Analysis on the Integration and Application of Green Architectural Design Idea in Architectural Design

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Abstract: With the popularization of the concept of energy saving and environmental protection, green buildings have attracted more and more attention in modern architectural design because of their advantages of energy saving, low carbon and environmental protection. Green building design can not only provide people with comfortable and healthy living space, but also promote the harmonious coexistence between man and nature, which is the fundamental to achieve sustainable development of the construction industry. The development and application of green architectural design concept in the construction industry to a certain extent improves the deficiencies of modern architectural construction in environmental protection, but also reflects the new requirements for architecture in the development of the times. In view of the application status of green architectural design concept in architectural design, this paper briefly introduces the important value and principles of integrated application of green architectural design concept in architectural design, and puts forward the main points of integrated application of green architectural design concept in architectural design, hoping to provide good help for related projects.

1. Introduction

In the architectural design work, the application of green architectural design concept can achieve the expected sustainable development goal of the industry. To this end, the relevant builders should fully clarify the value of the foundation, through adaptive and targeted measures to enhance its effectiveness in practice [1-2]. In this way, the development of construction industry can serve the comprehensive development process of modern economic construction in a sustainable state. As a high energy consumption industry, the construction industry not only wastes resources seriously in the development process, but also causes environmental pollution to a certain extent. In recent years, people's awareness of environmental protection has gradually increased [3-5]. Green building has become the main mode of building structure selection in China with its advantages of energy saving and environmental protection, as shown in Figure 1. At the same time, green building will become the dominant design mode of future construction projects. How to apply the idea of green architecture design in the actual production of building structure is an important issue for architects to consider.

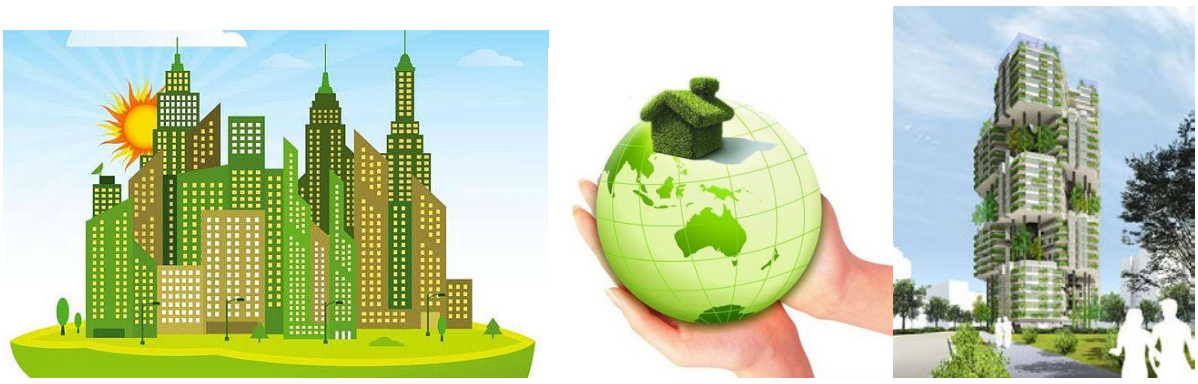

Figure 1 Green building sketch

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2. Green Architectural Design Concept

The concept of green architectural design provides a new development opportunity and goal orientation for the development of architectural undertakings. Through scientific design scheme and strict compliance with the construction scheme, we always adhere to the concept of green environmental protection and energy saving, while ensuring the quality of construction projects, we can save resources [6-7]. When building design and construction, it scientifically allocates resources according to the site environment and geographical characteristics, such as solar energy, wind energy, green planting, etc., highlighting the concept of green design. The value impact of green architectural design concept is mainly reflected in the following aspects:

1) Man and nature live in harmony.

At this stage, the demand for natural resources is constantly increasing, and the social and economic progress is rapid. At the same time, the ecological environment problems are exposed. Global warming, greenhouse effect and so on have a great impact on people's lives. In this regard, the sustainable strategic objective is put forward. In order to meet the development needs and save energy consumption, the green building design concept has been widely applied, improving the natural environment, providing healthy and comfortable ecological environment for people, and achieving sustainable strategic goals [8].

2) Reduce resource consumption.

The application of green design concept in construction projects firstly reduces the application of non-renewable resources and advocates the recycling application of renewable energy. In the process of building scheme design, designers can use advanced technology to gradually improve the construction form, select environmentally friendly, non-polluting materials and allocate resources scientifically, which can not only save cost but also improve the energy-saving effect of buildings [9]. In the later stage of construction, the energy consumption is large. Designers incorporate environmental protection devices such as solar panels to reduce power consumption. Set up automatic rainwater collector and water circulation equipment, make full use of rainwater resources to solve the problem of water shortage.

3) Create healthy and green living space.

The concept of green building design realizes environmental protection and energy saving, and helps to improve air quality and environmental conditions, provide people with a good living environment, and enhance their physical quality.

