Preliminary Study on Green Building Design Review System Based on BIM

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Abstract: Sustainable development is a common concern in today's world. In the field of urban construction, it has also begun to develop from traditional high-consumption buildings to green and efficient buildings. Green buildings have become the main trend of world architectural development. From the perspective of design and application of architectural design review system, combined with the concept of BIM technology, green building design and related requirements, this paper proposes to use computer technology to build BIM building information model, and to construct spatial geometric information, functional information, building materials and Integrated management of equipment. Besides other related data provides relevant basis for the design of green buildings. At the same time, the formation of the green building design review system can realize the green building evaluation function by visualizing the three-dimensional data information.

1. BIM Technology and Green Building Design

1.1 BIM Technology
BIM technology is a kind of building information modeling technology using computer technology. It is also a kind of digital technology. It has the characteristics of simulation, visual information expression and information sharing. At present, the technology has been widely applied to various construction projects. The technology is applied in the architectural design, which can realize the planning and management of the overall construction project. Through simulation and visual expression, the problems existing in the architectural design can be discovered in time. At this stage, although BIM technology does not have a unified concept, its essence is a computer digital model, which utilizes the characteristics of information technology to realize intelligent management of architectural design and construction. The ultimate goal of using BIM technology for building design planning management is to improve management efficiency, reduce construction costs, and ensure the quality of the project, thus promoting the sustainable development of the construction industry.

1.2 Green Building Design
Green building refers to the combination of environment and building, considering local natural environmental factors in building design and construction, taking measures to reduce the impact of building construction on the environment, strictly controlling the consumption of buildings, and achieving energy saving and emission reduction targets eco-buildings. Compared with ordinary buildings, green buildings have the following distinctive features; the first architectural form and the architectural design ideas are very different. The green building design can greatly reduce the use of materials in the construction and reduce the formal investment. After the use of energy consumption, thereby achieving the purpose of improving resource utilization and reducing environmental pollution.
Therefore, the green building design reflects the people-oriented, harmonious relationship between man and nature, and realizes the coordination of energy conservation, ecology and building functions by creating a comfortable and safe ecological environment. In addition, green buildings are also a kind of protection and utilization of local and humanistic historical environment, such as the use of local style of building materials, following the principle of local materials can not only reduce the cost of material transportation, but also make the building style unique, suitable for local people to live.

2. Green Building Design Review
The review of green building design refers to the combination of green building design specifications and requirements. In the process of transforming the building industry towards green sustainable development, research and analysis of green building theory and technology, using computer technology to establish BIM building information model, to achieve Integrated management of relevant professional data and information such as building space data, providing a basis for green building design implementation, and using 3D data information visualization technology in energy saving data analysis, program analysis optimization, lighting and lighting, natural ventilation, rainwater harvesting and utilization, etc. To establish a multi-angle ecological technology indicator assessment and decision-making mechanism to improve the utilization of non-renewable resources, achieve the effect of energy conservation and consumption reduction, solve the energy and environmental problems brought by urban buildings, through the analysis and review of the environment, develop a more scientific and rational design.

However, because China's green buildings are still in the initial stage of development, there are still many areas for improvement. For example, green building awareness, insufficient knowledge, no strong incentive policies and regulations, no systematic standard system, and no strict regulatory system. In the promotion of green energy-saving technology, it has also encountered many difficulties. The reason why the above problems are mainly related to the current lack of a sound auxiliary design system, lack of qualitative and quantitative evaluation of architectural design and construction in various stages of planning, design and construction, so there will be no corresponding in the implementation and promotion of green building design as technical means.

3. Formation of Green Building Design Review System

3.1 The Significance of Establishing A Green Building Design Review System
The use of computer technology to establish a BIM building information model, and then provide an important basis for the design review of green buildings through the unified management of building information data. Because the factors affecting green buildings may appear in the planning stage, and may also occur in the design and construction stages, the review of the building should be throughout the design and construction of the building. In the early planning and site selection, building selection, material equipment selection and technical application, relevant assessments will be carried out. Through the establishment of the evaluation system, various factors affecting green buildings can be considered in advance to avoid the impact of building defects due to design defects. In addition, the review system is also a platform for promoting services, enabling designers to better experience the impact of green design methods on buildings and better understand green building design concepts and related design methods.

3.2 Difficulties in Establishing A Green Building Design Review System
The review system is primarily for the design phase, and the basis for the review can provide quantitative data for green building design. However, the different stages involve different professional, external conditions, design concepts and technical means. Any one of the links may affect green building products, while different green buildings involve multiple professional design processes. There is no integrated data system. The planning control method is difficult to ensure that all the data related to the building is true and reliable throughout the green building design, and it is
difficult to quantitatively analyze and review the relevant data.

3.3 Elements of the Green Building Design Review System

The elements of the green building design review system based on BIM technology and the problems solved through the review include the following points: First, the review provides the basis for the architectural design and obtains the ideal architectural design effect, thereby reducing the utilization of non-renewable resources and realizing the goal of energy saving and environmental protection. Second, improve energy utilization and use renewable energy as much as possible. Third, create a good indoor environment and avoid pollution of the outdoor environment. Fourth, create a good community environment. From these goals, it can be seen that the establishment of the green building design review system includes designing and evaluating data integration building data throughout the design process, and establishing an integrated model system to provide design and calculation analysis tools for each major of planning and design. Green building design code requirements are based on inspection and review to ensure that all elements are controlled.

