

Application Research of BIM Technology in Engineering Project Management

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Abstract

The application of BIM technology to engineering project management is the future trend. Based on this, the application status of BIM technology in engineering project management is introduced. Through the 3D data information and non-three-dimensional data information integration project in BIM model, the information collaboration, sharing integration and application among project participants in the whole life cycle are proposed. An effective strategy to further promote the application of BIM technology.

Keywords

BIM technology engineering project management application research.

1. Introduction

Since the reform and opening up, the development and progress of China's construction industry has made the information technology of construction engineering more and more updated, and also includes related technologies of engineering management [1]. The concept of BIM was derived from the idea that the United States proposed to improve efficiency in the entire industry in the shadow of the oil crisis in the late 20th century. The construction industry uses BIM technology with visual analysis and quantitative analysis, which will have unparalleled advantages in ensuring the quality, workload and efficiency of work and safe production. BIM technology can also implement responsibility and traceability. The responsibility is implemented to each member involved in the construction of the project.

2. BIM Technology Application Status at Home and Abroad

2.1. Status of Foreign BIM Technology Application

BIM technology began to be applied abroad first. It has also experienced more than 30 years from the proposal to the application. It is also used by several developed countries such as Singapore, the United Kingdom, and the United States to take the lead in its development. Relevant policy support, and then the starting point for enterprises to pursue high-efficiency work, has verified that BIM technology is the cutting-edge technology of the new generation engineering construction industry [2]. In 1995, Singapore developed and applied an information technology called Corenetit, which enables all participants in real estate development to communicate and share information with each other. As early as 2016, the UK required construction. The industry uses BIM and uses 3D-BIM simultaneously to informatize all documents in an information-based manner. In 2003, the United States implemented a 3D-4D-BIM program through its Public Building Services Office. The strategy to support and guide the behavior to ensure that the program can be completed, since then the United States began to use BIM technology in the construction industry and become mainstream[3].

2.2. Status of Domestic BIM Technology Application

From 2011 to now, the Ministry of Housing and Urban-Rural Development has successively proposed the "Outline for the Development of Construction Industry Informatization from 2011 to 2015", the "Guiding Opinions on Promoting the Application of Building Information Models" and the "Outline for the Development of Construction Industry Informatization from 2016 to 2020". Such documents, through administrative guidance, play a very good role in the implementation of BIM construction in all participating units in the construction industry, and will issue relevant national standards through policy opinions and other means.

3. Application of BIM Technology in Engineering Project Management

3.1. Construction Project Progress Management Based on BIM Technology

(1) Guide the preparation of construction progress

Management of schedule management by using task decomposition in BIM technology The completion of work procedures has the function of determining the context of construction tasks and the reasonable allocation of working hours, so that project managers can effectively and rationally arrange resources and configure them.

(2) Analysis and control of project schedule

According to the progress of the site, the actual deployment of on-site resources and personnel allocation in the background combined with the plan requirements for the progress analysis service. In the BIM platform, it is possible to compare the actual and planned progress differences in the project and the various situation comparisons on the site, so that it is easy to find the node status that may be harmful to the progress and solve the problem in time.

(3) Progress correction and post-evaluation

Project participants can share the visual data through the BIM system platform. When facing the project schedule deviation, they can discuss and propose corrective measures together, save a lot of content loss in the process time of information transmission, and improve the effectiveness of corrective measures. The BIM system platform can be used to fully assess the progress control capabilities, work coordination and productivity of all project participants after the project is completed.

3.2. BIM-Based Construction Project Cost Management

(1) Improve the accuracy of investment estimates

Compared with the previous calculation of cost through the earned value method, it is necessary to record the change of engineering quantity. The engineering data is obtained through BIM modeling as the basis of earned value analysis, and the actual progress of the project is grasped by using the data. With this function, cost control can be optimized by mastering the cost and schedule that must be recorded on site in the past.

