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Research on Green Building Engineering Management Based on Sustainable Development

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Abstract. With the development of green building and sustainable building, the emergence of innovative project management is an inevitable trend of the times. This paper mainly studies the green building project management based on sustainable development. First, the relationship between green building and sustainable building is analyzed under the concept of green building, which leads to a series of reforms and upgrades that construction management needs to face. Then, by comparing the differences between old and new project management models, the methods of applying green building management to engineering production and construction are analyzed to reduce the impact of high energy consumption and greenhouse gases on the environment. Through the analysis of (Building Information Modeling) BIM calculation and intelligent management, the development trend of future project management is summarized. Finally, taking Hangzhou e-Sports Center as an example, it verifies the necessity of designing according to green building design standards in the design stage, and expands internal management and dynamic monitoring of the whole process of project implementation to ensure management efficiency. The research results can provide new ideas and possibilities for the innovation of construction project management, and promote and disseminate these new technologies to promote the healthy development of the construction industry in the future.

Keywords: Project Management; Sustainable Development; Green Building.

1. Introduction

The construction industry has always been an important energy-consuming sector. With China announcing its goal of achieving carbon dioxide neutrality by 2060, it is particularly important to promote emissions reductions in the construction sector and to vigorously develop green buildings. Green buildings can play an integral role in achieving carbon neutrality by transforming from energy consumers to renewable energy suppliers.

Carbon dioxide neutrality refers to the total amount of greenhouse gas emissions produced directly or indirectly by a country, enterprise, product, activity or individual over a period of time, which can be offset by afforestation, energy conservation, positive and negative compensation and relative "zero emissions". Carbon dioxide emissions from buildings must take into account carbon dioxide emissions associated with the production and transportation of building materials, construction, demolition and operation. China's construction industry has become energy-intensive and shows a continuous growth trend.

With the progress of urbanization in China, the number of urban houses will continue to grow, resulting in an increase in building energy consumption and CO_2 emissions. Therefore, the emergence of innovation in project management is a necessity of the times. At the same time, project management must be flexible to respond to project changes and risks, and make timely changes and decisions. The implementation of construction project management can improve project efficiency and quality, reduce the risk of loss of resources, and enable a control of costs. Proper planning and organization helps to better monitor and coordinate construction schedules, reducing project delays and unused available resources. In addition, construction project management modeling can provide comprehensive information and information support to help managers make scientific decisions and forecasts to improve project success and market competitiveness[1]. In summary, with the support of

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green buildings, innovation in project management can make green buildings have a longer life and utilization rate. Therefore, this paper aims to analyze the innovation of green building project management in the context of sustainable development, and provide a theoretical basis for the long-term development of green building.

2. Relationship between Sustainable Development and Green Building

2.1. Green Building Concepts and Characteristic

Green building is to improve the environment and protect the surrounding environment during the construction process and subsequent building maintenance by saving resources and controlling carbon dioxide emissions in building production. Project management companies can help the construction industry realize the development goal of green building through reasonable project management planning.

Green building project management is characterized by a new era of green projects through green construction processes and project management methods. Eco-construction is the only way to reduce the impact of human construction activities on the natural environment, while ensuring the goals and quality of the project, realizing the balanced and coordinated development of the environment and the economy, and further reducing carbon dioxide emissions. At the same time, project management of green construction contributes to the development of environmental protection and green theory. The promotion and dissemination of green ecological theories in the field of civil engineering is to accomplish a successful excess in the building construction recuperation phase [2].

2.2. Demand of Sustainable Development

In recent years, the rapid development of social economy has created new opportunities for the construction industry, which has become an important industry supporting the development of national economy. In order to enhance their own competitiveness, major design institutes and construction companies need to improve the optimization and innovation of design patterns, so as to ensure that the company's technical team plays a beneficial role in the industry, achieve the increase of technical design costs, and meet the current strategic needs of sustainable development.

Construction companies need to master scientific management theories as a part of optimizing and innovating design management mode and improving comprehensive business level, and integrate these into design management practice. From the perspective of rapid social development and improvement of people's living standards, the governance level of the construction industry has also improved, making advanced technology an important driving force for the survival and development of enterprises. Therefore, construction enterprises need to strengthen sustainable and innovative management models that meet project requirements to ensure stable and long-term development.

In addition, construction enterprises must optimize and innovate construction project management in the form of rationally organizing different types of workers, formulating scientific human resource management plans, enforcing strict rules and regulations, and strictly enforcing rules and regulations. Employees share benefits, provide smooth management progress, maximize functional management, and improve the quality of sustainable management [3].

