

Learning from the past in Today's Architectural Design

Case Study: Architecture in hot and arid zone of Yazd in central Iran

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**“Don’t Let The Noise of Others’ Opinions Drown
Out Your Own Inner Voice”**

“Non Lasciare che il Rumore delle Opinioni degli
Altri Offuschi la Vostra Voce Interiore”

Steve Jobs

ABSTRACT

This thesis, researches traditional housing in city of Yazd, Iran. There are two objectives on this research work. Firstly, vernacular elements used in traditional houses in central Iran and, in particular, courtyard houses in Yazd will be investigated and analyzed in relation to contemporary Iranian design. Secondly, the broader social context of housing in Iran will be explored with a view toward sustainable development and improvement of local architecture. Additionally, this study will explore the social and environmental bases of the traditional Yazd house. In order to develop a cohesive understanding of contemporary issues in Iranian design, a variety of resource materials will be drawn on, including journal articles, reports and books.

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INTRODUCTION

Statement of the Problem

Nowadays some of the important issues of the world scientific communities are the discussion on the sustainable development, saving the non-renewable energy and the sustainable architecture. Undoubtedly the irregular use of non-renewable sources such as the fossil fuels, will jeopardize the world's environmental situation in the near future. More than one third of total consumed energy has been used in the buildings section, so with this high demand of energy consumption, there is no hope for preserving energy sources for the future. Lack of energy resources emphasize the importance of reaching the sustainable architecture.

The main part of the non-renewable sources have been consumed. It is predicted that the price of fossil fuels continues to rise in the next years, therefore, the idea of the zero energy building has been formed in order to meet the energy needs of the current century and is used for removing the energy related concerns in the current era. Indeed, human hope to accomplish the creative ideas such as zero energy building, neutral en-

ergy building or independent building for many years. By using modern technology the biggest human dream, preserving energy resources, can be achieved.

Iranian traditional architecture as one of the best sample of the sustainable architecture, represents the effective usage of non-renewable energies based on the climate region in the past. The ancient Iranian architecture indicates the experience of the Iranian in using the non-terrestrial (non underground) natural energies such as the energy of the sun, wind, water and etc. The different geographical and climatic situations have been integrated with the penchant and intelligence of the past people for using the natural energies in order to form the unique patterns of the Iranian traditional architecture. Today, it is possible to utilize the past experiences and restoration of those traditional patterns which have been forgotten in the current era, in order to meet the climatic needs of each region and decrease the consumption of the fossil fuels.

In this thesis, the country of Iran and its vernac-

ular houses have been investigated as the most notable samples of “adjusted architecture” per climatic conditions. In this thesis, the hot and arid climatic region of Yazd has been investigated. According to the investigations, the usage of the correct materials, accurate identification of the climatic specifications of each region and its related facilities can lead to creation of the appropriate spaces in order to meet the air conditioning and minimize the consumption of non-renewable energies.

In this thesis, the renewable energies in the passive houses and zero energy buildings have been investigated. Meanwhile, it has been attempted to use the new materials and technologies and traditional experiences in the new building complexes as part of the solutions in decreasing consumable energy and expenses in the houses.

Methodology

This thesis relies heavily on textual research. Additionally, the data collected during a research trip to Yazd on May 2016. The data includes field observations recorded by the author, research of various materials in local libraries, and conversations and interviews with local academics.

Central Iran’s distinct and relatively constant climatic conditions are rarely factored into the designing of modern day structures. As a result, large-scale commercial and residential construction practices tend to produce buildings that are inefficient and out of sync with local climatic needs. Yazd is among Iran’s oldest cities with a rich architectural history. The city’s local architecture, along with concepts, ideas, and values rooted in Iran’s architectural traditions served as a major impetus for this work. The methods of traditional Iranian architecture can be used to meet contemporary needs. While sustainable energy and development is a key priority, the architectural values and town planning of old Yazd cannot be sacrificed. Sustainability and development will be integrated in such a manner so as to retain the city’s essential character. Sustainable development, therefore, can be attained by integrating traditional architectural concepts and values with current technology.

