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THE APPLICATION OF BIM TECHOLOGY IN CONSTRUCTION ENGINEERING COST MANAGEMENT

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Abstract: In the information age, BIM modeling technology has become an indispensable part of construction engineering. At this stage, the combination of BIM technology and engineering cost management is the main problem of construction engineering cost management reform; this article mainly conducts BIM technology The concept definition and characteristics are analyzed, and the status quo analysis based on China-Belarus project cost management is carried out, so as to propose a relatively suitable application strategy of construction engineering BIM technology in cost management to promote the development of construction engineering information model cost management.
Keywords: construction engineering, BIM technology, cost management

INTRODUCTION

With the development of the times, the 21st century has entered the era of digital information. For the rapid development of the construction industry, BIM technology has basically penetrated every aspect of construction project in the past five years. It stores the actual construction project information in the virtual model, and then realizes the virtual construction, construction simulation, operation and maintenance management of the construction project in the computer. It is a visual digital construction method. With the advent of the era of big data, construction projects are less dependent on engineers' accumulated experience data. Two-dimensional drawings to guide construction and traditional paper data storage are gradually replaced. In order to promote the healthy and sustainable development of the construction industry, BIM technology has been gradually used In all stages of the project, the application of BIM technology to construction project cost management can not only improve the overall cost management efficiency and quality, but also add impetus to the improvement of the economic benefits of construction enterprises.

RESULTS AND THEIR DISCUSSION

1 Definition and use of BIM technology

BIM is both a technology and a process, which can comprehensively collect the building operation process and related information content, and then present it in a digital form. It is a new form of intelligent technical management, mainly used in construction engineering design and cost management, and is generally based on model construction in construction engineering information management. BIM technology can effectively integrate the various parts of the construction project cost, and at the same time use three-dimensional technology to design the corresponding data information of the construction project to meet the needs of smart construction projects.

BIM technology can realize the diversification and three-dimensional representation of architectural effects. This technology can integrate various project information of construction projects, and then construct a three-dimensional model, which can be visualized by means of simulation

216

technology [1]. BIM technology has many characteristics such as information perfection, information unity, visualization, and simulation. Information perfection is mainly reflected in the comprehensive description of engineering information; visualization features play a greater role in construction engineering, such as construction drawings and component information. It can continue to be fully expressed. In addition, BIM technology can also enable the communication and communication during the design and construction of the project to be carried out in a visual state. In addition: ① BIM technology uses intelligent digital technology to reveal the difficulties of construction projects, making it easier for enterprise engineers to study them. ②BIM technology can also realize the sharing of a large amount of resources, which can meet the needs of personnel in different departments of engineering enterprises to extract data, so as to ensure that the engineering cost data mastered by internal personnel of engineering enterprises is unified. ③BIM technology can realize the data storage function and provide technical support for the later management of the cost of smart construction projects [2].

2 The core technology of BIM

BIM stands for building information model, a model that emphasizes the integration of relevant information about the entire life cycle of project construction, that is, on the basis of the three-dimensional model (3D), the construction period dimension can be added to form a 4D model, and the integrated cost dimension information can build a 5D model and even The effect of the ND model is ultimately achieved by the model for information interaction and collaborative work. [3] Its technical core lies in three-dimensional observable, parametric modeling, and collision checking.

2.1 Parametric modeling

There are obvious differences between BIM parametric modeling methods and traditional CAD software modeling. The key content of BIM modeling is parameters. By creating specific graphic elements, the relationship between all components in the model is defined. However, the use of CAD software for modeling operations uses the coordinate geometry to complete the creation of graphic elements. In the BIM model, graphical elements can be displayed in the form of components, and at the same time, relevant parameters can be adjusted reasonably, and the differences between components can be expressed intuitively.

2.2 Three-dimensional observable

With the help of BIM technology, a three-dimensional model of the building can be established, so that people can intuitively see the overall appearance and renderings of the building, and show the design plan. The use of BIM technology enables people to understand the designer's design concepts and ideas. In addition, use BIM technology can also obtain the data information of all aspects of the project, and carry out certain communication and integration, and realize visualization in both the modeling process and modeling results, so enterprises can use the visualization function of BIM modeling for engineering design and editing. And decision-making and other work.

