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The Study of the Relationship between Sustainable Architecture and Vernacular Architecture in the North of Iran

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Abstract

This study investigates sustainable architecture and reasons of its usage. Architecture is under influence of a range of socio-economic aspects including but not limited environmental, social, cultural, economical problems and the connection between these issues as well as fashion, religion, climate, and etc. Concerning vernacular architecture and introducing the unseen principles of sustainable architecture in it, are an effective method in order to introduce sustainable architecture, so it will cause renewed focusing on vernacular architecture and through using it converts architectural topics to the modern and international issues. Of course, vernacular architecture was sustainable in its own time and place, so it's pointless to renouncing it. The north Iranian architecture is a kind of architecture that has maintained its basis of nativism. Principles of sustainable architecture is considered in it, which is studied in this article. This descriptive study's results let us know the important role of North Iranian vernacular architectures in creating a sustainable approach in architecture.

Keywords: Sustainable, Sustainable Architecture, Vernacular Architecture, North of Iran.

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1. Introduction

The view of many cities around the world, which was totally different in the past, is going to decay of what let it to have independent and monotony. Cities and architectures were two innovative products of pre-modern human that were a result of climate and structural constraints on one side and collective beliefs on the other side.

Vernacular architecture is a branch of architecture which is based on regional needs and building materials. In order to reflect regional traditions, vernacular architecture has over time based on a local, cultural, technological and historical background which was in it. Vernacular architecture is the opposite of the official architecture (which designed with stylistic elements that were non-accidental been together for aesthetic purposes that are beyond the necessities building), we must know that traditional architecture is not vernacular architecture, also there are relations between them. Traditional architecture may include buildings with formal design elements like temples and castles.

Each of sustainable development theory and after that sustainable architecture is the most controversial issue in contemporary architecture, every building should be able to communicate with the environments in which it is located, and it is not disputable. The challenge is about the type and conditions of this relationship. Nowadays the sustainable architecture theory is trying to answer this question (Asadpoor, 2006).

The study of sustainable architecture and why it is been used in architecture design lead us to vernacular architecture and sustainable approach versos each other in order to extract its teaching which can be used in architectural design (Armaghan, 2009).

In dealing with collections and architectural units, it appears that, this sets are good examples for sustainability in time and location. Mazandaran (a province in the north of Iran) vernacular architecture integrated with nature and developed some methods in this way to create a sustainable and appropriate environment, which not only it doesn't damage the environment around itself, but also excellence and perfection is given to materials by it. In this article, first we will review the sustainable architecture and after describing climate and architectural characteristics of Mazandaran we will follow the sustainability concepts in this region.

2. Research Method

In this study, we try to study on the structure of the vernacular architecture of Mazandaran region based on sources and documents, construction methods in order to clarify some parts of the architecture's values during this process. Regarding to this, the method in this research is cross-sectional study based on library studies and available documents, whose sustainable indicators are declared and presented by excavations carried out in this field and also according to the climate conditions on this province. To obtain ideal results in this article, we investigated the current academic literature and analyzed the results and concluded them in order to achieve a final conclusion.

3. Conceptual framework

3.1. Sustainability

3.1.1. Sustainable Architecture

The concept of sustainable architecture is based on an undeniable reality that ecological conditions can influence economical activities. These conditions includes the idea of creating a logical environment in which development claims become a challenge to promote the all-round quality of life. There are many definitions for the sustainable development, you can see some in the following lines.

Sustainable development is the combination of economical social and environmental purposes in order to maximize current human welfare without damaging new generations' ability due to fulfill their requirements.

World Commission of Environment and Development who had presented this term for the first time, identified sustainable development as a development which can fulfill requirements, this definition includes two concepts:

- 1- The concept of needs, especially poor people's basic needs is a top priority.
- 2- Sustainable development includes the ideas which limit every country because of ecological, social and environmental situations. It means that each country must identify the sustainable development purposes operationally inside itself, based on human soberness of himself and natural resources of the earth indeed, and it wants a unique and sustainable lifestyle for everyone, it is against the overuse and the dissipation of resources, disregard for the future generation and disconnection with the past. So, here is a question arises, "is the

current lifestyle acceptable? Is it correct to extend this style and basic resource utilization to next generations?”

