

Exploring the Scientific Development of Green Building based on the Perspective of BIM Technology

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Abstract

Green building is in line with the characteristics of energy saving and emission reduction proposed by the international now, and is a major trend of the future development of the construction industry. However, the birth of green building is late, and there are still a lot of vacancies in the research and construction related to green building, so how to promote the healthy development of green building has become a hot spot in the construction industry nowadays. This paper composes the development dilemma that green building is facing at present, analyzes from the perspectives of legal system, evaluation standard, whole life cycle, digital development, etc., and suggests suggestions for the development of green building with the advantages of BIM technology and BIM informatization as a feature.

Keywords

Green Building; Development Exploration; Whole Life Cycle; BIM Technology.

1. Introduction

From the 1970s, the concept of "green building" was introduced in the western developed countries to improve the deteriorating natural environment from the perspective of the construction industry, and the concept of "green building" was clarified for the first time at the United Nations Conference on Environment and Development in 1992. In 1992, the United Nations Conference on Environment and Development first clarified the concept of "green building", and then the concept of green building was implemented to the construction industry all over the world, and gradually became the development trend of future construction. However, in the decades of rapid development of green building, problems and shortcomings in the development have also emerged accordingly, and as an emerging concept, there are still many issues that need to be explored, studied and improved by relevant practitioners.

At present, the development of green building shows the characteristics of fast speed and significant problems. Li Xumin[1] pointed out that the industrialization of green building technology is still in its initial stage; Zhang Tanqiu[2] proposed that green building should develop from light green stage to deep green stage and finally to full green stage; Sui Honghong[3] used game theory to analyze the economic policy of green building; Li Yingxue[4] obtained countermeasures and suggestions for the development of green building by studying four levels: government, organization, enterprise and society; Gao Yutong[5] built the ISM- The study of green building development at the macro and micro levels through the evolutionary game is presented by Jing Wang[6] ; the study of green building development in the context of new urbanization is presented by Ying Wang[7] ; the study of green building development in the context of new urbanization is presented by Wenli Cao[8] ; the study of small and medium-sized cities is presented by Wenli Cao.

BIM technology, as a latest technical means, can integrate the complicated building construction information, improve the construction efficiency and ensure the project quality,

and has important practical significance in the exploration of the future development trend of green building. Zhi-Liang Ma[9] studied BIM technology from the conceptual level, which provides help for the relevant personnel to know BIM technology deeply; Meng-Qi Zhang et al.[10] proposed the application prospect of BIM technology by studying the development status of BIM technology, and pointed out that BIM technology can provide strong support for green building; Baoling Wang et al.[11] proposed that BIM+smart city will be the development direction of BIM technology.

For example, Gao Yunhong[12] pointed out that BIM technology can be applied in the process of green building design with high visualization and low information transfer cost to provide a more scientific and effective design method; Wen Quan et al.[13] proposed a value evaluation method based on convolutional neural network to realize the value evaluation of BIM technology application in green building. It helps the decision making and management of BIM technology application in green building; Jingyu Wang et al.[14] combined BIM technology to establish carbon emission measurement model to calculate the emission in each stage of the building and put forward the corresponding countermeasures for energy saving and emission reduction; Junyan Sun Chen et al.[15] explored the feasibility suggestions to enhance the research of BIM technology in green building; Tengteng Jiang[16] established the model of building industrialization using BIM technology in the context of green building, which provides a more scientific and effective design for the combination of green building concept and building industrialization provides a reference.

This paper will interpret the barriers to the development of green building from different dimensions, interpreting the legal regulations, evaluation standards and technical development, focusing on the solutions and applications of BIM technology in each problematic aspect, and putting forward scientific suggestions to help the development of green building from the perspective of BIM technology for each problem.

2. The Dilemma Facing the Development of Green Building

According to the development status of green building, this paper will roughly divide it into macro and micro perspectives to explore the problem, and meticulously divide different levels between macro and micro perspectives for research, concluding that the macro development of green building affects: legal development, regional development, evaluation standard development; micro development includes: technology development, process management development, digital information development; analysis concludes that the current The dilemma faced by green building.

2.1. Green Building Legal System is not Sound

Green building started late, in recent decades, although the international legal regulations on green building are constantly improving, but from the adaptability and practicability of the relevant legal regulations can not achieve a good role in the regulation, for example, in: water saving, electricity saving, carbon emissions, etc., the relevant regulations by different departments responsible for the formulation, it is difficult to form a coherent, resulting in the lack of legal basis for developers in the construction phase Uniform standards are not available.

In addition to the mandatory implementation of the concept of green building in exemplary public buildings, in the process of green building implementation, many developers choose to do "superficial projects" because of the high construction costs, without site visits, and only need to submit relevant evaluation materials without implementing the standard operation, they can pass the approval inspection, and the mandatory legal level is not enough to make Green building can not be actually on the ground.

2.2. Development Fragmentation of Different Regions

Analyzing from the geographical distribution, the development of green buildings in urban and rural areas forms a significant difference, the development of green buildings is uncoordinated and prone to polarized split, green building projects are mainly concentrated in economically developed areas, and it is difficult to carry out green building projects in rural or urban areas with various problems such as lack of technical support, lagging economic development and backward green concepts. The old buildings in rural areas occupy a large area of land, and it is difficult to implement new green buildings without demolishing the old buildings, and the energy consumption and carbon emission of the old buildings from establishment to destruction are a big burden to the environment.