2.3 Collision check

In the design stage of a project, the collision check function is used more often, mainly to check whether the component design of each specialty is reasonable. Avoid conflicts in the subsequent construction phase. Use collision checking software to closely link the BIM models of each profession, and then carry out collision inspection with other professions at the size and space level, and discover and solve potential problems in time. In addition, the use of BIM technology can also realize the coordination and coordination of engineering underground drainage facilities, elevator shaft design and other designs, and facilitate subsequent design modifications and adjustments [4]. The collision check is shown in Figure 1:
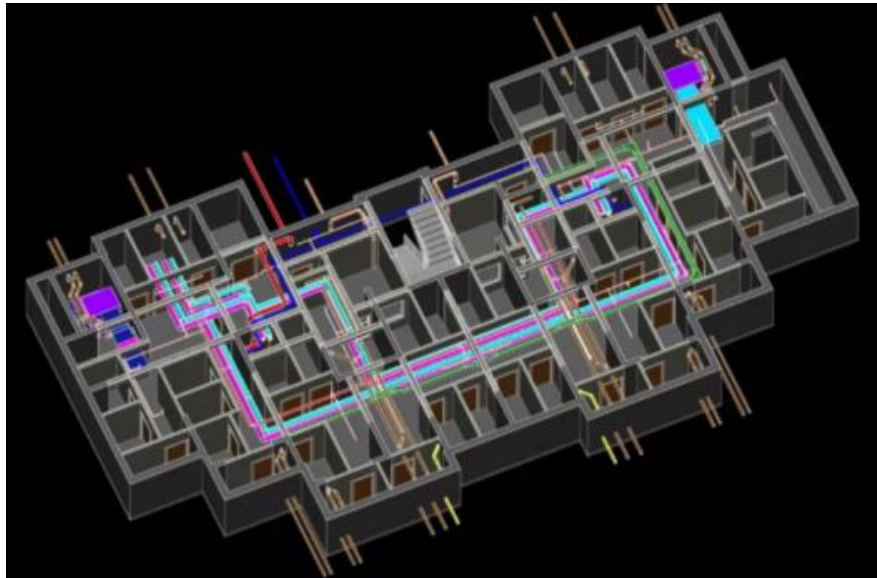
Figure 1

3 Status Quo of China-Belarus BIM Technology Cost Management

3.1 Analysis of the status quo of the application of BIM technology cost management in China

Stage China construction engineering the whole process of cost management mode , is the construction cost of the whole process of project decision-making stage to the final acceptance of the project to determine the reasonable and effective control , the use of fixed pricing and bill of quantities coexistence of the whole process of cost management. Fixed pricing method is mainly calculated fixed amount of engineering projects, referring again to the provincial construction administrative department issued labor costs , material material costs , machinery use fee pricing information and market prices over the same period, to obtain direct costs; indirect costs is then calculated based on the rates , Profits and taxes; final summary to determine the base price or bid quotation. The pricing method of the project quantity list is that the tenderer himself or entrusts a qualified cost consulting company to prepare a project quantity list reflecting the consumption of the project entity and measure consumption, and provide it to the bidder as part of the bidding documents, and the bidder will base it on the project quantity list. Pricing method of independent quotation.

Due to the large number of engineering cost management agencies, multiple quotas, large amounts of data, and inconsistent lists, data cannot be directly shared. It is difficult for various units and government departments to coordinate and communicate with each other, and it is impossible to share engineering information in the market. Although the government adopts a combination of dynamic and static cost management methods, because of the different levels of economic development in various regions, the calculation rules of the project volume are also different, and the average social cost and average labor efficiency of the project budget quota and consumption indicators in the region are also different. It is the same, although the market price is dynamically adjusted in stages, or the guide price is issued monthly or quarterly, the guide adjustment coefficient is announced regularly or irregularly, and the list of project cost quotas is compiled, reviewed, and determined. However, due to the fast update of the price of construction materials and the obvious data lag, the published price guidance list still cannot provide accurate information for the project cost budget.

In the CAD era of construction engineering, China has already used computer pricing software " Shen Ji Miao Suan、Xing An De Li ", etc. Although this software can directly set quotas and calculate the cost, the engineering quantity statistics still need to be completed manually, and the cost personnel cannot really count the engineering quantity Freed from the heavy work. The statistics of some engineering quantities and the calculation of grooves still require manual calculations, and modern large-scale construction projects are becoming more and more complicated, and there is an urgent need for

218

three-dimensional calculation software to cope with the development of the construction industry. With the introduction of BIM technology, China has also carried out application innovations in cost management, making full use of BIM technology to manage the whole process of cost. Use Glodon, Luban, THS Siweier and other software to establish the BIM-3 D model, and provide the data required for cost management according to the construction dynamics, and use the database and the cost index library to realize the sharing of cost data. Then import the construction model into Glodon software to set the engineering quantity calculation rules and quota list, realize automatic calculation and automatic deduction functions according to the BIM-5D technology platform, efficiently calculate the cost and reasonably formulate the construction project schedule, budget, and resources The whole process of cost management realizes refined cost control.

3.2 Analysis of the status quo of the application of BIM technology cost management in Belarus

Belarus Academy of Sciences Golubov, O.S. in the current BIM technology in Belarus cost application management expressed the information technology, design automation, is a symbol of science and practice of cost management cost of construction. Construction cost management is based on a pricing system, which is based on resource consumption standards and so on. Belarusian construction cost measurement includes material and labor costs, project management, winter construction costs, fixed asset depreciation fees, taxes, etc. The cost management plan is usually implemented in a "top-down" and "bottom-up" approach. "Top-down" cost management is based on the prescriptive setting of contract prices, and according to budget constraints and the contractor's certain types of work and planned costs, it will be allocated to each project. Project cost planning using a "bottom-up" approach is a typical method of estimating a price system. It is based on calculating the cost of performing each individual work type. This calculation is too cumbersome and does not occupy an advantage over the visual management of the whole process of BIM technology cost.

