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REVIEW ARTICLE

Research on Ecological and Development of Architectural Design

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ABSTRACT Reasonable ecological architectural design can promote the realization of energy saving and environmental protection strategic planning. Architecture is an artificial environment to meet people's daily life and living, architects may achieve energy saving and low consumption requirements through this kind of environment. Optimization should be made on the aspects of overall layout, functional configuration and space combination during design, in order to create more value under limited economic conditions.

KEYWORDS
Ecological construction
Architectural Design
Low consumption

1. Introduction

With the development of economy and society, the destruction of ecological environment has become increasingly severe, as many environmental problems are threatening people. Therefore, people become aware of the importance of protecting the ecological environment, and how to perform the scientific eco-design on buildings has become a very important issue. The author will discuss the eco-design and development trend based on the actual situation and expecting to provide some reference for the majority of the relevant workforces [1].

2. What is the ecological architecture

Ecological building originated from the '50s of last century, and it is also called natural building, green building, or sustainable buildings. At that time, the famous American architect, Paolo Soleri adopted the principles of ecology and combined the architectural characteristics, integrated ecological protection and architectural design together, put forward the concept of ecological building.

Paolo Soleri require to coordinate the relationship between building and other fields based on the local environment and using the modern science and technology during ecological building design, that making human, nature and building to form a good circulatory system. Thereby, it achieved several major functions of ecosystem, such as energy saving, land saving, water saving, reducing pollution and improving economic efficiency [2-4].

3. Construction program and construction materials

3.1. Construction program

First, in order to perform ecological building design, we must consider the coordination of buildings and the surrounding environment. Some architects may pay too much attention to the personality of building during the program design. However, when reflecting the personality and characteristics of building, we also need consider its coordination with the surrounding environment. And it must be consistent to the local cultural and social environment.

Second, we must properly handle the coordination relationship between economy and aesthetic nature, to meet the needs of investors as far as possible while minimizing cost and investment. In addition, due to the building designers urge to pursue the architectural beauty, at the same time, it may consume some investment and increases the cost. However, if the blindly reduce costs and promote economy, it may result in the loss of the aesthetic nature of construction program, and resulted unsatisfied from user or investor.

Finally, we shall implement the concept of sustainable development in the design program. China's economic nowadays was development rapidly, hence there cause more energy consumption. In order to reduce energy consumption, we may fully consider the concept of sustainable development during the design process. A good ecological building work includes not only the contribution of archi-

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tect but also other relevant professionals. Since energy consumption is related to all aspects of daylighting, lighting, ventilation, heating, cooling, etc., hence the architects need to coordinate and cooperate with the related professionals.

3.2. Construction materials

The construction materials used was necessary to play the best performance of the material, and play a role in environmental protection and energy conservation. The first material that fulfil the following statement was glass mosaic, which produced by melting method and sintering method. Its raw material was quartz sand, limestone, dolomite, soda ash, emulsifiers, etc. It was produced through high-temperature melting and chain plate calendaring method. It characterized by soft colors, simple and elegant, good physical and chemical properties, solid and so on. In addition, it has a good bond performance with cement, and is widely used in building facades decoration today.

The second material was foam glass, also known as porous glass. Its raw material is foaming agent and glass, it form foam glass material after calcination. Depending on the difference of physical and chemical properties, foam glass can be divided into insulation, sound-absorbing, anti-radiation, etc. Insulating foam glass has closed pores, which can reduce the thermal conductivity and water absorption. In addition, the remaining particles and debris due to production of foamed glass can also be recovered as granular filler, and then become materials for the production of concrete and roofing.

The third material was clay brick, which is produced through natural handwork. Its color was dark red, when used as a building material, where may not only improve performance, but also give a strong sense of visual impact.

4. The saving principles of architectural design

4.1. Saving raw materials

There are a lot of raw materials, such as structural materials, waterdrop-heating electrical materials, communications materials, decoration materials, etc. In order to achieve ecological building design, raw materials must be designed. With the development of modern materials and technology, the past masonry structure was no longer meet the needs. The past thick brick and fat columns, as well as light steel structure, cable structure may expand the use of space to some extent. We may use the large space membrane structure, which is prestressed empty net overall structure that structure and building envelope parts are combined together, so that it fully play out the carrying capacity of the material, and the appearance is very beautiful. It also possess the features of flexibility, energy saving [5].

4.2. Energy saving

In the process of ecological building design, energy saving design is also very important, as a result, the designer must choose the building materials with less energy consumption. The energy saving potential of building is very large, which can be achieved by renewable energy. Architectural designer must adopt some scientific approach, in order to achieve natural ventilation, daylighting, shading, insulation function. In addition, the efficient use of solar energy should be achieved in order to reduce the energy consumption of the device. Contemporarily, this is the most common energy-saving method.

The most typical energy-efficient building was solar building, now most of them had adopted a passive model. In japan, there had a lot of solar energy houses, which used pitched roof for thermal storage. Since the high cost of photovoltaic panels, it induces the cost of building increased to a certain extent, so the application was relatively small. Started from previous years, some of our buildings began to use a light pipe, try to introduce sunlight into the room to increase the illumination and indirectly reduce the electrical energy consumption.

In addition, the re-use of resources was also a method of energy conservation, but it is very complex and involves a lot of knowledge of other fields. Likewise, it also includes a lot of contents, such as reuse of old buildings, as well as material recycling after building demolition.

4.3. Reuse of buildings

Reuse of building has a very large development potential. At present, many countries had begun to promote and apply this method. Many of the best architects had made study on this aspect. Therefore, there have been many excellent works. For example, some western countries will not carried out large-scale demolition on the building, and rarely demolish the old buildings, they reuse the buildings as much as possible. However, large-scale demolition and change of buildings were made in our country, which do not meet environmental principles and economic principles. According to statistics, during the industrial production process, resources which were used did not exceed 5%, and others are abandoned. At the same time, it was the underlying factor of environmental pollution and wastage of resources. Therefore, we must vigorously advocate and construct ecological building [6].

5. The architectural design ecological development trend

Today, although the social economy had obtained a certain amount of development, quality of life has also been improved to some extent, and people has paid a high price, however, the ecological environment was destroyed, a lot of ecological resources were wasted. Among all the wasted resources, the majority were non-renewable resources, such as petroleum, soil, coal, mineral resources, water resources, etc. In order to maintain a balance between the contradiction of social development and energy consumption, it is necessary to implement ecological construction, so as to ensure the stability and durability of the ecological environment. By promoting the use of ecological building,

people can minimize the damage to natural resources, save energy and reduce consumption.

Meanwhile, ecological building was also the main development direction of future building. With the increasing competition of the real estate industry, the technical route had become the most reliable way for building enterprise to stand in the market. Moreover, with economic development, people's requirements for the building have gradually improved in which they require not only full-function, but also improving the health, and comfort level. Therefore, the bright future of high-tech buildings has been appearing increasingly. Applied of high-tech inside the building not only improved indoor comfort, but also reduced energy consumption, environmental damage and pollution. In addition, eco-building reduced construction costs, therefore, there will be a lot of construction enterprises to vigorously develop and design ecological building in 21st century, and this will promote the rapid development of china's construction industry.

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