DOI:10.18686/ahe.v7i25.10108

Application of BIM Technology in Whole Process Engineering Cost Control

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Abstract: With the rapid development of construction technology and big data information technology, the application of BIM technology has broad prospects and plays a certain role in the management of engineering projects. Based on BIM technology, this paper applies BIM technology to the project cost control in the decision-making stage, design stage, bidding stage, construction stage and completion acceptance stage, so as to save the cost, improve the cost management level, and effectively realize the whole process of engineering cost control.

Keywords: BIM; Building model informatization; Engineering cost control

1. Connotation

1.1 The connotation of BIM technology

BIM is a shared database that includes all the information including the whole life cycle of the engineering construction project. Different participants of the project can use BIM to work together under their respective responsibilities. From the perspective of results, BIM can be understood as a Building information model, which inherits the information of the whole life cycle of the project construction;While from the perspective of process, BIM can be regarded as building information modeling, which continuously inputs information throughout the whole project to realize the modeling of building information, thus providing strong decision-making basis for the construction project.

1.2 Engineering cost control

Engineering cost control is within the approved Engineering cost limit, to determine, control, supervise and manage all the construction costs required before the feasibility study, investment decision, design and construction to the completion and delivery, to correct the deviation at any time and ensure the realization of the project investment target, so as to use the human, material and financial resources reasonably in each construction project and obtain better investment benefit, finally, the final accounts of the completion of control in the approved budgetary estimate.

The engineering cost control mainly includes two aspects: First, the reasonable determination of the project cost. The reasonable determination of project cost in each stage of construction project includes investment estimate, budgetary estimate, construction documents estimate, tender control price and bid price, project settlement and final accounts. Second, the effective management of

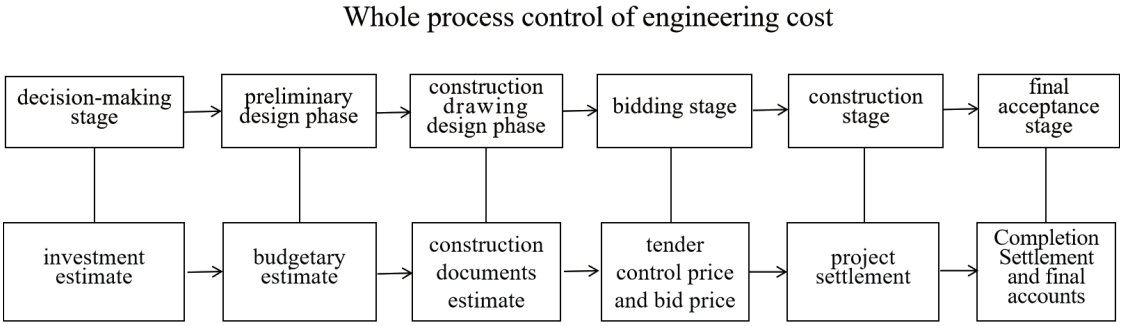

Figure 1 Whole-process engineering cost control

the project cost. On the basis of improving construction environment and design scheme, the total environmental construction cost is gradually controlled within a reasonable range by adopting corresponding measures, so as to ensure that the different stages of the project can be reasonably controlled.

As shown in Figure 1 is the whole process control of engineering cost.

2. The application advantage of BIM technology in the whole process of engineering cost control

2.1 Build a model

2D drawing can be transformed into 3D model by Revit software. Revit model can set the parameters of each component, which is convenient for data updating. Based on the 3D model, the engineering quantity can be calculated and the engineering quantity list can be formed by using the series of Glodon software. The project cost is calculated by using the pricing platform, and the project cost is effectively managed in each stage of the project. By using BIM5D technology, cost and schedule can be related to 3D model, and real-time data can be updated, which is more conducive to project cost control.

2.2 Consolidate resources

Based on BIM software there are various regions to choose from, integrated not through the region, time of the material price, and at the same time in the three-dimensional model based on the construction, be able to coordinate with schedule, cost, quality, contract, materials and other information integration, adjust the work of various departments to ensure the construction period and quality, but also timely adjust the resources of various materials and modify costs, effectively control the cost of all stages of the project.

