



Implementation of Green Roofs and Walls in Tourist Residential Centers; A New Approach in Architecture and Aroused From the Concepts of Sustainable Development

Case Study the Proposed Tourist Residential Center in Gheshm Island

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Abstract

Sustainable development is the ideal point of tourism industry and many other industries in the twenty-first century. This approach emphasizes on development for maintaining the integrity and diversity of environment, meeting basic human needs, preserving resources for future generations. If sustainable development is one of the objective goals of the tourism industry in this era, so designing the tourist residential center in Gheshm Island based on strategies of sustainable development is also a necessity. The purpose of this study was to evaluate the sustainability of tourist residential center in Gheshm Island based on architectural aspects. If we look at the Iranian tourist residential centers well, we find them with a sense of deep vacuum, away from the peace and tranquility of nature. In addressing this problem, human beings have found a proper solution for reconciliation with nature and change of the urban landscape by creating green roofs and walls. In fact, the use of green roofs and walls is a method to utilize the unused and spiritless spaces of urban buildings to create small green spaces. This work, in addition to aesthetic aspect of the city, causes to purify the air in micro-scale and reduce air pollution and eventually improve the environment. So, for stability and sustainable development in Gheshm Island, the research stages have been used purposefully during a process, which eventually led to proposals for making more sustainable benefits of tourism development for Gheshm Island tourist residential center.

Keywords: Sustainable development, sustainable tourism, tourist residential center, green roof.

Introduction

This island limited to Bandar Abbas in the north and a part of Bandar Lengeh, to Hormuz Island in the northeastern, to Lark Island in the east, to Hengam Island in the south, and to Abu Musa Island and Greater and Lesser Tunb in the southwest. Although, Gheshm Island has many tourist attractions- which are known as Seven Wonders of the Persian Gulf- never has been actually received by domestic and foreign tourists as it should do. One of the main reasons for this lack of interest is lack of suitable housing. The tourist who enters this island by spending a lot of money and travelling long distances, apart from unique natural attractions, thinks of residential facilities, services and attractions; s/he deserves herself/himself a pleasant and relaxing atmosphere with appropriate services, as her/his obvious right. Thus, according to observing the spatial and physical standards, we should consider the form of building as an attracting factor to attract the tourists.

Also today, the development of tourism in different countries has been considered by all both economically and in terms of aspects of sustainable development. In our country from a period before this matter has been taken into consideration¹; therefore, tourism is important in terms of the sustainable development². We should know that the content of World

Conference on sustainable tourism Charter in Spain is based on the requirements of sustainable development of tourism³. However, the tourism has the harmful and negative impacts on the host community⁴.

The open and green urban spaces often seem not to have direct economical values, while the development of the constructions in short-term have more huge benefits in local and public investments, and cause to increase the rate of using land in the service of short-term economical benefits. From one side, the use of green roofs and walls is one of the new approaches of architecture and civil construction, and derived from the concepts of sustainable development, which can be utilized in line with increasing per capita green space, improvement of environment quality, and sustainable urban development^{5,6}. Therefore, construction of these green roofs and walls in Gheshm tourist residential center has many advantages including the absorption of rainfall, creating an insulating layer on the roof of building, providing a new ecology for various species, and also distribution to reduce temperature, and fighting against the effect of the thermal islands that occur in tourist lodgings. Finally in this paper, we try to deal with the sustainability of tourist residential center based on the strategies of sustainable development in architecture and its impact on tourism industry of this region.

Statement of problem: Unfortunately, today the dominant thinking in designing hotels and lodgings-tourist centers simply is to create a modern building and benefit from the technology of the day. This issue has caused to see the construction of hotels and residential-tourist complexes quite similar them in various parts of the world with different cultures and climates. This apparent homogeneity in terms of attracting tourists can be a negative point because what encourages a foreign or domestic tourist to travel is to face with something new, different architecture and to different climates. Thus, we can say that architecture element at its core has a unique feature, and it is a display of mode of thinking, lifestyle and the ways to deal with the natural and climate difficulties.

