Research on the Refined Management of Engineering Cost in the Field of BIM Technology

Jiacheng Gong
NingboTech University, Ningbo 315100, China. E-mail: 879189660@qq.com

Abstract: With the development of the times, economy, technology and the requirements of the civil engineering industry in China have been improving constantly. In view of the low profit and high cost of the construction industry, BIM technology is used in the refined management of project cost to improve economic benefits. Based on this, the article introduces the concept of refined engineering cost management, discusses the problems in engineering cost refined management, and studies the feasibility of using BIM technology in engineering cost refined management.

Keywords: BIM Technology; Project Costs; Fine Management

1. Introduction

BIM technology integrates the construction information of each link of the construction project into the three-dimensional model information database through digital technology. According to the information provided by the database, the personnel of design unit, construction unit and supervision unit can optimize management, allocate resources scientifically and rationally, improve economic efficiency, and achieve sustainable development.

2. The deficiency in the fine control of construction project

2.1 Project participant data is not easy to determine

A construction project contains multiple links, numerous participating units, and a large amount of information. Data changes over time, making it difficult to share data in real time. At the same time, the design plan was not thoroughly reviewed at the initial stage. Many problems were not found before construction, and the difficulty of finely managing the project cost was greatly increased.

2.2 Inaccurate preliminary engineering estimates

In the early decision-making stage of the project, the project cost personnel cannot understand the project thoroughly due to the lack of professional talents and the information available in the early stage of the project. The low accuracy of preliminary project estimates will directly affect the accuracy of project decision-making, thereby increasing the company’s investment costs, increasing the difficulty of construction, and even rework.

2.3 No real-time engineering information processing

When compiling the engineering quantity list, the cost engineer needs to process a large amount of engineering...
data information. The information summarized is trivial and complicated. Besides, there are many types, and it is easy to miss the calculation. Manually processing engineering data and information not only takes a lot of time and is inefficient, but also affects the development of refined engineering cost management.

2.4 Imperfect engineering cost management

With the continuous development of economy, the requirements of engineering management technology are also constantly improving, and the cost budget based on drawings and two-dimensional software is no longer suitable for current engineering projects. In addition, many managers fail to update their management techniques in time, resulting in the inability to effectively carry out refined project management, and a series of problems such as confusion in cost management may occur, which affects the quality and progress of project construction.

3. Application of BIM technology in the fine management of project cost

3.1 Design phase

The design stage is the core link in the construction process of an engineering project. The accuracy of the design determines the construction schedule and overall quality of the project. If a two-dimensional CAD drawing method is used for design, misreading of drawing information may occur during the construction process, which hinders multi-party information exchange and is not conducive to the development of refined project cost management. Using BIM technology to build a three-dimensional model and analyze the data can discover problems that cannot be derived from traditional designs. It can also improve the accuracy of the design, ensure the integrity of information transmission, and effectively avoid the problems of change and rework caused by the design. In addition, the content of the project cost is complicated and trivial, and the amount of information is large. It takes a lot of time for multi-party communication and negotiation, low efficiency and easy to make mistakes. The use of BIM technology can predict the conflicts between different units in advance and provide effective solutions to ensure the smooth development of project cost work and effectively improve the efficiency of project construction\[^{[1-3]}\].

3.2 Decision-making stage

The accuracy of project decision-making will directly affect the rationality of the project cost and hinder the development of refined management of project cost. Using BIM technology, the feasibility of many solutions can be compared scientifically and reasonably, and the best investment solution can be selected. The data of the project participants will change from time to time, making manual processing difficult. Using BIM technology to integrate project information into a virtual three-dimensional information database, the changed information can be entered into the information database at any time for comprehensive and accurate analysis, and corresponding estimates can be made in time, effectively promoting the progress of the project. Compared with the manual estimation of the project cost, the project cost under BIM technology is more accurate, and the manual processing of intricate data will inevitably lead to missing or incorrect calculations, resulting in the project cost estimation is not accurate enough, the project cost estimation under BIM technology only needs input the required project information, you can quickly get accurate estimation results.

4. Bidding stage

In the project bidding stage, the tenderer can apply BIM technology to check the collision of the plan, verify the bill of quantities, and avoid problems such as errors or redundancy in the bill of quantities due to design. In addition, bidders can use BIM technology to build project engineering models, simulate construction plans, and directly show the effect of simulation to the bidder, and use technology to increase the quotation advantage. When selecting candidates for engineering projects, suitable candidates can be selected based on the quotation information provided by BIM, which greatly suspends the evaluation efficiency and ensures the rationality of candidate selection\[^{[4-7]}\].
5. Construction stage

The project cost refined management is carried out in the construction phase of the project through manpower. The longer the project management cycle, the longer the time. The influence of external factors will increase, and problems, such as the lack of funds for purchasing materials, are likely to occur. Apply BIM technology to integrate project information into a virtual three-dimensional model database, establish virtual project models, perform real-time dynamic data analysis, scientifically calculate project quantities and costs, find construction problems in time, and promote the development of refined project cost management. In addition, BIM technology can also simulate the process of picking materials, thereby reducing material waste or payment reduction and other problems, and improving the cost management level\(^8\)\(^{–}\)\(^10\).

6. Completion stage

The traditional manual completion settlement, comparing the construction list with the contract list, has a large amount of project information, a long time consuming, and low efficiency. The application of BIM technology comprehensively analyze the data can efficiently and accurately verify the information and ensure the accuracy of the refined management of the project cost.

7. Conclusion

With the continuous development of China’s economy, the requirements on the civil engineering industry are increasing. The traditional refined management of engineering costs has certain problems, which cannot well meet the requirements of the development of the times. The emergence of BIM technology can optimize the refined management of project cost. By integrating project information into a virtual three-dimensional model database, a virtual building model is established. The real-time monitoring of data, accurate estimation of cost results, cost control, and reduction of waste of human and material resources have improved the overall quality and level of project engineering.

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