2.3. Relationship

Green building is an important support for the sustainable development of urban and rural construction. It has the characteristics of environmental protection, energy saving and reducing pollutant emission, and can effectively alleviate the consumption of nature and resources and the pressure on the ecological environment of building construction. While pursuing the simultaneous and rapid development of economic construction, green building materials provide a healthier and more livable environment, creating the possibility of harmonious coexistence between man and nature

and sustainable development of architecture. Therefore, green building projects are also considered as a form of sustainable building.

3. Green Building Project Management Methods

3.1. Traditional Construction Project Management and Green Building Management Mode

The traditional construction project management model focuses mainly on quality, safety and speed with strict management processes and standards. Project managers plan and manage according to schedules and benchmarks developed for project cycle tasks. At the same time, the traditional construction project management model does not pay attention to environmental issues, which often leads to problems such as resource waste and pollution. Therefore, in the new development environment of the construction industry, it is necessary to further improve the management level and skills of the traditional model on the existing basis. New ideas and technologies are adopted to promote the development of the industry and achieve an organic combination of environmental protection and economic benefits.

Green improvement of the construction industry is the latest solution to the increasingly serious environmental and energy-saving problems of modern society, and it is also the dominant trend of the modern construction industry. Rationalizing the implementation of green building construction, building managers can start with all aspects of materials, processes and equipment, and implement a series of environmental measures using new technologies, concepts and techniques, such as carbon footprint reduction, recycling and resource reuse, and synergies. The construction industry should also promote technological advances, and with the rapid development of high-tech intelligent products, it should encourage innovations in the use of sustainable technological tools in the construction process and ensure the widest and most effective application of new technologies in project management [4].

3.2. Green Building Management Based on BIM Technology

Through the implementation of information modeling based on building carbon emission standards and assessment criteria, the results of calculations of CO_2 emissions from buildings are systematically evaluated to determine the sustainability of the building, and the green rating of the building is determined according to the normative standards. The consequences of environmental destruction directly affect people's normal life. Traditional buildings are a major source of carbon dioxide emissions, so promoting green and low-carbon development in the construction industry is crucial. In recent years, the rapid development of BIM technology has provided reliable theoretical guidance and construction basis for the construction of sustainable green buildings. Many renowned scholars and professionals have systematically explored the implement ability of the application of BIM technology in green buildings. Green building software packages can calculate the carbon dioxide emissions of various processing, transportation, construction and maintenance steps of building materials, analyze the damage of buildings to the environment, and fully understand the impact of buildings on the natural world. Most energy-efficient BIM software is based on CAD design software that links drafting software to architectural drawings, which are converted into a working 3D model in each module, and used to calculate whether the building's energy consumption ranges are in line with the relevant regulations of the local project. As China's sustainable classification system matures, "green development" has become an inevitable trend. In the future, completed buildings will be categorized as green buildings, and whether a building is green and its rating will become an important indicator of whether a building's design is mature and sustainable. In addition, according to the national sustainable development strategy, the use of BIM technology in green building modules may reduce construction costs. Combining BIM technology for pre-designed and mid-construction cost and energy consumption management is a major leap in engineering management technology [5].

3.3. Intelligent Management Mode

Intelligent building global management system uses different sources of intelligent system information resources to complete the collection of information. Through the system integration technology and methods to collect the necessary information to complete the construction management, to achieve complete information sharing, resource sharing and activity sharing in the basic function of the improvement. In addition, since each subsystem (central air conditioning, cold station, heat exchange station, water supply system, drainage system, lighting, high voltage distribution, low voltage distribution, automatic fire alarm and fire linkage control system, patrol security, garage ventilation) cannot operate separately, it is necessary to establish functions that cannot be performed accurately. Fig. 1 is the schematic diagram of the intelligent building global management system. The goal is to provide users with better solutions to meet their needs. As green and smart buildings continue to evolve, the concept between the two is difficult to strictly define. By collecting different data and establishing an internal intelligent environmental management network and standardized transmission protocols, a comprehensive analysis of the data between different subsystems can be performed in advance. The effective combination of intelligent management and various environmental protection and energy saving technologies will soon become the future development trend of the construction industry [6].