The importance and necessity of research: In the construction planning of the most modern cities of the world, creating green roofs and walls has become an executive regulation. So, according to the pollution caused by dust and dirt that comes into Iran from the Southwest countries, as well as pollution from gasoline fuel, which threatens the health of people in big cities, considering the environmental effects and the positive effects of green roofs and walls seem necessary.

Review of literature: The World Tourism Organization in 1988 for the first time defined the term "sustainable tourism" according to Brandt Land's criteria as follows: "sustainable tourism meets the needs of present tourists and host communities by protecting and enhancing opportunities for future generations"⁷. Sustainable development of tourism as a special form of tourism that makes the system to be able to maintain a high level of quality to survive⁸. Michelle Miko (2006) with reference to Linz research on sustainable tourism in Hawaii provides a better understanding of the concept of "sustainable tourism": sustainable tourism is not designed to prohibit tourism, but is to manage the interests of benefitting groups including host communities, tourists and tourist industry practitioners, and seeking to create a balance between development and conservation, and generally trying to find the best form of tourism development for a region based on its culture and environment⁹.

We can refer to example of different applications which has sustainable architecture in the following: Museum: Dong Damon Building and Park in South Korea (Seoul) designed by ZahaHadid with approximate area of 7800 square meters which has included a museum, library and educational facilities in combination with the green roof in its designing. School of the Arts: School of the Art, Design and Media at Nanyang Technological University in Singapore, which is beautifully designed by CPG Consultants. This structure with its suitable insulation accumulates the rainwater to irrigate landscaping around it. Academy of Sciences: California Academy of Sciences designed by world famous architect "Renzo Piano" which has a very stunning green roof. This green roof covers a planetarium, a planted rain forest and an aquarium on the bottom. Public Space: Millennium Park in Chicago, with an area

of 7.9 hectares is one of the largest green roofs in the world. Its roof has two garages for parking, a transit center, and a roof-covered executive multi-purpose hall.

Methodology

This paper has been prepared based on documents and library studies. In the present paper, it is tried to study the benefits of the used green roofs and walls in Gheshm Island's tourist residential center based on documents and evidence to clarify a part of values of using green roofs and walls. This study is also an empirical-descriptive research by analyzing researches done in this field and considering the hot and humid climate conditions of the region, in order to provide guidelines for the optimum application of used techniques.

Green roof: A green roof is a roof that all or a part of it is covered by the vegetation cover and soil, or a medium with a vegetative plantation. Making green the roofs needs plants to be able to resist against harsh and spiritless environment of the roof in conditions with lack of water, freezing, flood, etc. The selected plant type is various depending on weather and climate.

The green roofs are divided into three main categories based on the operating system, the average depth of the plantation, and the rate of needed infrastructure requirements: Extensive system, Intensive system, Modular system or planter box

Extensive system: For extensive system, the term "green roof" is used: This type of roof consists of only one or two types of plants and the shallow planting medium. This system is often used when the minimum weight is to be considered. In this system, usually the plants with the root depth of 40 to 100 mm are used. The approximation ultimate load is 50 to 100 kg/m² in saturated case. For the gradient roof and in most places, the gradient of 10 to 20 % is recommended. The plantation milieu has a shallow depth, and usually a part of the roof and a part of building structure is green. An extensive green roof is generally available to the public and is not used for a certain function.

Intensive system: The term "roof garden" is used to for intensive systems: This system is also known as deep level. Intensive roof systems require a common deep of soil for growing larger plants and lawns. This type of green roof is comprised of a variety of plants and is designed like a park. Some green roofs have big trees and water-views that this subject needs to essentially strengthen the structure, especially for roofs that have public access. These types of roofs require irrigation, fertilization and other treatments.

