

Research on Application of BIM Engineering Technology in Engineering Cost Management

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ABSTRACT

Economic development has driven the construction of infrastructure. The abundance of material life has increased people's demand for public facilities with different functions. With the increasing market demand for the construction industry, the construction industry has become an important component of the Chinese economy section. The project cost exists in the entire life cycle of the project, it determines the estimation, budget and settlement of the project, and it is of great significance to the smooth implementation of the project. With the continuous progress of society, the traditional engineering cost management level has been obviously insufficient. BIM engineering technology, the full name of Building Information Modeling, is building information modeling. The birth of this technology gives the engineering cost management a technical basis for forward development. This article briefly introduces the technical definition, characteristics and application of BIM technology in engineering cost management the study.

Keywords: *Infrastructure, BIM Engineering Technology, Project Costs*

1. CONCEPT FEATURES OF BIM TECHNOLOGY

1.1. Definition of BIM engineering technology

BIM (Building Information Modeling), building information model. Autodesk first proposed this concept in 2002. Its core is the use of digital technology to establish a three-dimensional virtual building model, which contains an engineering information database that is the same as reality. The information database contains the information database of the building from the beginning of its design to the end of its life. The information database contains the geometric status, material properties and various status information of the building materials. The highly integrated information body enables designers, construction parties and owners to effectively negotiate, communicate and operate in the decision-making, design, construction, and operation phases of the building. It improves work efficiency and greatly reduces budget costs. Quoting the definition of BIM in the US National BIM Standard (NBIMS), this definition consists of three parts:

- (1) BIM digitally expresses the physical and functional characteristics of the project;
- (2) BIM is a shared information resource library, and it integrates and shares all kinds of information about

this facility, so as to provide an effective and applicable basis for all plan planning of the facility from the decision-making stage to the entire life cycle of building demolition the process of;

- (3) In each stage of the project, different stakeholders use BIM to write, read, update, and modify the information in the information database to support and reflect the collaborative work of their respective duties.

1.2. BIM technical characteristics

1.2.1. Visibility

All the engineering information of the building is highly integrated on a virtual three-dimensional model, so that the construction party and the designer can have a very clear understanding of the overall appearance of the building. Traditional drawing construction not only requires the designer to have high requirements, but also requires the construction party to have an accurate understanding of the drawings. For some systems with relatively simple structures and not complicated functions, the construction and design personnel can also respond well. However, if the design and construction of some large and complex buildings are carried out, the drawing construction will bring great challenges to the designer and construction. The virtual three-dimensional building model constructed by BIM

engineering technology allows the various information of the building to be displayed intuitively and clearly in front of people. It is very easy for designers to modify the various structures of the building. They say that they have a clear understanding of the actual shape of the building, which is conducive to the smooth construction of the building.



Figure 1. Convert plan drawings into 3D models.

1.2.2. Coordination

BIM technology runs through all links of the entire project, and all kinds of information about the project can be obtained in time by the designer, construction party and owner. The synchronization of information makes communication and negotiation between parties simple and easy, and it is more traditional to use manual to achieve communication between parties. BIM is more efficient and more applicable.

1.2.3. Simulation

A very important function of BIM technology is the simulation of engineering. Not only the simulation of the building model, but also the simulation of reality. By simulating and deriving data for some things that happen in the building, such as lighting, water supply, emergency evacuation, fire prevention and power failure, etc., it can effectively formulate a reasonable construction plan and reduce budget costs. It can carry out some emergency simulation exercises during the construction operation stage, and effectively obtain emergency handling methods.

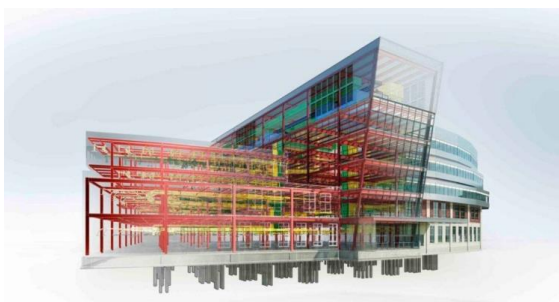


Figure 2. Really simulate the internal structure of the building.

1.2.4. Optimization

The information database provided by BIM technology can integrate and analyze a large amount of engineering information, and designers can optimize the structure and function of the building well. The various tools supporting BIM can make the optimization of designers easier and faster, even for some complex large-scale projects, it can easily get the best optimization scheme with the help of scientific tools.