3.4 Structure of Green Building Design Review System

The BIM-based Green Building Design Review System aims to achieve the analysis of quantitative data. The system should include BIM integration data for all stages of architectural design and various disciplines, including geometric information and professional design information for building components and materials. There is logical information between various professions. The structure of the system includes three aspects: architectural design three-dimensional information BIM model, building data information analysis and processing, green building analysis data information visualization and expression. First, from the perspective of green building design, combined with the concept and norm of green building design, the BIM building information model is used as a data carrier to complete the storage, extraction, management and storage of green building planning and design, material use, energy consumption and other data analytical work. Combine the results of computational analysis to optimize various stages of building planning and design, optimize design and construction plans, and achieve efficient use of energy, resources and environmental protection. In the green building design, the BIM building information model can realize the integrated management of the relevant spatial data and functional information of the building space, and provide an important basis for the green building design. Secondly, based on the BIM-based 3D graphics platform, it can realize the extraction and calculation analysis of related data such as architectural design, structural system and material application, and complete the integration and unified management of various professional data. At the same time, we study the overall planning, design, structural system, building materials, HVAC system and other related data, do a good job in statistics and analysis, and combine the requirements of green building design to achieve optimal adjustment of the professional design. Thirdly, the BIM-based 3D graphics platform can realize the analysis of relevant building information through the 3D visualization model, realize the visual expression of the data results of each professional, and convey the analysis results to the designers through the form of chart images.

4. Application Effect of Green Building Design Review System Based on BIM

The green building design review system based on BIM technology can use a unified standard to describe the building information and realize effective information exchange. In actual application, it can also realize coordinated control of remote projects, which can effectively reduce design errors. And post-design change issues to reduce the security risk of information. Secondly, because BIM technology has the advantage of visualization, the BIM model can improve the accuracy of the design and realize the virtual construction of the whole project process. Secondly, using the characteristics of three-dimensional representation of BIM technology, the building structure and content are accurately expressed, and the design calculation details are obtained according to the BIM model. In addition, using the intuitive nature of BIM technology, the building's final construction results are known in advance, the BIM model is used to express the owner's expectations of the project, the design changes
are reduced, the cost due to the design change is reduced, and the BIM model can be used to carry out the cost accounting test, using its multi-dimensional characteristics to make the audit work more intuitive, in order to find and solve problems in a timely manner. In addition, BIM is used to make information more accurate. Every link of the construction project needs to manage a lot of content, and the application hardware and software facilities are different. In order to make the information transmission accurate and convenient, the model can be effectively transmitted, processed and saved by using BIM technology to avoid the software. Different brings information transfer and conversion problems. At the same time, the use of BIM technology can not only achieve the effective transmission of information, but also help the construction unit to express the demand to the design unit.

5. Application Practice of Green Building Design Review System Based on BIM
First, the application in planning design analysis and optimization. Combine the overall layout of the building plan, the site distribution and other information to analyze the economic and technical indicators in the planning plan, and find out and control the problems in energy resource utilization and regional environmental impact. Then optimize and improve the design according to the requirements of the green building design. Secondly, according to the domestic requirements for energy-saving design of green buildings, a three-dimensional visualization model of building energy consumption analysis based on BIM is established to realize the analysis of building energy consumption, and an energy consumption analysis model is established to complete the integration and integration of analysis result data. Management, through the visual simulation means to achieve energy-saving control in the design process. Third, the BIM-based green building design model data can be combined with the use of solar energy in green building design. The local sunshine conditions are calculated by means of simulation and simulation with reference to the sunshine data of various places, and the schemes related to shading and solar energy utilization are optimized. The solar energy that can be utilized is calculated by combining the comprehensive dynamic sunshine conditions of the building, and then design the optimization of solar energy collection and power generation is carried out to maximize the utilization of renewable energy. Fourth, the BIM-based building information model is used for indoor lighting and lighting analysis, and the analysis results are used for the optimization of indoor lighting design. Different lighting equipment consumes different energy, so it is necessary to analyze and simulate the three-dimensional illumination of the room, and then optimize the different lighting schemes in combination with the requirements of green building design. Fifthly, combined with the BIM building information model data, the evaluation and analysis of natural ventilation in the building, the establishment of ventilation evaluation standards, and then the integration of internal and external factors to complete the model establishment, transformation and analysis, the results of these analyses can be used as a visual dynamic simulation in. Sixth, analyze the green environment outside the building, such as collecting and analyzing data such as wind and sand fixation, soil erosion, toxic and harmful gas emissions, and noise emission, and then list the impact parameters and include them in the evaluation criteria. Seventh, the simulation analysis of the acoustic environment of the building is carried out, and the influence of the sound intensity on the built environment is calculated and visualized by the determination of the relationship between the number of sound lines and the number of sound intensities. Eighth, relevant to the collection and utilization of rainwater in the construction community, the database is established according to the local storm intensity coefficient and calculation formula, and the influence of different landforms on the runoff coefficient is calculated according to different rainwater harvesting methods, and the rainfall is calculated from the area of buildings, roads and green areas to make optimization adjustments.
6. Conclusion
In summary, the use of computer technology to build a BIM building information model, these building information data will affect the life cycle of the building. With the development of science and technology, the formation of three-dimensional graphics system makes the building information model data system more complete, can realize the sharing of graphics and other data between different professions, and realize the dynamic control of architectural design. In green building design, BIM-based data models can provide a basis for calculations and reviews of building plans, structural systems, building materials, energy consumption, and the environment. The use of visual technology to establish an evaluation and decision-making system can improve the utilization of non-renewable resources, achieve the goal of energy conservation and emission reduction, and reduce various construction pollution. That is to use the eco-environmental information technology to establish a green building design review system, which can achieve the goal of energy saving, environmental protection and ecological environment, and lay a technical foundation for the sustainable development of urban architecture.

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