

# *The Application of BIM Technology in the Construction Management of Green Building Projects*

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**Keywords:** Green building projects, Construction management, BIM technology, Application

**Abstract:** At present, the rapid development of China's economic construction has promoted the continuous development and progress of the construction industry, and at the same time, people have new development needs for the construction industry and begin to tend to develop in the direction of green buildings. In today's environment, the use of BIM technology is essential to achieve effective construction management of green building projects. How to effectively apply BIM technology to the construction management process of green building projects and realize the green ecological development of the construction industry requires in-depth exploration and practice by relevant personnel.

## 1. Introduction

At this stage, with the further deepening of China's urbanization construction process, the development scale and speed of the construction industry have been greatly improved, and green construction has become the focus of the current development of the construction industry, and BIM technology has played a pivotal role in the realization of this goal. The application of BIM technology in the construction management of green building projects can realize the rational allocation of resources, effectively avoid the waste of construction resources, make the construction process of the entire construction project more coordinated, and promote the smooth development of a series of construction operations and management of construction projects. To better realize the construction management of green building projects, it is necessary for construction units to have an in-depth and detailed understanding of BIM technology, and explore corresponding reasonable application methods, to give full play to the effectiveness of this technology in the construction management of green building projects.

## 2. The Concept of Construction Management of Green Building Projects

As far as China's previous construction project construction and management process are concerned, to obtain higher economic benefits, the construction unit does not hesitate to consume a lot of resources, which has caused serious harm to the ecological environment and led to the frequent occurrence of various ecological problems. As a result, more people are paying attention to green building projects. The so-called green building is a relatively advanced construction project

management concept, mainly to maintain balanced ecological development, reduce unnecessary waste of resources, and promote social harmony. Therefore, the relevant construction units must continue to reform and innovate their own green environmental protection concepts in the project construction process, actively introduce various advanced technologies, rationally plan and allocate the use of resources in the project construction process, strictly abide by the purpose of sustainable use of resources, and ensure that the construction management of green building projects has high scientificity and rationality, so as to better coordinate the relationship between construction and natural environment in the construction industry.<sup>[3]</sup>

### **3. Problems in the Construction Management of Green Building Projects**

#### **3.1 Construction Technology Lacks Rationality**

Comparing green building projects to traditional building projects, we can see that green building projects focus on the ecological effects that can be brought about by the construction project. However, in the long-term development process of China's construction industry, the implementation of green building projects is in its infancy, and there are great deficiencies in the construction technology and management process used, which hinders the realization of green building goals and reduces the management efficiency of the entire construction process.

#### **3.2 The Concept of Green Building Construction is not Effectively Implemented**

The concept of green building construction is a major goal pursued in the current development of the construction industry, which requires that while carrying out construction work, it is also necessary to pay attention to the protection of the natural ecological environment, and effectively implement the green environmental protection concept advocated by the state in the realization stage. However, in the actual construction process, most construction units blindly pursue their own economic benefits to maximize, regardless of the impact of construction activities on the environment, and do not carry out construction work in accordance with the construction concept of green buildings in a strict sense, which affects the harmonious development of man and nature.

#### **3.3 Focus on Surface Quality Greater than Actual Quality**

In recent years, with the vigorous implementation of the concept of green building construction in China, although more construction units have adopted this concept in the actual project construction, most of the implementation of this concept is more only on the surface, and does not really carry out green building construction. Some units pursue the uniqueness and aesthetics of the appearance of the construction project without considering its practicality and functionality, resulting in the design and construction of the entire construction project requiring a lot of resources, which is inconsistent with the concept of green building.<sup>[1]</sup>

### **4. The Practical Significance of BIM Technology in the Construction of Green Building Projects**

#### **4.1 Save Building Resources**

In the construction management process of green building projects, the use of BIM technology can help the construction unit select the best construction site in a short period of time, so that the construction site and scale of the construction project are more reasonable, which can not only meet

the expected requirements of project construction, but also reduce the energy consumption of all aspects of building as much as possible based on ensuring the construction quality.