Table 1 Details of a construction project

Main items	Details
Engineering name	A civil building phase III project
Design life	50 years
Seismic requirements	7 degrees
Construction land area (m^2)	15689
Volume rate (%)	1.89
Building density (%)	24.8
Greening rate (%)	36.6

The application of green architectural design concept in architectural design emphasizes the consideration of many aspects and the whole process, such as low-carbon energy-saving, ecological environment and economic principles, in order to create a harmonious living environment. In this process, the designer's design thought and thinking are related to the design effect of the main body of the building. Therefore, it is required to economize on energy use according to the law of life development and living demand at the present stage, so as to keep the main body of the building comfortable in the natural environment. Through investigation and research, it is found that there are many shortcomings in the design of green buildings, such as low technical content of materials, unreasonable application of soil resources, unsatisfactory lighting and ventilation application, and unscientific use of materials [10-11]. At the present stage, the concept of green ecological architecture design lacks a powerful guiding system, and it is difficult to achieve a rule-based and

law-based, which further restricts the effect of green architecture design.The design principles of green buildings are shown in Figure 2.

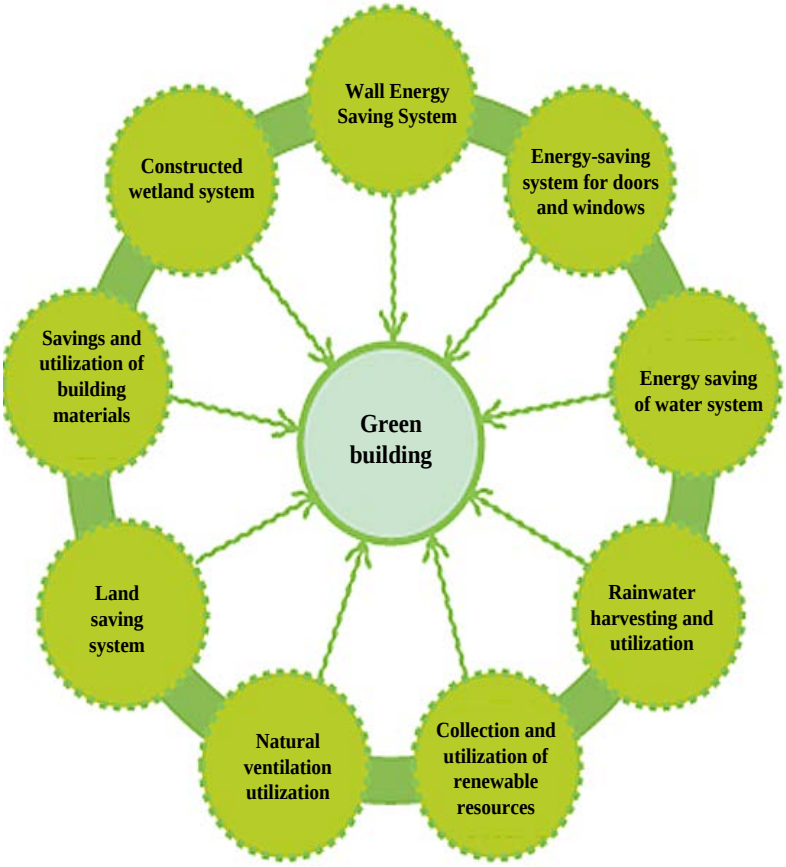

Figure 2 Principles of green architectural design

3. Integrated Application of Green Architectural Design Concept in Architectural Design

3.1 Strengthening building layout planning

In the early stage of the design of the building project, the building area of the project is 15,698 m2. Designers should rationally use the concept of green architectural design to ensure the better implementation of the architectural design scheme. Designers should save land resources as much as possible, reduce the occupied area of the building and ensure the better use of space. For architects, it is necessary to fully understand the survey data of the construction site, improve the original architectural design scheme and reduce the leveling construction of the construction site according to the topographic and characteristics of the area. For example, during the land planning process, if the slope of the construction site is relatively large, designers can build a reasonable semi underground parking lot on the slope location, and the above ground departments need to carry out scientific design to ensure the efficient use of land resources.

In addition, in the design and construction of construction projects, designers should understand the general design and construction requirements of construction projects, incorporate the concept of green architectural design rationally, ensure better energy-saving effect of the project and improve the utilization of various energy resources, so as to provide a more comfortable living environment for people. For example, in the process of actual design, designers should make clear the orientation of buildings, and select the orientation of maximizing the use of solar energy according to the climatic and environmental factors in the region, including topographic and characteristics. Designers should also continue to expand the green area, collect external rainfall reasonably, and use the collected rainwater to irrigate green areas, so as to achieve the goal of saving water resources.

3.2 Reasonable optimization of supporting facilities

In the process of building engineering design, designers should not only optimize the main structure, but also strengthen the design and use of details and supporting equipment. The concept of green architectural design can ensure the rational use of energy-saving materials and improve the implementation effect of green architectural design. For example, when designing the fresh air system in a large building, the designer can make the fresh air pipeline and ventilator into a more independent air handling system. Fresh air ventilator can purify and filter the air outside the building. After transmission through pipeline, it can be transmitted to the building.