Also, the first principle of Rio Declaration says: sustainable development focus on humans, and humans deserve a healthy and productive life in harmony with nature. On the other hand, sustainable development in technical word can be defined to a development path in which welfare for today’s generation will not diminish next generations welfare and prosperity. Being in this way needs to eliminate abuses, which end natural resources and demolish environment, additionally the concept of equality, which combines the intergenerational justice with intergenerational justice, needs a structure of revenue and distribution models.

So, according to some experts’ opinion we can say that it is a precondition to adapt any strategies related to sustainable development. In fact, without the social justice in current generation, intergeneration justice is not accessible.

3.1.2. Sustainable Architecture

In theorists’ opinion, the purpose of improving the quality of architectures is to reach a goal, and that goal is welfare. An important point is considered in this kind of architecture, is that all the factors involved in welfare, are linked together and are considered as a unique system. Totally, according to the theorists, a sustainable design represents a special attitude on architecture which points to a few basic points:

- 1- Quality
- 2- Future consideration
- 3- Environmental consideration

So in their opinion, sustainable design is not a formal style, it is not retrieved from a temporary condition or impermanent emotions, but it has core concepts which links humans, nature and architecture inside itself (Melatparast, 2009).

3.1.3. The process of sustainable architecture

Today, sustainable architecture is seen by inference architecture as a sustainable product. While there will be important changes if we invert this relationship, meaning that if we conclude stability from architecture, important changes will be found in the architecture, which means to destroy and rebuild architecture and architects. So, this architect at the

beginning of a project will ask himself: “what will be stable through built form? What is claimed as a sustainable manner, is really sustainable?”

The first question, will clearly answered while understanding the activities which supports building, but it is very hard to answer the second question; to answer this question there is a need of a judgment, in many cases the answer is no! Or partially sustainable, and if the answer is no, the architecture must make what he needs to use clear, and if the answer is “partially stable”, the architecture must make clear what he has to correct.

In order to gain a true relationship between the built form and what should be sustainable, we must stop considering a building design as a finished product, and instead we must concern the process which includes these items:

- What are the supported elements in the intended building?
- How will they fit and work together with other processes?

It means they have present as a node at the intersection of services, information, people and other materials of life. Sustainable development is a process which can be repeated. Sustainability is a concept which is used as an amount of values of a method. A method that encounters the contemporary security needs via a reliable and durable behavior. So, process is an important as the finished product. Sustainable development, certainly recognize that the finished product may depreciate little by little and by the time pass, and shall be replaced but it can also recognize a durable and lasting process that may stay forever, and it can be repeated and renewed, without unnecessary destructions of environment and resources.

Sustainability needs to be in a relation with a process as a power, which makes something stable. As an object that shapes the relationship biophysical “built object” and social culture and symbol. This outlook is something more than a “finished product” regarding to sustainability as a process. It means to see it as an ability to change, to hold a feeling that leads us to know what should be saved and what is good for sustainability (weather buildings, objects, activities, technologies, stasis, work, physical habits or mental habits) and what is not appropriate.

3.1.4. The principles of sustainable architecture

Here are some topics that should be obeyed in order to put a building among the historical monuments:

- *Saving Energy*: A building must be built in a way that it could use less fossil fuels.

- *Harmony with the nature*: You should design your building in a way that it could work and be in a harmony nature and energy resources, in where it is going to be built.
- *Reduce using new resources*: Building design should be in a way that it could reduce the use of new resources as possible, and after its shelf life, it could be a new resource to be used for making new buildings.
- *Fulfill residents' needs*: in architecting, it is very important to fulfill physical and mental needs of residents.
- *Harmony with the site of the land*: The building must place amenity in the site of the land and have congruity with the around environment.
- *Holism*: The whole sustainable architect must be embodied in a process which leads us to have a healthy environment (Ghiyasvand, 2006).

3.1.5. Sustainability preparation

Information, knowledge of ideas, new skills and lots of new technologies can be hardly transmitted to other countries and cultures, even when they were introduced to new cultural fields, they were partially performed or didn't match or have been replaced or even they were ignored. It seems that the key of this issue is on the hands of those weakling people who didn't concentrate on local cultural needs, expectations and wishes when they were designing and promoting new technologies. Before claiming that these technologies are valuable and performable as a reality, we must learn they are complicated to the culture and technologies which are accepted by a group of people, necessarily other people don't accept (Cole, 2003).