2. INSUFFICIENCY OF PROJECT COST

2.1. The cost control link is out of touch

Segment management is the management mode adopted by the investment management of most infrastructure projects. Therefore, project estimates, budgets, and settlements are also prepared in segments. The design unit does not participate in the settlement, and is generally only responsible for the construction drawing budget and design budget. This situation has caused the phenomenon of disconnection in investment control. The upgrading of various new construction equipment and building materials, the continuous fluctuation of product prices, and the disconnection of investment control and the lagging quota, make the project settlement always exceed the project budget after the completion of the project. If the designer does not know enough information about various construction projects and does not investigate the cost of various projects, then the same problems will continue to appear. Therefore, it must complete the collection of various necessary data in the decision-making stage, and have enough information to plan the project. The budget estimator also needs to collect enough information to make the investment forecast of the project.

2.2. Concept of cost management

The management of an engineering project attaches great importance to the quality and progress of the project construction, but the engineering cost management only pays attention to the contract price, final cost and change cost during the project construction, but it often pays attention to the project cost management during the early stage of the project decision and design. Not paying enough attention. Most project cost management personnel only consider the construction cost at the completion stage of the project's cost estimation, but they have not conducted a systematic study on the management and maintenance cost after project operation. Project cost management is a profession that runs through the complete life cycle of project engineering

decision-making, design, construction and operation. Performing full-cycle cost management can help reduce the overall cost of the project.

2.3. Market environment

Most of the current project pricing is based on the bill of quantities. However, some construction units and owners are not clear about the risks of the project itself, and are uncertain about the possibility of market changes. Even the government bidding agencies Somewhat at a loss. To implement bill of quantities pricing, they must master a large amount of market information, and the construction unit needs to have professional information gathering talents and a professional platform, and use the large amount of information to study the best project price. However, there is still no unified standard to organize the data of the built projects. The disconnection of the information of all parties in the project makes the budget and the final account very different.

3. APPLICATION OF BIM ENGINEERING TECHNOLOGY IN ENGINEERING COST MANAGEMENT

3.1. Decision stage

Decision-making is the basis of the entire project cost. A good plan requires a lot of argumentation and discussion to prove its scientificity and applicability. The information integration and information analysis capabilities of BIM enable decision makers to plan several plans while effectively using the information they have, and find the optimal solution for the project plan. The economic cost of the project is a key factor that needs to be considered in the project cost. The application of BIM technology enables decision makers to find effective data information in the information database, and to reasonably and effectively perform a series of factors such as manpower and building materials for the project. Screening, which greatly reduces the economic cost of the project. Its powerful information and data analysis capabilities greatly improve work efficiency and speed up the decision-making process.

3.2. Design phase

BIM's architectural model construction capabilities can enable designers to observe the overall shape of the designed building in advance, which is beneficial to designers to modify local details of the building and optimize the overall building, avoiding serious structural problems after the completion of the building. In addition, the realistic virtual

three-dimensional model and powerful information database can enable designers to choose the most cost-effective building materials, allowing them to plan more reasonable structure, and more applicable, more beautiful, and more economical engineering projects. The realistic virtual model can also enable the investor to have an intuitive understanding of the project as a whole, which is conducive to the communication of information between the two parties and the investor's own design opinions.

3.3. Construction stage

BIM's powerful reality simulation function allows the construction party to simulate the construction process by computer, and then find the design defects, allowing them to plan a better construction plan. Every midway change of the construction plan will increase the construction cost of the project and greatly delay the completion date. Finding design flaws in time and planning a better construction plan will greatly reduce the construction cost of the project and speed up the project progress. BIM technology can also monitor the operation of each department of the project in real time, which is conducive to the overall planning of the actions of each department and effectively guarantees the progress of the project.

3.4. Operation phase

The life cycle of the project does not end with the completion of the project, but also includes subsequent operations and maintenance. From the beginning of the design, the subsequent operation and maintenance have been considered. It uses the simulation function of BIM technology to simulate the real events that may occur in the building, so as to improve the function of the building structure and avoid unreasonable building structure. The operation and maintenance caused unnecessary trouble. The simulation of emergencies such as power outages, water outages, fires, earthquakes and other emergencies can enable operators to reasonably plan effective treatment plans before the incidents occur, and provide convenience for subsequent management.



Figure 3. The application of BIM technology as a whole.

4. CONCLUSION

Compared with traditional engineering cost management, BIM engineering technology has powerful information integration and analysis technology, realistic three-dimensional model construction, and realistic event simulation functions. It greatly improves the efficiency of engineering cost management, the development of cost plans is also more reasonable. The extensive application of BIM technology in project cost management is the development trend of today's construction industry, and the application of its functions is interspersed throughout the life cycle of the project. The introduction of BIM technology makes the estimation of project cost more accurate, which increases the economic benefits of enterprises and strengthens their competitiveness in the market. China should invest more funds and talents in BIM technology, and increase the research on BIM technology, which will help the development of Chinese construction industry, and it can have a considerable gain in Chinese economic construction.

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