In addition, in the energy-saving design of the building air conditioning system, the designer can adopt the fresh air air conditioning system controlled by temperature and humidity independently, and the fresh air fan adopts the heat pump solution and cooling fresh air fan. In particularly hot summer, the use of lithium bromide solution to remove fresh rheumatism, air and evaporator heat transfer and cooling, and into the building interior. In this process, the solution with lower concentration can exchange all heat with the exhaust fan, and absorb all the heat generated by the condenser. After concentration, the solution can be reused, because the COP value of the fresh air unit can reach 5.5 by using heat properly. In cold winter, through scientific adjustment of four-way valves, the new rheumatism and heat can be guaranteed to meet the standards. Combined with the concentration of carbon dioxide in return air, the equipment can adjust the fresh air volume by itself to ensure that the indoor air quality of buildings meets the relevant regulations.

3.3 Vigorously applying energy-saving and environmental protection building materials

In the field of construction, especially in the process of building engineering design, designers should vigorously apply energy-saving and environmental-friendly building materials, which will not cause any harm to human body. For example, in the early stage of construction, a large number of sand, gypsum and bricks are used, which not only meets the construction quality requirements of construction projects, but also reduces environmental pollution. Designers should not be greedy for cheap materials and choose inferior construction materials. Many construction materials such as fiberboard and plywood are needed in the design and construction of this building project. When choosing the above building materials, the materials with better environmental protection performance should be chosen as far as possible, and no environmental pollution will occur.

In addition, in the process of decoration and decoration design of housing construction projects, designers should scientifically select lamps and lanterns, not only considering the aesthetics of lamps and lanterns, but also having a good energy-saving effect and minimizing energy waste. Designers should strengthen the greening landscape design, aiming at noise generated by vehicles passing through, planting trees on both sides of the road, effectively absorbing noise and dust, and ensuring effective improvement of urban air quality. When building public places, we should take into account the sound of human activities, and try to choose building materials with good sound insulation effect. The noise level of the horizontal and living room in the building is shown in Table 2.

Table 2 Noise level regulations for bedroom and living room

Room name	Permissible noise level (dB)	
	Daytime	At night
Bedroom	≤46	≤38
The living room	≤46	≤46

In the process of building interior design, we should try our best to use advanced and sustainable building materials, save a lot of energy, and ensure the better use of green architectural design concept. Applying the concept of green architectural design to architectural design can meet the requirements of sustainable development advocated by today's society, improve the utilization rate of new energy, and promote the green development of China's construction industry. In order to ensure the perfect expression of the concept of green building design, designers should make scientific use of the natural environment around the building, and combine with the planning of the

surrounding environment of the community, strengthen the overall planning to ensure a more coordinated each region.

3.4 Application of monomer design

Firstly, the shape coefficient of a single building will affect the thermal performance. Curved-surface buildings consume less heat than straight-facing buildings. If the volume is the same, the thermal energy consumption of decentralized buildings is greater than that of centralized buildings. Architects should minimize the surface area of exterior walls to control the scientific rationality of floor height setting.

Secondly, the design of building exterior wall should control the use of electrical equipment when the basic requirements of ventilation and lighting are met. For example, the use of Ming Wei and Ming Kitchen to improve the design effect of building interior space. For the design and selection of exterior wall materials, traditional clay walls should be avoided and materials with more energy-saving and environmental protection effects should be adopted. As shown in Table 3, it is the performance standard of exterior wall protective materials.

Table 3 Performance standard of wall energy-saving materials

Energy-saving materials for walls	Heat storage coefficient	Thermal conductivity	Specific heat capacity	Dry density
Polyurethane rigid foam	0.39	0.36	1.5	30
Polystyrene foam	0.39	0.044	1.5	20~40
Polyethylene foam	0.73	0.047	1.5	105
Foam glass	0.73	0.06	0.86	140

Finally, designers should develop flexible design schemes to enhance the applicability and reliability of the building as a whole. In order to improve the growth of building stairs, the bearing capacity and reservation of floor and foundation should be considered.

4. Conclusion

With the development of science and technology, the concept of green building design is more and more widely used in the whole architectural design. Building energy-saving not only reduces the waste of a large number of resources, but also plays an environmental role, in line with the concept of sustainable development of modern society. Our modern architectural design should follow the concept and design principle of green architectural design, adhere to people-oriented design, take the sustainable development road of energy conservation and environmental protection, promote the harmonious coexistence between man and nature, and promote the efficient use of energy, so as to promote the development of China's construction industry in a better direction and create good environmental conditions for people's lives. The proper application of the concept of green architectural design, the planning of architectural layout and the optimization of different supporting facilities within the building can provide reference for similar projects and promote the green sustainable development of China's construction industry.

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