So, understanding the field and the content of the local culture is very important to successfully transfer and perform technologies. If you want new technologies and new usage to be acceptable and workable, you need to put them together in a line of people who probably use these technologies and usage, people's expectations, needs, knowledge and culture is very important for this purpose. If you want a technique or method to be acceptable by people and perform a sustainable architecture which can answer the particulars above, the following criteria and standards could be the basis of assessment about sustainable architecture (Norton, 1999):

- A perfect usage of existing materials and local transportations
- Using recourses which are available and enough to fulfill general and essential demands without damaging the environment
- Being independent through unavailable equipment

- Using those kinds of skills which effectively developed and trained in the society
- Using those kinds of skills whose results are corresponding to the social, economic, environmental, and local fields
- Skills whose results are valuable
- Skills which work through local weather effects
- Skills which are flexible through local demands and habits
- Skills which could be repeated by indigenous people

Many examples of successful sustainable architecture which were presented in the past. Compliance with these standards are gained by local creativities, attempts and sometimes foreign supports. What really is sustainable needs a long time to be understood, you need to spend time to develop and increase abilities in order to prove an idea or be tasted for a financial or organizational system to be sustainable.

3.1.6. The purposes of sustainable architecture

- Paying attention to human life, preservation of it in the current time and future
- Using materials which are humanized with the environment during producing, using and even destroying time
- Minimum usage of fuel energy and maximum usage of natural energy
- Minimum environment degradation
- Physical and mental important of human life and other organization
- Being in a harmony with the local nature

The purpose of designing these kinds of buildings is to reduce damaging environment includes the following rules:

- Using less nonrenewable resources
- Developing natural environment
- Omit or reduce the usage of toxic or harmful substances on nature in the building industries

Building techniques tries to assure integrated quality in economic, social and environmental fields. Rational use building proper management leads us to save the limited natural resources and helps us to reduce energy consumption and improves environmental quality. Quality is the base of sustainable development design. Good quality could not be achieved without paying attention to the nature and also perennial materials should be used as more as possible. Achieving high quality standards, safety and comfort which in fact ensures human

heathenness is one of the most important purposes of sustainable architecture which can be gained by efficient management and using the latest technologies.

According to this, the following principles should be obeyed in this kind of architecture.

- Understanding the sense of place, universe space and not disturbing in it
- Using natural energies like solar and wind energy
- Using natural-local materials which are recyclable and durable
- Collect and use water, especially rain water and use water of lakes and oceans
- Prepare insulation of the building, thermal and sound insulation
- Available natural ventilation through the roof
- Proper lightening and proper design of the openings (Gorji Mahlabani, 2007).

3.1.7. Sustainable architecture approaches

In the modern age supplying society welfare was on the top of the development purposes, but when this topic about the relation between human, environment and development in 1970s, the concept of sustainable architecture was considered according to universities' scientific activities and librarian arts experts beside the "World Commission on Environment and Development" in 1987, United Nations determined some principles for sustainable development. But formal concepts of sustainable development appears in the world affairs, in an environment and development conference in 1992 and in Rio de Janeiro, urbanization as one of the four basic stands of current world, results different interdisciplinary topics to be considered in order to achieve sustainable architecture (today, cities as proper contexts are considered in order to achieve sustainable development). The most important achievements are economy, environment and society. Of course architecture with sustainable approach is also one of the components of sustainability of the city which adherence altogether the mutual concepts in the context of it. Life climate and environment and its changes, reduction in energy consumption, green buildings and ecological issues are some important and effective factors on formation of architectural approaches in different layers of a design process, manufacturing process, the process of manufacturing materials. The concept of sustainable architecture appears in the report of Graham Brantland's in 1987 and often it is based on two principles; a group which considers to design a building based on relevance and its impact on environment and another group which points to reduction in energy consumption in buildings various factions in vestige of architecture design and sustainable architecture in order to achieve economic, social and sustainable environmental strategies guideline needs to learn

sustainable concepts and executive experiences study in last four decades. What can be studied about the principles of sustainable architecture can often be studied in scientific journals and building codes of leading countries (like Germany, the U.S., Canada, Denmark, etc.) in these fields and practical experiences (Biranvand, 2011)

Building is the largest industry in the world after agriculture. Pollution of buildings heating and cooling and producing building materials is much more than the pollution of course and use nonrenewable resources very fast, sustainability in architecture looks like to an image of future constructions. Not only it is based on physical sustainability of the building, but also it is based on preserving the planet and its resources. According to this, it seems that sustainability is based on a pattern in which we must use materials and resources in a better usage, more than wasting and disregarding.

