

Research on the Influence of BIM Technology on Engineering Project Management and Its Development Countermeasures in the New Period

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Abstract: Large-scale construction projects have occupied a large proportion in China's construction industry. Realizing the life cycle management of construction projects is the goal pursued by project management. The implementation of life-cycle management can more effectively control the various stages of project planning, implementation and operation to achieve the purpose of adding value to the project construction. However, as the scale of the building and the complexity of the building continue to increase, the construction period increases, the number of project participants is large, and the project management of many large projects is difficult to implement. The emergence of BIM technology brings new opportunities for the life cycle management of construction projects. This paper briefly introduces the characteristics of BIM technology and the impact of BIM technology on project management, and it mainly analyzes the application of BIM technology in project management, in order to improve the design level of the project and improve the construction efficiency and management level of the project.

1. Introduction

As the construction industry grows in size, traditional management methods and technologies are no longer able to meet the needs of increasingly complex architectural forms. This requires new technology references, making project management more sensible and improving project management efficiency. In order to meet the needs of the development of modern construction projects, combined with computer information technology, a technology that is more in line with the management of modern construction projects, namely BIM technology. BIM technology enables all participants in building project management to share and use the same building information model data on the same platform. This speeds up the informationization process in all aspects of construction project management, and greatly improves the efficiency of project management^[1].

2. BIM technology features

The use of traditional technology for engineering information management, generally in the engineering project information compilation, including the initial preparation of the engineering construction drawings and information processing after completion. Such information management

is a passively accepted and discontinuous management method, and it is impossible to achieve continuous management and control of engineering projects. In a large project, the information of each department must be communicated with each other. However, the traditional information management method does not solve this problem. We can often find engineering defects and blockages caused by information occlusion and unreality in engineering projects.

BIM technology is an information database formed by an N-dimensional model of a computer. It is reflected in all aspects of the engineering field, such as collision volume inspection, reduced rework, 3D rendering, promotional display, etc. For the irregular construction project construction requirements and construction technology, the invocation of massive information data, to meet the technical level of decision support, BIM technology has a unified information standard, and different participation methods can be changed and acquired at different stages. This achieves full sharing of engineering information. By creating all the information into the engineering data model, all discrete information flows are integrated, avoiding information inconsistencies and errors, and optimizing information management^[2].

3. The impact of BIM technology on project management

As a new project management tool, BIM technology brings great convenience to the construction, management, operation and post-maintenance of the project. People no longer need to blindly design or construct the project according to their own imagination.

3.1 Project life cycle

The life cycle of a construction project includes the decision-making phase, implementation phase, and use phase of the project, as shown in Table 1:

Table 1 Life cycle of construction projects

Life cycle of construction projects
DM-Development Management: macroscopic simulation analysis
PM-Project Management: all professions work together
FM-Facility Management: improve building life

First, in the decision-making stage: since the traditional CAD can only provide the traditional two-dimensional model, the macro-simulation analysis of the construction project is carried out accurately in the project decision-making stage, which leads to the construction of new buildings and surrounding buildings (underground pipe network). There was an inconsistency that caused the final project site to be biased. BIM+GIS can now be used to combine the surrounding building data provided by GIS with the new building data provided by BIM to rationally plan the layout of the city and underground pipe network^[3].

Second, the implementation phase: the traditional project management period is longer, and the list is easy to miss and miscalculate. Moreover, due to the need for multi-professional coordination in the project management implementation stage, due to the difficulty of coordination management, etc., some of the water and electric heating pipelines do not conform to the design elevation of the building structure. If the design is applied to the actual project, it is easy to repeat the work in the later stage and need to be re-adjusted on site to achieve the consistency of the plumbing line and the architectural design elevation. After the BIM technology is applied to the project management, the BIM technology can coordinate the cooperation of various professions in the early stage to optimize the design results and reduce the rework, lost work and material waste caused during the construction period.

Third, the use phase, operation and maintenance phase: after the development phase and the implementation phase, the project construction has been initially completed. There may be many problems left over from the previous period during the maintenance and use, which makes the maintenance and use in the later stage extremely difficult. The cost. Applying BIM technology to this stage can improve the service life of buildings and reduce the cost of operation and maintenance; and can update maintenance information in time to improve maintenance efficiency and avoid certain risks^[4].

3.2 Project implementation management objectives

In project management, its core tasks are mainly target control, including: investment control, schedule control, safety management, quality control, contract management, information management, organization and coordination.