2.3. Vague Evaluation Criteria System

At present, the existing international evaluation standards mainly include: the United States - LEED, the United Kingdom - BREEAM, Canada - GBTool, Japan - CASBEE and other more mature evaluation system, of which the United States LEED (Leadership in Energy and Environmental Design) is the most widely popular, is currently the LEED (Leadership in Energy and Environmental Design) in the United States is the most popular and the most influential evaluation standard in the world. However, because of the late start of green building research and vague evaluation standards, the green building system in each country has not been able to achieve systematic, perfect and comprehensive development of standards, and the development is unbalanced between adaptability and relevance, which cannot provide scientific and accurate assessment for the universal development of green buildings and greatly reduces the development speed of green buildings.

2.4. The High and Low Technical Connection of the Building is not Reasonable

From the technical aspect, the technical development of green building is mainly divided into two parts, one is the high technology development and the other is the low technology development. High-tech development is mainly based on high-end building materials and technologies, including composite glass, light-guided lighting, renewable energy systems and other building equipment, with a wide range of flexible application scenarios and high requirements for construction costs and construction technology; low-tech development mainly uses non-mechanical means, such as sunlight, heat, rainwater, topography, greenery and other existing environmental factors, and achieves green building by designing and transforming environmental factors. purpose, the design cost and technology is relatively low, but the adaptability is lacking.

2.5. Inefficient and Cumbersome Whole Life Cycle Management of Buildings

The life cycle of a building is a complex cyclic process that includes building design, building construction, operation and management, renovation and demolition. The original green building information is presented in a two-dimensional static form, however, the information generated in the whole life cycle of a complete green building is dynamic and cumbersome, and it is difficult to centralize a large amount of building information gathering, and the accuracy of information transfer is poor and the process is redundant, and the data on two-dimensional paper is often not intuitive, and many building details will be hidden, leading to low efficiency and many errors in the management process.

2.6. Poor Promotion of Information Digitization

The future green building will develop towards intelligence and informatization, and the intelligent development needs to achieve interdisciplinary and interprofessional combination to help the green building from light green, deep green to cloud green process. However, at this

stage, there is less research that can make green building to be with intelligence, and the gap of related technology application that supports to go to informationization is waiting for practice.

3. Suggestions for the Development of Green Building based on the Perspective of BIM Technology

3.1. Establishment of BIM-based Green Building Evaluation System

In order to unify the evaluation standard of green building effect, improve the reward and punishment mechanism of the government, establish the green building star mark, and systematize the green building evaluation system, the actual data and impact coefficient of the building level can be used for scoring and judging. A set of evaluation standards based on BIM technology measurement data, energy saving, water saving, emission reduction and reasonable land use can be established to provide a concrete construction basis for developers and the government, solving the problem that laws and evaluation standards cannot be fully implemented.

3.2. BIM Strengthens the High and Low Technology Compatibility of Green Building

In view of the difference of regional development and the difference of high and low building technology, a reasonable combination is needed to promote the development of green buildings, with high technology as the main focus in developed areas to assist the development of non-mechanical technology; and non-mechanical technology as the main focus in backward areas to adapt to the development of high technology. The visualization model built by BIM technology can be used for green transformation of existing buildings using technology to maximize economic benefits and reduce environmental burdens during the building life cycle; for new green buildings, analysis can be conducted to design buildings that can make scientific matching of high and low technologies and complement each other.

3.3. Application of BIM in the Whole Life Cycle of Green Building

Combining BIM technology with the whole life cycle of green buildings is the future trend, using BIM technology to scientifically control the construction to management operation and finally to demolition of buildings. In order to promote the green building to solve the whole stage of energy saving and environmental protection, BIM technology can be used to obtain the whole process information of the building. For example, BIM technology can be used to collect site environmental information, climate information, construction scale information and other information to build a variety of information database for program design; in the construction phase, BIM models can be established, using its construction data, construction materials, equipment systems and other construction information to flexibly adjust the construction state to reduce the construction cycle; maintenance phase with the model for systematic management, in the In the maintenance phase, the model can be used to systematically manage and monitor the carbon emissions during the life cycle of the building, and achieve the optimal management of green building projects.

With the help of BIM technology, we can break the limitation of traditional building information and manage the building information in real time monitoring, so that the building data can be visualized and managed, which effectively solves the problems of slow transmission efficiency and low accuracy of building information.

3.4. Create BIM Combined with Green Intelligent Building

The future "cloud green" stage of green building requires the introduction of big data and other related technologies into the building, and BIM technology will also assist the construction industry towards BIM + smart city, and the creation of green and smart buildings combined

with BIM technology will help the development of future buildings. Through BIM technology, the geographic information, building information and facility information of the city will be recorded, and the information will be integrated and uploaded to the cloud server to support the green building in the design and management stages.

4. Conclusion

This paper examines the macro and micro perspectives of green building development, from the evaluation system of green building to the future development of green building, and explores the solutions from the perspective of BIM technology in order to explore the key role of BIM technology in the development of green building. The research results show that BIM technology has an indispensable role in the development of green building and needs to be applied in depth in various aspects to carry BIM technology in the development of green building. In addition to solving the above problems, the author believes that the combination of BIM technology and green building still needs to be tested in practice. The first is the need to strengthen the adaptability between the two to face more architectural scenarios; the second is that the application talents related to BIM technology still need to be cultivated vigorously, and there is still a large gap in the market; the third is to ensure the rationality of BIM technology in the life cycle of green building and not to blindly use BIM technology and ignore the essential concept of green building.

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