In the word, we must concentrate on building ability, the ability that leads the local factors and weather conditions to combine them so that a space quality, welfare and good forming can be resulted. Sustainable architecture, advanced techniques of explanation and the achievements of scientific technology are always duties of modern sustainable development and early modernists see technology as a power which could cause revolution, early modernists thought that technology causes changing but when the time pass, it was criticized and in some cases it creates natural, flexible and useless spaces.

3.1.8. Modify barriers in sustainable architecture approaches

It is not correct to ignore dependent relations of habits, life style and cultural values in order to understand sustainability and biophysical. Matters which cause problem in sustainable architecture creation are in the following lines:

- Strategies which are the results of accretion and non-review solutions and today these strategies became problems themselves.
- An aesthetic program which is skillfully placed in architectural sustainability and marginalized stability correlations or think that forming is like sculpture.

This is not correct that sustainability is a result of compounded technology which are shown as symbols. The appearance of the building is the only thing that reminds sustainability in this case, and the whole complex is thus unstable.

All these matters causes the sustainable architecture to be known as a transferable technology which can be transferred to any region, here is two problems:

- Knowing the architecture as a production
- Ignoring the need to every subject and new techniques to location features, in another word, ignoring the necessity of naturalization

3.2. Reading vernacular architecture

The main purpose for study each environment is to reach knowledge about it. Vernacular architecture has important features that lead us to find reasonable solutions in vernacular architecture and trying to adapt them with contemporary constructions is one of the most important purposes of vernacular architecture studies in the 21st century.

Many researches, like the famous Turkish architect Süha Özkan, emphasize using vernacular architecture in contemporary buildings. The result of vernacular architecture recovery leads us to have a correct understanding of the environmental, architectural and cultural methods. Native forms and aesthetic values, which are parts of our language, come from social values and symbols. These symbols come from personal and social identity. In fact, they are retold social values.

Additionally, the study of vernacular architecture lets us to compare contemporary constructions with buildings based on vernacular architecture. Comprehensive study of environment can effect initial design ideas. These effects come from local-cultural factors, which overcome the environment in a way that inhabitant's needs in the building, must be fulfilled by an organized method.

3.2.1. Factors which influence the formation of vernacular architecture

- Culture: Beliefs, faith, religion
- Nature: Climate and geography
- Economy: Live-hood and its variants
- Society: Tribal structures, homogeneous or heterogeneous of the community.

4. Sustainable development and vernacular architecture in the north of Iran

4.1. Local and geographical features in the north of Iran

The beaches of the Caspian Sea are in a temperate region, because of plentiful precipitation and mild climate in this region which is closure in Alborz Mountain and Caspian Sea, it is made up of plains which reduce the weather humidity and moderation while it continues to

the east. In fact, Alborz Mountains which are in the middle of two different climate, separates Caspian plains of central plateau. One of the features of this climate is high humidity weather and another one is moderation temperature (Kasmayi, 2010).

4.2. Architectural features in the north of Iran

The vernacular architecture of these regions is usually as following:

- To protect building from a high range of humidity, houses floors are built on the web basis
- To protect rooms from rain, wide and covered balconies are built around the rooms
- Buildings are usually built of materials with minimum thermal capacity
- Natural ventilation and airflow
- Buildings are decentralized and scattered
- Buildings have sloping roofs

4.3. Basic approaches in sustainable architecture in the north of Iran

These methods might be known as real “passive solar systems” these methods help residents to live comfortably with using less energy and more natural factors like the wind and draft. These are exactly the basis of a real sustainable architecture.