(2) Application of the preferred scheme

Relevant research proves that the impact on the overall cost of the project is more than 75% in the decision-making stage of the project, but this stage tends to have the lowest cost. The use of BIM in the decision-making stage can easily estimate the cost and also compare the various indicators of the project, so as to obtain an optimized plan, which facilitates the adjustment and comparison of existing models to improve the effect of project comparison.

3.3. Quality Management of Construction Engineering Project Based on BIM Technology

(1) Complex node visualization

In the BIM platform, the complex nodes in the project can be visually displayed in three dimensions. For complex planes and sections, the three-position structure is predicted in advance [4]. Through the three-dimensional model, the technical information is integrated to integrate the complex information, and the supervision and acceptance are accepted.

(2) Integrate design changes and identify problems in time

Collision checks are performed in the BIM model to identify problems in the design drawings. For example, collision and reservation problems for pipes and holes, as well as problems found in BIM model collision checks and field investigations to prevent on-site rework from affecting progress.

(3) BIM model collision check

Use Navisworks to organize the required models, generate a report of the collision check, and check the place where the collision occurred in the report[5]. Deduct the places with interference, find the real collision and analyze the cause and extent, analyze the cause of the collision, check each drawing, check the collision results in Navisworks, and write a collision inspection report.

3.4. Application of BIM Based Technology in Engineering Construction

The 3D Building Information Model enables project managers to clearly understand the information presented by the building and the spatial patterns of the site[6]. Through BIM technology, it is also possible to scientifically and rationally arrange the site and plane in larger volume engineering. The construction site is rationally arranged in various areas, and scientifically and reasonably divided into areas such as office, living and construction sites, which can reduce the impact of secondary handling and interlacing, and facilitate the construction and entry and exit of vehicles, and use BIM technology to simulate construction. Facilitate project management personnel to intuitively simulate emergency situations, ensure construction safety and improve construction efficiency.

4. Strategies for Effectively Applying BIM Technology in Project Management

4.1. Building A Data Management Platform Based on BIM Technology

Modern engineering project management requires all participants to share information in a timely manner and work together to each other. This requires a tool that can connect all parties to improve the decision-making science and rationality of the project, so that the parties All of them can wait for all kinds of work delays caused by untimely information transmission, and build a shared data management platform on the project management platform in BIM technology to share information about project planning, decision making, construction and operation.

4.2. Establish An Evaluation Mechanism for BIM Technology Applications

The application of BIM in project management will influence the decision-making of participants and the overall benefits of the project. It is necessary to evaluate the use of BIM technology in the project. First, it is necessary to unify the application standards and data delivery processes in each link. Second, it is necessary to determine the functions of all parties. Third, it is necessary to collect the applied application evaluations in a timely manner. Fourth, it is necessary to timely optimize the application level of BIM in project management based on the evaluation results, so that it is more in line with its application purpose.

4.3. Strengthen the Whole Process Management

From the whole process of the project, quality, schedule and cost are management objectives, the project will be completed on time, and qualified to ensure more economic benefits to

improve the effectiveness of BIM technology. The project construction unit can use BIM technology to do the project bidding, change and completion and settlement, and use it to provide better solutions to the owners, in order to save costs in the later construction of the project to achieve better benefits for the enterprise[7].

5. Summary

Under the new economic normal, the development of the construction industry has both opportunities and challenges[8]. The advanced nature of construction engineering technology management is an inevitable requirement for ensuring the progress and quality of the project, and is also an inevitable way to improve the efficiency of the enterprise. The proposal and development of the building information management system will have a great impact on the technological progress of the engineering construction industry. The application of BIM technology can greatly improve the integration degree of engineering construction, promote the transformation of production methods in the engineering construction industry, improve the quality and efficiency of investment, design, construction, operation and maintenance, and improve the quality and efficiency of engineering construction. Improve the level of scientific decision making throughout the life of the project.

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