Modular system or planter box: In this system, plants are grown and stored in special boxes. In non- modular systems, the plantation milieu is a continuous layer in the roof. In modular system, this layer is non-continuous.

Green Facades: Green facades are systems in the facade in which climbing plants or hanging plants cover the walls. These plants can be planted directly in the ground at the base of the structure, or in pots placed at a certain height from the facade.

Although, green roof systems may follow almost the same trend, but in the green walls, there are many differences among systems¹⁰.

Green facades are divided into several different modes:

Traditional green façade: Traditional green facades or direct green facades views that are immediately connected to the wall include climbing plants that directly without retaining climb over the wall. This condition is associated with damage to materials, attracting animals, and high maintenance costs.

Double-shelled green facade or green shell façade: In double-shelled green facade or indirect façade that is connected to the wall by the use of a supporting structure, the goal is to create an independent green cover of the wall. Independent green facade can be a modular scaffolding or modular trellises. Modular scaffoldings are light steel scaffoldings which are placed on the wall or have an independent structure which keep the climbing plants.

Living Walls: In this method, boxes are used that connected to a vertical buffer system, or sometimes to the wall structure. Vertical buffer system includes a frame of profiles that are connected to each other at specified intervals through the iron bars. The boxes are cube-shaped, and usually with dimensions 30×30×10 cm from polycarbonate-poly propylene type which in the upper part of it, a track is set that the pipes are placed inside and through them irrigation is done.

Environmental benefits of green roofs and walls: Considering the existence of huge areas of green roofs and walls in urban condensed regions causes a big potential to create positive environmental changes that we can refer to the followings:

Beautification of urban spaces: Green roofs and walls, due to creation of visual attraction, cause to create variability and beauty in the environment in which human beings do their routine activities. The issue causes the environment becomes a more desirable place to live.

Promotion of psychiatric characteristics of the residents: Increasing of urbanization has led people away from nature, and destroys the nature. Consequently, human beings always try to find new ways to enhance their spiritual characteristics to connect with nature. So we can conclude that green roofs and walls can meet the needs of the human species¹¹.

Improvement of the air quality: Green roofs and walls are able to filter out toxic gases, particulate matters in the air and other pollutants.

Reducing greenhouse gas emissions: Carbon dioxide is the main greenhouse gas that causes half the world's annual greenhouse effect. 10 to 30 percent of carbon dioxide is produced due to the loss of forests and changes in ground level¹². Just it is enough that the issuance of carbon dioxide is prevented in order to climate changes return to the normal state and pass rational process. Therefore, replanting plants, carbon dioxide emissions will also increase¹³.

Protection of Buildings: Green roofs and walls protect the building against ultraviolet sunlight, freezing, and temperature fluctuations. These factors will lead to a durable lifetime of facade materials, and will reduce maintenance costs and replacement of parts¹⁴.

Noise Reduction: Plant cover reduces noise levels; particularly it is effective for reducing noise at high frequencies¹⁵. The factors that affect the noise include the type of green roofs, green walls and the materials used in it, the depth of growing plants, the type of plant, and the distance green material from the wall. According to this fact, the space of the green roof and wall can be unconsciously used at margin of highways to reduce unwanted noise.

Components of sustainable development related green roofs on Qeshm Island

To recognize the roots of green roof, first we should recognize the components of sustainable development, and then analyze their role in creating green roof and wall and the kind of its relationship with Qeshm Island.

Human being: In sustainable development, Qeshm Island people, the development axis, and entitled to health care and healthy life in harmony with nature are presented. Green roofs and walls also are in line with the characteristics of health and healthy living for residents in direction of human-centered designing.

Children and the youth: The theorists of sustainable development, by considering the future, has emphasized on the rights of children and role of young people; and according to the lack of safe environments in neighborhoods and homes on the island today, in addition to creating safe environments for the fun of children in the roof, we can flourish children creativities and meet their need to mobility and dynamism.