4.3.1. Balcony

Balcony is a semi-open and middle course which leads us to access indoors. It is usually seen in the city houses, and it is all around the building. This balcony not only connects the rooms on a house, but also prevents the rain to reach the body of the building. The main balcony is bigger than all the rooms of the house and it is used as a living room. The depth of the balcony is high enough to prevent unfavorable exposure of sunlight in summer. On the other hand, it doesn't prevent favorable exposure of sunlight in winter (Kasmayi, 2010). Balcony is usually built on the south or east of the house and they are higher than other rooms in order to have a better view and airflow. The differences of balcony and other rooms are collected below (Gorji Mahlabani and Yaran, 2010):

4.3.2. Qolam Gard (passageway)

Spaces with two columns in front of halls are called “Qolam-Gardesh” (passageway). Also, roofing continues next to the passageway in order to protect a wall of it which is like a balcony that is continued all around the house. In this case using passageway and the cover above, not only leads us to achieve protected walls, but also a suitable space appears under the shadow which has a good airflow and air condition for residence to use (Ghobadiyan, 2006).

4.3.3. Sloping Roof

The roofs here are always sloping roof because of heavy and usual rain. Using this style, prevents rain water and snow collecting in the roof of buildings. The empty space between the roof and the sloping roof here in the buildings is a suitable space to storage annually foods and it is usually built in a way that, again airflow and air condition became accessible.

4.3.4. Sleeper wall

In order to prevent moisture on the floor, the building is higher than the ground, so the airflow is presented between the floor and the ground (Armaghan et al, 2009).

Sleeper wall and materials in the Caspian humid temperature zone is a function of topography and the material accessibility on one side, and empirical knowledge of the local craftsmen, the type and duration of the building, and producer economic potential on the other side, there are four categories of sleeper walls for traditional buildings which are placed on the ground:

- 1- Sleeper wall of stone and mud
- 2- Sleeper wall of mastic ransom
- 3- Sleeper wall of well multitude of sector (pile drive)
- 4- Sleeper wall with materials of masonry

Usually the material of foundation is wood, mud or stone, the form is usually merged or single columns which is under the building (Kolbadinejad, 2012).

There is other solutions in city houses, and that is double flooring for the room floors in order to access air flow and evaporation of moisture.

4.3.5. Kutam

It is a kind of balcony and a kind of summer building that is used as a sleeping porch, also it is called to a shaded roof, or an independent terrace, a four sides open one which is built on four high columns. This is an open air space. A room which is built with about 3.5*3.5 meters wide and 1.5 to 2 meters higher than the ground. This is an four sides open space and it is surrounded by a wooden parapet and has a pyramid-shaped roof. The lower part is used for animal husbandry, and the upper part is used by family members for summer dormancy (sleeping porch). The building has a special importance in terms of climate. According to the heat and high humidity during summer which creates sultry weather in the region, constructions of a semi-open spaces that are open on all four sides, and is higher than the ground, can lead you to achieve climate welfare by creation breeze and airflow in different directions.

5. Conclusion

This study concludes that;

1- Because the north of Iran has its specific climate urban texture, building have been formed simultaneously with its climatic and ecological conditions.

2- Using technologies and traditional construction methods in order to create an optimal environment with natural energy and minimize fossil energy usage, are sustainable patterns in the north of Iran.

3- Vernacular buildings of northern Iran, not only don't harm their platforms, but also became a part of it which tries to improve the quality of it. Building is like a member of a natural cycle and it works to develop this cycle. For example, the use of the skin of the rice grain, which fulfill the residents' requirements of overlay. It became a useful material instead of being a wastage material in nature. This action shows that in the north of Iran, the principles of sustainable architecture are compliance.

4- In vernacular architecture of the northern Iran, every part is a member of a coherent and sustainable substance, which works together. Existing materials, methods of construction, type of building, and their connection to the project are all showing the balance and dynamism of this kind of architecture. Like when wood, as a part, became a wall or a roof and form the general concepts of housing which it is itself a member of a platform that completes

with natural factors. This holism shows sustainable opinion in vernacular architecture of the northern Iran.

5- Solutions and innovations in the form of vernacular architecture, in its simplest form, tries to save energy, fulfill residents' needs and totally create the best kind of welfare with using less energy and creating less pollution.

6- The northern Iran vernacular architecture not only cares about having harmony with the natural environment, culture, identity, traditions, conventions and social values, but also helps to create social and cultural stability.

And in the end, vernacular architecture meets the needs of its users with all its principles, and skillfully explains economic-social relations with natural environment with cultural symbols. This architecture is sustainable in its time and place, and the purpose is not just mere the apparent imitation but what should occur is understanding the values of vernacular architecture that can truly work today.

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