At this stage, Belarus mainly uses «Помощник инженера-сметчика» to budget for construction projects . This software is mainly used to estimate the cost of complex building construction, provide document support for construction projects, consider the cost and quantity of construction projects, etc.; it is not a set of 3D visualization software system, it is only a software developed for construction cost , There are only cost estimation and price measurement. Compared with BIM, the architectural model is more complete. It lacks modeling, information database platform and the whole process management of BIM-5D technical cost.

Russian Academy of Science Leonovich S.N. to use BIM computing architecture life cycle proposed digital model, elaborated 3D modeling, 5D whole process cost control management. It also shows that the Belarusian structural design, drawing design, etc. have basically used the BIM modeling era, and CAD-based 2D graphic design drawings are gradually eliminated, but there is still some time for the whole process management of the project cost, the full realization of BIM visualization and 5D whole process management. Distance and cash are only conceptualized and proposed models, and it takes a lot of time to popularize the technology and make it practical on site. Therefore, the whole-process management stage of the Belarusian BIM technology cost is still in its infancy. It lacks both professional leading talents and phased production and application on site.

4 Application of BIM technology in construction engineering in cost management

4.1 Application advantages of BIM technology in cost management

The BIM technology database platform can effectively coordinate the government, design units, construction units, construction units and many other interested parties, so that they can reach a unified multi-party coordination platform. Realize the efficient sharing of project cost information, ensure the timely update of the statistics of the engineering quantity pricing rules and the quota list, scientifically and rationally allocate the project cost resources, and ensure the accuracy of the construction project cost results.

BIM model establishment and model collision checking of architectural design can effectively reduce the conflicts of cross-structure parts, facilitate timely adjustment of the architectural model, and

improve the accuracy of its construction engineering volume. Then use the 3D Boolean calculation method, scientifically and rationally use the list and quota data in the BIM database to exchange and share electronic documents, thereby effectively improving the accuracy and efficiency of the calculation, and solving the isolation of the calculation data at each stage of the project cost process. problem.

In the actual application process of BIM technology, through the establishment of three-dimensional models and costs, it can monitor and manage project-related activity information in real time, rationally allocate personnel, funds and building materials, etc., and improve the management efficiency and quality of project cost. [6] At the same time, according to the BIM-5D technology, the organic integration of each module component is dynamically managed in the construction project cost, and the time dimension and cost dimension are added to manage the whole process of the construction project cost, which can effectively improve the level of resource planning management.

4.2 Discussion on the application of BIM technology in cost management

In the application of investment estimation, BIM technology has great advantages in the collection and use of information and data. It can not only perform a complete analysis, but also can be well imported into the model database, which can provide a true and reliable reference for cost management. The amount of engineering. In the process of investment estimation, BIM technology analyzes historical data and information materials more thoroughly and comprehensively. The construction unit can also quickly screen out the required personnel, materials, machines, taxes and fees on the historical database according to the specific types and characteristics of the project. Cost estimation, set into the real-time quota of the BIM database platform, accurately and quickly complete the project cost of the investment stage, and achieve the investment estimation target earlier.

Discussion on the application of cost estimation. The use of BIM-3D-5D technology makes construction cost estimation much higher than CAD-2D era cost estimation data processing, basically getting rid of the era of manual auxiliary estimation, and the whole line has entered the era of functional cost estimation. BIM 3D technology combined with the use of Glodon's calculations, trenches, earthwork, and steel reinforcement measurement, which were originally inaccurately measured sub-items, can now be fully used to generate automated calculation results using 3D-5D technology, which not only reduces manual calculations Costs can also improve its work efficiency and achieve accurate university calculations.

Discussion on the application of construction schedule simulation control, BIM-5D can provide accurate image schedule, material consumption, process measurement, cost accounting and other core data for technology, production, business and other links in the construction process; effectively solve the cumbersome engineering volume It is possible to settle the project quantity in a more timely manner, and to prepare the material procurement plan and capital plan according to the actual situation of the project. At the same time, it can also comprehensively check the related problems of the cost estimation, update the early engineering data in time, and propose an optimization plan to promote The goal of the whole process management of project cost has been achieved.

In the discussion of the application in completion settlement, the overall project cost information can be stored through the BIM model and imported into its database platform. Along with the settlement of project unit projects and individual projects, the construction progress information, labor costs, mechanical shifts and material costs of each stage will be continuously updated in the database to produce the best solution to ensure that the overall cost of funds is reasonable The arrangement and operation of the project, and improve the accuracy of the total settlement of the completion of the construction project, save the cost of funds, and lower than the total cost of the budget.

CONCLUSION

The optimization and accuracy of cost management in the whole process of construction projects are inseparable from the use of BIM technology. In carrying out construction project cost management, BIM databases and modeling systems can provide accurate information and data resource support for

cost management. 2D-5D The conversion not only improves the level of refinement of project cost management, but also meets the controllable requirements of various units for project cost. While performing management on the effectiveness, accuracy, enforceability, and efficiency of the project cost, it must also be implemented at the root, promptly discovering the problems existing in all aspects of the project cost management process, and optimizing the management of BIM technology, so as to improve Quickly and better enter the era of comprehensive and accurate cost management of information technology.

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