Women: Women in the world and particularly in developing countries suffer most from inequality, while the development is not achieved without their active participation. Green roofs and walls, by creating an environment especially suitable for housewives, are very effective to respect the rights of the women of the island.

Environment: This is a reality that considering environment and nature has become a standard in our times, a standard that is

pervasive in the world every day to before. In the environmental outlook, the development is sustainable only when it is based on the foundation of the island's ecology¹⁶. The most important feature of the green roof and wall is to move in line with the ecology and environment of the island.

Culture: By proving this point that economics alone cannot present a program for welfare, and fit with human dignity, the culture obtains its importance and real status in development debates. Obviously, by the adoption of sustainable development as a central pillar, the way will be opened for the arrival of the other spiritual and immaterial components¹⁷. So we can localize the green roofs and walls, and respect cultural frameworks.

Education: In our time, education as the most effective tool of the communities to enter into future challenges has been agreed, and principally it has accepted that in light of today education the world of tomorrow will form. Education is the most important factor that is applied in changing attitudes and behavior of human beings in the course of economic development, improvement of quality of life, creating knowledge and skills, and providing job opportunities and increasing the production in society. Thus, green roof, in its broad sense, will have the capability to create a proper environment for people to think and learn in an open space in this island.

Participation: public conscious participation especially in recent years has been emphasized as one of the main indicators of sustainable development. Dell Barrio, in a report for the twenty-first century, believes that the sustainable development requires transition from individualist membership in community to participation of people¹⁸. Social life in the roofs corresponding with local and cultural conditions is a suitable bed for the people presence of the island together and their active participation to create changes in the life.

The study of the region as the context of the project: Hotel project is located on the north coast of the island at the kilometer 8 Qeshm expressway.



Figure-1
The location of the intended site, Source: Google Map

The study of ways to access roads to the site: Accessibility is possible in two ways: either the main road of Qeshm Island highway or other coastal road, the old road to the Persian Gulf and the coastal plains of Qeshm and Hamoon.



Figure 2
The ways of access to the site, Source: Google Map

Landscape and view of the site: The site is limited to Persian Gulf from the north, to Qeshm port city from northeast, to Hamoon port city from the east, to Persian Gulf hotel from the west, and to Qeshm city from the south.

The main idea of the project: The main idea of the formation of the shape of "Qeshm Island Hotel" has been the creation of a fluid construction, remembering the form of the big entertainment ships. Basement and ground floor suite has been provided for parking lot. In the ground floor, independent accessibilities have been predicted for commercial and residential floors. In addition to allocate the basement to hotel and residential parking, accessibilities to commercial and residential parking have been separated from each other.

In designing this collection, it has been tried that in spite of independent accessibilities, integration and coordination are preserved in the form of the construction.

The U-shaped form of the construction provides the possibility of an enclosed central green yard.

The idea of a green roof, in addition to the visual appeal of the building, creates a very pleasant and attractive environment for residents of the hotel.

Designed terraces in the facade of the hotel with their special form, in addition to creation of beautiful play of light and shadow, play the role of awning for under units.

Conclusion

About what was mentioned on sustainable architecture

strategies, different strategies have been used for each of these methods because these strategies present different ways to implement the construction in sustainable designing based on knowledge and technology of architects and designers. But what is certain is that all of these methods are to establish several principles, including energy conservation, harmony with the environment and climate, as well as reducing the use of resources and meeting the needs of residents. Since the life cycle is continuous and chain-like, so to achieve at these goals, we should consider the holistic architecture in which all principles of sustainable architecture is symbolized in a complete process which results in creating a healthy environment.

According to researches done, the use of green roofs and walls, in the case of the proper design and management, can be a useful tool for setting thermal energy storage in buildings on the island that are interested to save energy. Consequently, green roofs and walls have many advantages, and influence the urban environment, citizen's ecological life and their mental, social and economic health.

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