#### **4.2 Save a Lot of Construction Materials**

In the process of green building project management, using BIM technology, the staff can establish relevant building models, to provide reliable and accurate reference materials for leaders more accurately, help them understand all aspects of the construction site, and improve the environmental protection construction and business efficiency in the construction work. If many green building materials are required during the construction of the project, it is necessary to increase the management of the construction site and improve the utilization efficiency of green building materials, to save the actual consumption of building materials in the construction process. For example, when purchasing construction materials, power companies usually purchase according to the bill of materials listed in the design drawings, and the use of BIM technology can better improve the accuracy of material purchase activities and avoid unnecessary waste.

#### **4.3 Promote the Lean Construction Process**

In the process of design, construction, operation and management of green building projects, the use of BIM technology can significantly improve the integrated management level of green buildings. In order to ensure the stable operation of the construction work of the green building project, it is necessary to discuss between the construction unit and the construction unit, and the construction unit can put forward some of its own effective opinions, introduce the new green environmental protection construction technology, and organically integrate various resources to reduce the loss of construction resources on the basis of ensuring the stable and normal operation of large-scale construction equipment.

#### **4.4 Improve the Efficiency of the Construction Industry**

In the construction of green building projects, construction units can also significantly improve the construction efficiency of construction projects through the effective use of BIM technology. For example, in the construction of construction projects, the use of BIM technology for design and appropriate strengthening of the planning of actual construction can ensure that the coordination and environmental protection of substation projects are fully and effectively played, and ensure that the personnel, materials and other aspects involved in engineering construction can be rationally configured. Green building projects have good energy saving and environmental protection performance, however, because the construction unit has not carried out comprehensive construction, it will have a greater impact on the construction progress. The construction unit can select the working materials with better energy-saving effect for construction according to the structural characteristics of the power grid engineering project. The application of BIM technology to the construction management of green building projects can not only effectively and fully improve the construction efficiency of construction projects, but also enable construction site managers and designers to further understand the use of various materials, to carry out more targeted schedule adjustment and control according to the progress of the construction site, and effectively improve the construction efficiency of green building projects. <sup>[2]</sup>

## **5. Construction Management Path of Green Building Project Based on BIM Technology**

### **5.1 Save the Use of Building Materials and Resources**

To reduce the pollution and impact of building materials on the atmospheric environment during the construction of construction projects, it is necessary to control the use of building materials and subsequent recycling and utilization. Specific methods include recycling and reusing building construction materials; Reasonably select material suppliers, and develop the best material transportation route scheme to avoid the material being damaged during transportation and cannot be used normally, and the transportation of materials also needs to pay attention to not affecting the regional environment through which the transportation process passes, so as to shorten the material transportation distance as the basic principle; Reduce the cost of recycling building materials, and try to choose renewable resources as construction materials; Use green materials and take corresponding material-saving management measures. Using BIM technology, the characteristics of building materials can be analyzed and compared in more depth and detail, to select the green building materials that best meet the construction needs of green building projects, and identify the component material information, and track and record the use and consumption of materials in real time.

### **5.2 Create a Material Analysis System**

The analysis of building materials is a core component of construction management for green building projects. The application of BIM technology in it can effectively improve the effectiveness of the material analysis results, avoid the lack of analysis results such as the performance of building materials, and lead to the impact on the construction progress of the project in the actual application process. In terms of appointment control for green building projects, BIM technology was used to analyze the application status of materials. By creating a BIM model, the construction unit can more clearly and accurately understand the internal storage of various building materials, types and application coordination, define the application functional characteristics of the building, and once it is found that there are problems that do not conform to the concept of energy conservation and environmental protection in the actual construction process, technical treatment is immediately taken to ensure that energy-saving materials can be used rationally and avoid problems in the construction schedule. At the same time, it is also necessary to improve the tracking and inspection of materials, and apply tracking and investigation methods in the progress control of green building projects to improve the inspection of construction materials.