2.3 Dynamically management

BIM technology can be used to simulate collision, generate collision report and analyze the cause of collision, which can help solve problems in time with professional design of building structure, building water supply and drainage , electrical equipment, etc. Through the integration and sharing of various resources, the actual progress can be compared with the planned progress in the construction process, the deviation can be found in time, the causes of the deviation can be analyzed, and the correction measures can be put forward in time. At the same time, the deviation of the cost can be corrected in time, so as to realize the management mode of real-time monitoring and dynamic adjustment, and improve the management level of the project cost.

3. Application analysis of BIM technology in the whole process of engineering cost control

3.1 Application of BIM technology in decision-making stage

In the early stage of project construction, it is necessary to control the project cost and estimate the investment.Investment estimation is to meet the needs of quota design, while ensuring the necessary accuracy. If the error is too large, it will lead to mistakes in decision-making. Therefore, accurate and comprehensive estimation of the project cost plays an important role in the pre-planning stage of the project. Starting from the planning stage, the visualization and simulation characteristics of BIM technology are utilized to create the proposed engineering model with BIM software, on which the engineering quantity can be calculated and the construction simulation analysis can be carried out. Using BIM cost index database query corresponding indicators of investment estimation. In the project investment decision-making process, the three-dimensional modeling is completed to calculate the project quantity, query and use the investment estimation index, and then edit the investment estimation file, so as to improve the estimation accuracy to the greatest extent, and provide reference for the subsequent design and construction cost management[1].

3.2 Application of BIM technology in design stage

According to the design documents and construction design drawings, the 3D model can be constructed. The 3D model has strong visualization characteristics, and its display effect allows engineering managers to understand the design effect of the building at a glance, and import project related data into the model. It simulates collision inspection from three stereo models, finds out collision problems, analyzes collision problems, and realizes the collaborative management of building structures, water supply and drainage, electrical equipment, etc., which greatly reduces the cost investment and improves work efficiency. In the preliminary design phase, BIM related software can be used to calculate engineering quantities and prepare budgetary estimate. Using BIM software in construction drawing design phase to complete construction documents estimate, with the aid of BIM database of similar project data indicators to compare, so from the perspective of economy, optimize the design phase of the cost data.

3.3 Application of BIM technology in bidding stage

BIM technology to the tendering and bidding process of the project cost control to provide effective data support, according to the BIM model, the engineering quantity is calculated and analyzed strictly in accordance with the list items, and the engineering quantity is obtained. The comprehensive unit price is scientifically calculated, and a series of work such as the project valuation is completed by using the list item standards, fixed consumption and cost standards of the cloud pricing platform. For the tenderer, can be completed with high efficiency of the tender control price, improve the effectiveness of the tender control price. for the bidder, according to the tenderer provides the bill of quantities, using BIM to calculate and review quantities, preparation and analysis the bid offer, and the selection of bidding strategy, so not only can enhance the competitiveness of the bid price, but also can enhance the level of work.

3.4 Application of BIM technology in construction stage

The building phase of the project is generally a long period, involving more participants, the process is complex, and there may change design and market price, Therefore, we must control the project cost, strictly make a settlement of construction costs, and ensure the turnover of funds and the achievement of economic benefits. Based on BIM model, related progress data and cost data, according to the actual progress of the actual cost analysis, the contract price, cost budget, actual costs to make comparative analysis, timely find problems, find out the reasons for deviation, formulate corresponding measures, while adjusting the construction schedule, to achieve dynamic management.

3.5 Application of BIM technology in final acceptance stage

After the completion of the project, the employer and the contractor shall settle the settlement of the project in accordance with the agreed contract price, contract price adjustment and claims. In final acceptance stage, based on the BIM model and the related progress, cost, contract, quality, materials and other information, real-time update, can calculate the change, deviation, claim, material price difference adjustment and other project payment adjustment items occurred in the process of contract performance, effectively determine the completion and settlement of the project cost. At the same time, the participants can realize the sharing of resources and ensure that the participants master the actual progress, quality and engineering cost information of the project, which shortens the preparation time in the early stage of final acceptance. In addition, with the help of BIM technology, the verification efficiency of the project quantity and the cost audit in final acceptance stage can be directly improved.

4. Summary

With the continuous development of the construction industry, BIM technology is also improving, which plays an important role for construction industry. If BIM technology is applied to the project investment decision stage, design stage, bidding stage, construction stage and final acceptance stage, it will strengthen exchanges and coordination between the parties involved, effectively give full play to the advantages of BIM technology, and improve the level of engineering cost management.

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