To be clear, this thesis does not argue against development, which would be futile. Instead, it seeks to temper it by promoting and understanding of development that is guided by a consideration of the local environment and social context. A more sustainable and context-based approach

to development can still include high-rise apartment buildings and high-density, lower incoming housing complexes. When these development types are in the design phase, consideration must be given to the local environment, wind and solar issues, and privacy concerns. Such an approach to development would be a marked departure from normative standards as it would attempt to maintain a connection to the Iranian and environmental context.

Purposes

1. Identification and interpretation of the traditional architecture in Iranian hot and arid climate and identification of the traditional and modern sustainable architecture (case study is the city of “Yazd” in Qajar period 1795-1925).
2. Investigation of the zero “energy buildings” and “passive buildings” and also investigation and identification of the type of usage in the reproducible energies such as water, wind and sun in the buildings.
3. Comparison between the Iranian traditional architecture and sustainable contemporary architecture of Iran and the world.
4. Method of utilization and the specifications of the Iranian traditional architecture in designing the current architecture, specially in the hot and arid regions of Iran for better living and saving of consumption in the non-renewable energies and decreasing the pollution.

Research Question

The main issue and questions of this research are as follows:

1. Can the renewable energies be used in the modern building instead of fossil fuels?
2. Is it possible to design and implement of the building which followed the sustainability principles according to the Iranian traditional architecture?
3. Is the usage of renewable energies in the current buildings affordable and economical?
4. Are the zero energy buildings and passive buildings useful for the humanity and future generations?

Research Hypotheses

- 1- Regarding to the specifications of the Iranian traditional architecture, the sustainable principles can use in new buildings.
- 2- Utilization of the renewable energies in the current buildings is effective economically.
- 3- Utilization of the modern technology and appropriate materials can lead to appropriate social, cultural and peripheral environment.

Keywords

Iranian Traditional Architecture, Yazd, Vernacular Houses, Sustainable Architecture, Zero Energy Building, Passive House, Renewable Energies, High-Rise Building, Smart Material, Contemporary Architecture

Thesis Organization

In this thesis, the architecture of the past, present and future time have been investigated.

In the first chapter, the warm and dry climate and the case sample of the city of Yazd have been investigated.

In this chapter, the traditional houses of this city in Qajar period (1795-1925) have been studied regarding the materials, technology, design, form, building direction, height and other components of the central yard buildings in order to demonstrate the effect of simple and accessible techniques of the Iranian architecture in making the sustainable spaces in the Iranian traditional houses.

Meanwhile, the Case Studies of the investigated houses were Gerami house, Golshan house and Lari house.

In the second chapter, at the beginning, the renewable energies and the reason of their usage at the present period, and at the rest, the sustainable houses, zero houses and passive houses in the contemporary architecture of the Iran and the world and the advantages of their construction have been investigated in order to identify some solutions including the utilization of the traditional technologies in their modern form for using the renewable energies such as the wind, water and solar energies in the buildings.

In the third chapter, firstly the Iranian contemporary architecture and the entrance of the traditional architecture in contemporary architecture have been investigated by describing some case studies of the Iranian architects' works such as Mirmiran Seyed Hadi and Diba Kamran. Secondly, the world contemporary architecture and the emergence of the tradition in contemporary architecture have been studied regarding to the architecture of Louis Kahn and his student Venturi Robert.

In the fourth chapter, the usage method of the renewable energies such as the solar energy, wind energy and etc. through the application of the modern technologies and new materials and architecture in the modern buildings and specially in the highest ones have been investigated. Moreover, some high towers such as the high-rise buildings and their samples such as Agbar Tower in Spain have been studied.

At the first part of the fifth chapter, the Discussion then, followed by the findings of this research have been explained. Afterword a general conclusion of its studies have been presented. Meanwhile, at the end of this chapter, some solutions and suggestions have been presented for improvement of living situation of the present and future people in the desert town of Yazd.