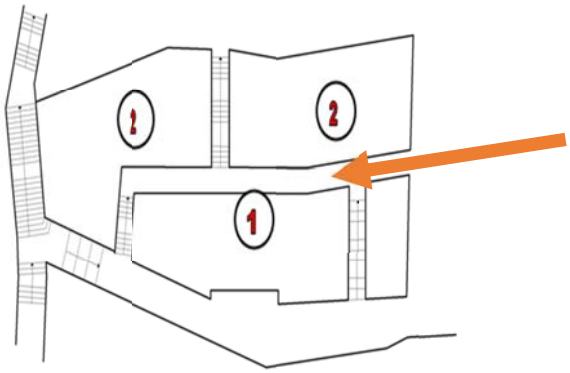

Fig. 8: To create the better circulation between the floors of part 1, 2, we need a moving path

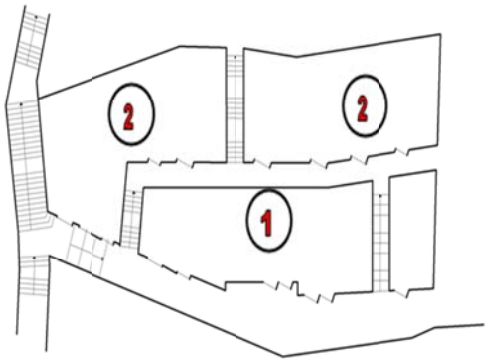

Fig. 9: After putting the suitable path for movement and putting inputs, the next problem is space lighting. To solve this problem, we put the windows with low angle as perpendicular on light radiation angle of south