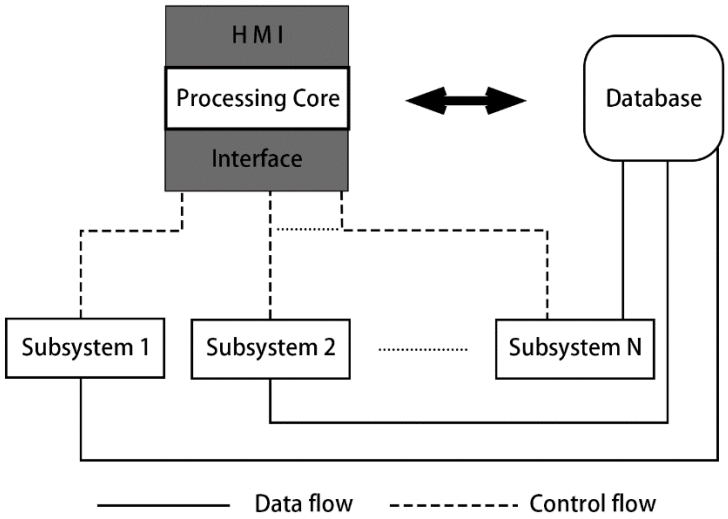

Figure 1. Integrated Management System Schematic

4. Case Analysis

In recent years, with the gradual realization of the national double carbon goal, it is necessary to immediately and actively change the concept of building development, vigorously develop green buildings, and strengthen the management of green sustainable building projects. To put the national dual-carbon development goal in the first place, it is necessary to establish a reasonable green evaluation system. It also ensures that the concept of green energy is fully integrated into the design and management of traditional Chinese projects, and establishes a demonstration benchmark for green urban architecture.

China has the Hangzhou Gaming Center in Hangzhou. The property covers 79,790 square meters and can accommodate 4,380 people. It is the first professional e-sports arena in China to undertake the Asian Games. With a building area of 19,265 square meters and a floor area of 60,525 square meters, the main structure of the stadium is a basic stable structure. The facade includes double-curved anodized aluminum sections, elector-mass variegated skylights and glass curtain walls with low radiation protection. The unique design brings many visual effects to the building phase. The project

actively used new materials, equipment and technologies for environmental protection and compatibility to meet the current national three-star standard for green buildings[7].

As an important provincial and local project, the concept of green building is designed according to the green building design standard in the design stage. The objectives and processes of open management of green building were clarified, several project management evaluation systems were developed as shown in Table 1. The responsibilities of employees in different departments were clarified, internal management was extended through design, construction and material selection, and the whole process of project implementation was dynamically monitored to ensure management efficiency. The project created this full-life-cycle electronic arena through diversified intelligent building management, Heating, Ventilation and Air Conditioning, water supply and drainage, electrical, and forward-looking passive energy efficiency with multiple featured technologies [7].

Table 1. Green Building Evaluation System Indicators [7]

Indicators	**Scope**
Resource indicators	Selection of materials, use of equipment, local substitution, material utilization, etc.
Management indicators	Degree of management informationization, division of labor, staff training, management mode, etc.
Technology indicators	Green technology utilization rate, safety and reliability of technology, applicability of technology, etc.
Energy indicators	Energy utilization rate, energy consumption, use of renewable energy, etc.
Environmental Indicators	Sewage treatment, noise pollution control, solid waste treatment, harmful gas control, etc.
Economic indicators	Risk control, cost control

5. Conclusion

This paper focuses on sustainable developmentalized green construction engineering management, and draws the following conclusions:

(1) The construction engineering industry with high energy consumption can no longer meet the requirements of environmental protection, low-carbon and environmental protection.Only from the traditional method to the green method is the inevitable change of the sustainable development of the construction industry. With the emergence of the concept of sustainable development, many industries and departments have attached great importance to green energy saving.

(2) The green energy saving consciousness of the construction industry is of great significance to the long-term development and leapfrog development of the construction industry. Building energy conservation is a complex system technology that is coordinated and interdependent. Therefore, reducing CO_2 emissions throughout the life cycle needs to be considered in a comprehensive way. With the horizontal development of green buildings and smart buildings, the concept between the two is no longer strictly defined, and the advantages of sustainable buildings are gradually emerging.

(3) In the operation phase of green buildings, the commissioning and management of public facilities should be strengthened, with special attention to environmental management. The construction company and supervision company need to organize components to receive and evaluate the energy efficiency of the building, install a real-time monitoring system for building energy consumption and access the platform. The management and evaluation of the whole life cycle of ecological buildings has a positive impact on the implementation of the national "two-carbon" strategy. The Gongshu

District Hangzhou Sports Center project provides the best case study in this regard and provides a good guide for the implementation of these projects in the future.

(4) At present, green building project management is still in the initial stage of development, and there are still many problems to be solved. First, most supervision companies lack a unified management system, prone to decision-making errors, need to strengthen the improvement of management system. Secondly, the backward construction technology brings the defects of imperfect technical indicators, and more scientific and advanced standards and technologies are needed to ensure the construction quality of green buildings. Third, the construction personnel have insufficient understanding of green project management, which cannot be implemented in practical projects. It is necessary to strengthen the training of construction technicians, enhance the green consciousness, and ensure the use of reasonable cash construction technology.

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