After using BIM technology, we can control the implementation of each major from the design, control the BIM model technology in advance, and refine the engineering quantity. The construction enterprises use BIM technology to be mature, and a professional BIM team is established. After the project uses BIM technology, the construction, structure, MEP and other models can be established in time, and the collision inspection of pipelines can be carried out in time to avoid "secondary construction operations". The phenomenon. BIM5D technology is used to timely feedback the on-site problems through the system. The decision-makers timely implement the rectification tasks to the responsible person, and timely check and check the quality of the rectification. All processed and unprocessed quality problems are in BIM5D. With records, the company's leadership and owner managers can check the quality rectification in a timely manner. After using BIM technology, the construction work on the site can be fully monitored in real time, and the hidden dangers of safe construction can be checked in time. After using BIM technology, the technology manages the contract, avoids risks, clarifies the responsibilities of all parties, and reduces disputes and claims^[5].

4. Analysis on specific application of BIM technology in engineering project management

4.1 Application of BIM technology in architectural design

In the architectural design process, BIM technology first exerts its own unique advantages. It is not just a drawing tool, but a design concept. The designer uses the digital architectural entities and related components as design elements, and creates a virtual building model based on the corresponding family libraries and units, which can fully display the spatial geometric relationship and functional association between related elements. In the design process, the application of BIM is mainly reflected in the following four aspects: collaborative design, renderings, animation display, and constructability enhancement. BIM technology can realize collaborative design, and effective information exchange and transmission between different professionals can greatly improve the synergy and design efficiency of architectural design. Based on BIM technology, the participating parties can also participate in the design work, and the synergy of all parties is enhanced, thus reducing design errors and loopholes. At the same time, the abstract 2D building information can be processed by BIM series software to obtain a more intuitive and visual 3D model. It is convenient for professional engineers to understand the project, and also allows non-professionals such as owners to understand the relevant situation of the project.

4.2 Application of BIM technology in construction

The application of BIM technology in 3D collision inspection has been perfected. Before the construction, the construction designer used Navisworks software and Luban virtual collision software to complete the collision check of the civil works, pipelines and process equipment of the project. This can completely eliminate all kinds of hard and soft collision problems, and avoid errors and rework during construction. Figure 1 is a graph showing the results of collision inspection using a BIM technology in a building. When calculating the quantity and size of materials, the BIM model created provides direct access to information on a variety of materials, including material quantity, size, etc., and is consistent with the original design. At the same time, BIM technology can combine the 3D model of construction site and construction progress, increase the time dimension, and construct a 4D construction information model. Through the 4D construction model, you can keep track of the project construction process and judge whether the construction progress is lagging.

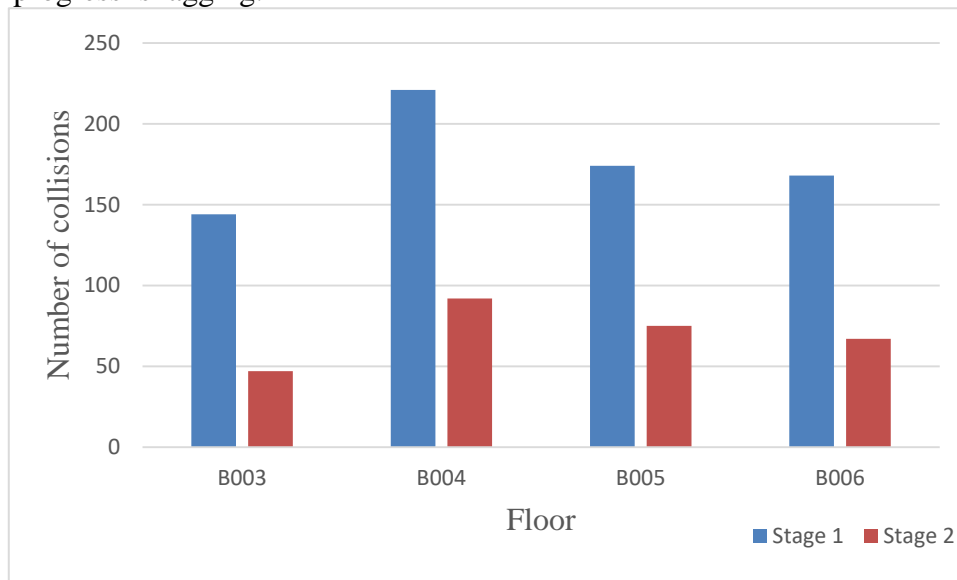


Figure 1 Collision check result data chart

5. Conclusions

As a product of the construction industry in the digital and information age, BIM technology will bring a second revolution to China's construction industry, and it will bring great changes to the implementation of project management. The use of BIM technology in the management of construction projects enables project participants such as construction units, design units, construction units, and supervision units to participate in construction projects to share all data of the same building information model on the same platform. The various levels of project management are more orderly. This is a scientific trend in the development of construction project management.

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