### **5.3 Application in the Economical Use of Water Resources**

Nowadays, all parts of China have relatively complete hydrological data, through the review and analysis of hydrological data, and the organic combination with the model constructed by BIM technology, to establish a relatively complete database, which is conducive to the preliminary prediction of the hydrological conditions in the area where the construction project is located. According to the predicted results, formulate effective and reasonable water-saving plans, and strictly implement them in the actual construction process to ensure that water resources can be used more rationally during the construction process, reduce the waste of water resources, and achieve the goal of construction management of green building projects. Specifically, for the temporary water pipe network of the construction site, relevant software can be used to rationalize the layout, establish an effective water resource recovery system, realize the recovery and treatment of rainwater, construction water, etc., and use the treated water resources for equipment cleaning and site dust removal at the construction site. The water source in the catchment tank at the construction site should

also be rationally utilized, and it can be applied to concrete curing, greening watering water at the construction site, etc. In addition, at the construction site, it is also necessary to pay attention to the concept of water conservation, guide all construction personnel to form a water-saving concept, and implement this concept in every link of construction operations to truly achieve the green environmental protection goal of water conservation. <sup>[1]</sup>

#### **5.4 Adjustment of Progress Management Deviation Based on BIM Technology**

In the actual construction process of the construction project, the relevant personnel need to collect all aspects of the data information of the project construction from the construction site, import it into the project model in time, and compare and analyze it with the expected time schedule, so as to formulate the corresponding error correction mechanism. Through the use of BIM technology, a BIM model can be established for the project itself, and all construction operation participants can understand the current construction progress at the same time, thus effectively avoiding the asynchronous transmission of construction information between construction personnel. In the actual project construction process, if the resource allocation of green construction is not reasonable enough, or the construction change causes a large difference from the original construction plan, then the construction progress needs to be resumed. In the traditional project construction process, it takes a certain amount of time to coordinate the relationship between different construction tasks, resulting in greater complexity in construction schedule management, while the deviation adjustment work of progress management based on BIM technology can be more convenient and effective.

#### **5.5 Green Building Project Construction Process Management**

The BIM database needs to be updated with real-time feedback from the project construction site. First, collaborative sharing of project data: the core of project management is the need to obtain engineering data related to construction projects in a timely and accurate manner. Through BIM technology, construction data can be shared collaboratively among various units and management departments, and the corresponding data information can be selected according to the needs of their own work; Second, document production and material management: through the use of BIM technology, standardized, reasonable and complete construction organization engineering drawings can be produced more accurately and quickly, including design documents, construction schedules, construction network diagrams and deepened construction plans; Third, the BIM database can obtain the basic construction information of the construction project relatively quickly. Through the comparison of data such as segmented unit price, itemized price, plan and material consumption in the actual construction process, we can understand the operating profit and loss, water consumption, subcontracting unit price and other aspects of the construction process of the construction project, so as to understand the rationality of all aspects of construction costs and carry out refined management of project costs; Fourth, three-dimensional scanning: the use of three-dimensional laser scanner to scan and measure the main structure of the building, similar to the stereoscopic image drawn by 3D technology. The surveyor assembles the pictures of the building taken at the construction site into a panoramic image to measure the coordinate points, thereby reducing the number of measurement points and avoiding aerial survey operations. <sup>[3]</sup>

#### **5.6 Construction Quality Management**

If construction units want to improve the overall quality of building construction, they need to strengthen the management of the construction process and strictly control each construction link. BIM technology can analyze each construction link by establishing a model, find out the

inconsistencies between the expected design and the actual construction, and predict the potential safety hazards that may occur, to continuously optimize and adjust to avoid the occurrence of safety problems. At the same time, BIM technology can also estimate and master the actual construction situation, optimize the construction design and staffing through the data in the model, ensure that the advantages of each construction personnel are maximized, and compare the expected design with the actual site during the construction process and adjust better meet the architectural needs of the construction project.

## 6. Conclusions

In summary, with the expansion of the development scale of construction projects and the introduction of green building concepts, traditional building construction technologies can no longer meet the current project construction needs. As a new technology, the effective application of BIM technology in the construction management process of green building projects is of great significance to project construction, which can also achieve green construction while improving construction quality.

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