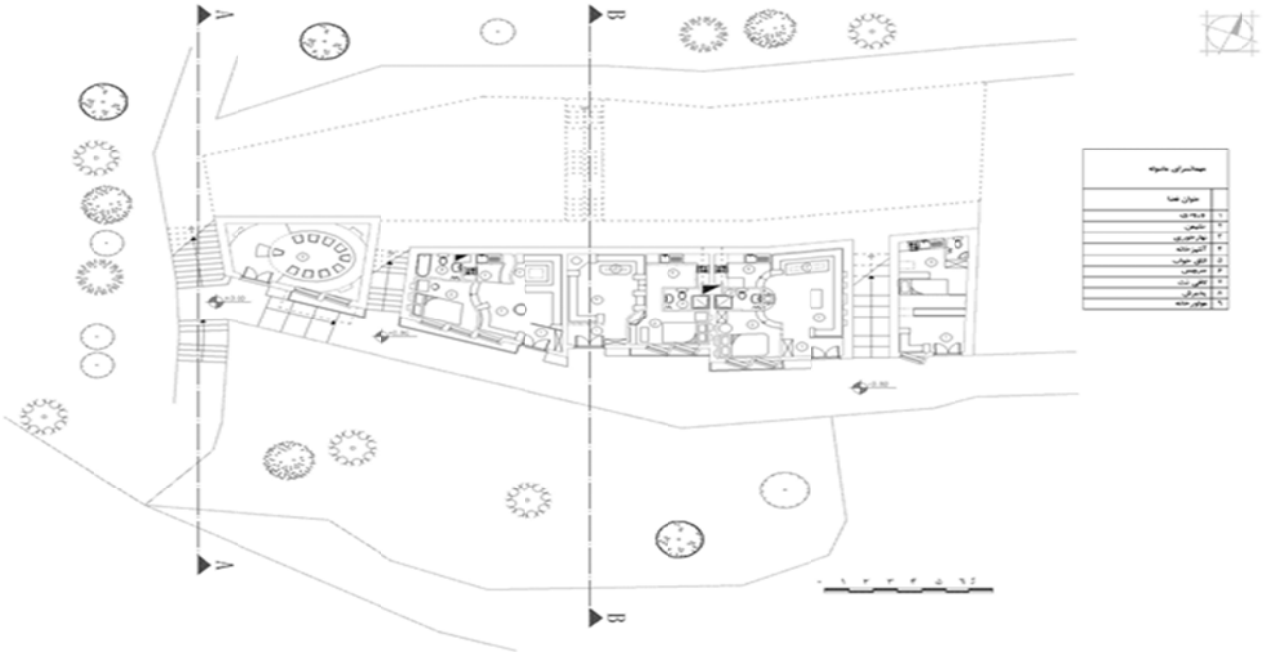

Fig. 10: Ground floor plan

Interior of eco hotel

Fig. 11: Dining room, kitchen, centrla heating

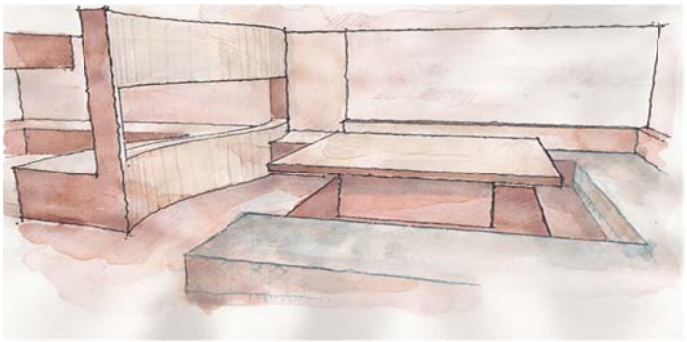

Fig. 12: Dining room

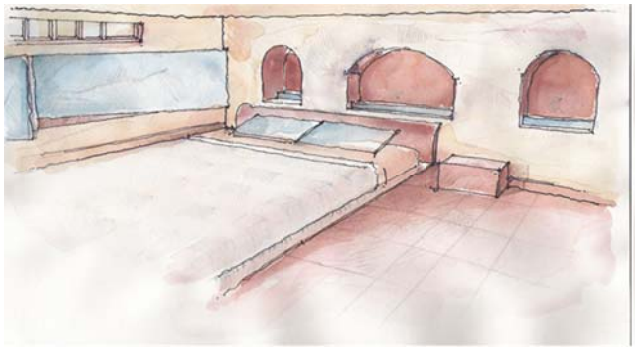

Fig. 13: Bedroom

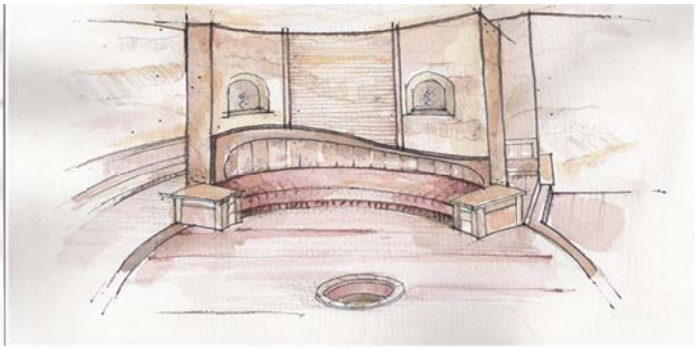

Fig. 14: Living room

Fig. 15: The position of windows

Fig. 16: Green roof and solar panels

Exterior of eco-hotel

Fig. 17: General facade

Fig. 18: General façade

9. Conclusion

Most of the pioneer countries in ecotourism and sustainable tourism have just one or some capabilities to attract tourist in special seasons. Iran with its great climatic situation can attract different types of tourists, namely eco-tourists in all seasons of year. Unfortunately, due to the lack of suitable infrastructures and inconsistency of tourism industry with tourism principles and sustainable development in the world, we couldn't achieve a good share in global market. Our problem is not only

the lack of suitable infrastructure and inability to attract domestic and international tourist, we observe with destruction of resources as there are many fans to observe them. A lot of studies should be conducted to create a good ground to attract eco-tourist and using its graces as most of them are out of the con troll of a consulting engineering company. The effect of architecture consultants and urbanization is creating suitable residency with common global standards with climatic capabilities to attract tourist. By technical capabilities in this regard, we can take a big step in development of ecotourism economy.

References

Brundtland G (1987). Our common future: Report of the 1987 World Commission on Environment and Development. United Nations, Oslo, pp.1-59.

Sheikholeslami A, Karimi B, Eghbali R (2009). Evaluation of urban sustainable development of Shiraz metropolis. Geographical Journal of Chashmandaz-E-Zagros, 1(2): 31-53.

Taghizade F (2008). Sustainable development. Urban and Rural Management, 1st edition, Municipality Organization, Tehran, Iran.

Zandie M and Parvardinejad S (2010). Sustainable development and its concepts in residential architecture of Iran. Housing and Village Environment, 29: 21-22.