

Research on the Application of BIM Technology in Construction Projects

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Abstract: The full name of BIM is building information modeling technology, which covers geometry, spatial relations, geographic information systems, the nature and quantity of various building components. Applying BIM to construction projects can accurately demonstrate the whole process of application of engineering projects. At present, with the continuous development of science and technology, BIM technology has been widely used in the field of construction engineering. Compared to traditional design methods, BIM technology can solve many problems, for example, the use of BIM technology can optimize the construction scheme and strengthen process control, so as to effectively improve the project quality, which is of great significance for the development of construction engineering in our country. This paper studies the application of BIM technology in construction projects, analyzes the connotation of new technical means, and combines its application advantages to explore effective application strategies from several stages of decision-making, investment, bidding, construction and acceptance.

1. Introduction

Combined with the actual analysis, BIM technology is an information inheritance technology model, which can essentially change the previous working method of project construction with drawings in the practical application process, so as to ensure the progress of the project, significantly improve the quality and efficiency of the project, and effectively reduce the project risk. After years of practice, the connotation of BIM technology can be analyzed from the following points: First of all, this technology is based on three-dimensional digital technology, which collects engineering data models related to construction projects, and can digitally transform the implementation and functional characteristics of engineering projects for technical personnel's reference [1]. Secondly, BIM technology is a perfect information model, which can connect the data and resources of the project in different periods and stages in construction projects. In addition, it can also describe the project object completely, and provide users with engineering data that can be calculated and combined, and all participants in construction projects can view the relevant data. Finally, BIM has a single engineering data, which supports the dynamic creation, management and sharing of engineering information in the life cycle of construction projects. It is a real-time project sharing data platform, which can greatly reduce engineering risks and improve the overall production effect during the use process.

2. The Advantages of Applying BIM Technology

As an information model to meet the needs of construction projects in the new era, BIM technology has unique and outstanding advantages in the use process. With the support of this technology, departments and managers related to the project can supervise the specific development of the project, effectively manage it in combination with the actual operation of the project, find out the possible engineering risks around their own construction needs, and formulate detailed and effective solutions, so as to solve problems in time and avoid deviations in actual work [2]. Not only that, with the support of new technical means, all kinds of resources of construction projects can also be effectively used, which can reduce the cost of construction and ensure that related enterprises can obtain more economic benefits; With the support of BIM technology, technicians can make decisions through all kinds of data, which can greatly shorten the construction time and improve the overall efficiency of construction; Technicians can also find the risks that may be faced in the project around the relevant data, and then resolve the risks to provide necessary protection for the construction of relevant personnel; In addition, with the support of new technology, technicians can also upgrade and optimize the related equipment of construction projects, and deal with the layout scheme of pipelines in time, so as to effectively improve the use value of engineering construction [3].

3. The Application Strategy of BIM Technology in Construction Projects

3.1. In the Investment Decision-Making Stage

Based on the actual analysis, in the initial stage of construction projects, some construction enterprises will focus on the construction cost management level, ignoring the previous investment cost management to some extent. In order to avoid construction problems and ensure quality, relevant units can introduce BIM technology to effectively strengthen the cost control of investment decision-making links and do a good job in related cost management.

3.1.1. Investment Estimation

The brand-new technical means have the functions of data information collection and integration, which can effectively collect the overall information in the investment decision-making, and then analyze it in all directions [4]. In addition, BIM technology can also summarize and sort out the historical data, and then the decision makers and staff of the project can analyze the relevant information and data in combination with the actual project, so as to formulate the corresponding project plan [5]. Moreover, in the investment estimation stage, BIM technology can also provide a shortcut for engineers to obtain information, and at the same time, it can also analyze the relevant data in depth around the construction characteristics of the project. In application, technicians can also adjust and modify the relevant information, so as to obtain the latest project information. Specifically, managers can calculate the equipment and materials during construction with the help of brand-new technology, and then estimate the project according to the current market price.

3.1.2. Scheme Comparison and Selection

This link is very important. In order to ensure the progress and quality of the whole project, the construction unit can use BIM technology. The main factor is that the brand-new technical means have visual characteristics, and technicians can analyze the implementation of the project by building a solid model, so that technicians can choose the best scheme. In addition, in the construction of new projects, this technology can combine the characteristics of new projects to

build a project model and classify and analyze each stage, so as to optimize the actual development plan. Through the model construction of different schemes, we can not only compare the advantages and disadvantages of schemes from different perspectives, but also provide scientific reference for decision makers, and also effectively control the cost through link simulation [6].

3.1.3. Decision-Making Stage

Since entering the new era, China's construction engineering field has achieved all-round development. However, due to the unstable overall market structure, there is a certain gap between the overall construction situation and the decision-making estimate, which leads to low cost accuracy. In the decision-making process, different schemes can be demonstrated. In order to ensure the accuracy of decision-making, the construction unit can use BIM technology to analyze the corresponding schemes and equipment in depth, and then select an effective control scheme in combination with the data provided by the system, thus reducing the decision-making risk and providing data support for the later construction.

3.2. Application in the Design Stage

Design is the foundation for the smooth construction of the project. Effective design by relevant units can reduce the risks in the construction process and realize effective control of cost [7]. From this point of view, in order to realize the steady progress of the design process, technicians can rely on BIM technology to compare the relevant data to ensure the rationality of the design.

3.2.1. Initial Design

Combined with the practical experience of many units, the preliminary design can lay a good foundation for the subsequent construction, and at the same time, it can effectively control the cost in the construction. At this stage, the project staff can calculate the project content in an all-round way according to the relevant project requirements, so as to grasp the expenses, and then submit the preliminary design scheme to the higher authorities, which can effectively control the total investment of the project [8]. Moreover, in order to improve the overall work efficiency, technicians can use BIM technology to strengthen the connection between construction units and design units, and then integrate relevant data and information, which can effectively improve the pertinence and scientificity of the project plan. In addition, in order to effectively control the cost data, technicians can also apply brand-new technology to compare the design files and then choose the best plan; Brand-new technology supports the analysis and inspection of design results, so that technicians can clearly identify the defects in the scheme and then improve it. This way can ensure the effective development of subsequent construction activities.

3.2.2. Construction Drawing Design Stage

In order to improve the efficiency of the use of funds, technicians need to design effectively in combination with the implementation of the project in the process of drawing design, and then make a good investment budget with the help of the comparison of individual and unit project plans [9]. In this process, technicians can carefully examine the engineering drawings with the help of BIM technology. The specific operation is to import CAD drawings into the corresponding software cost model and compare them. After that, the model can summarize the list data with the help of quota software, and then calculate the data through cost software, so the cost is in line with reality and within the expected range. In the process of budgeting, this technology can check and calculate the corresponding budget book, and it is more convenient to calculate the engineering quantity by

combining the calculation formula and the construction position. It can also make repeated accounting of the engineering quantity in the software, which makes the drawings and calculation methods effectively connected. In a word, through the calculation of the project list, the project can be constantly improved in its own drawing design, and then the rationality of the project cost can be improved.

3.3. Application in the Bidding Stage

In the process of construction, construction engineering units need to summarize and analyze all kinds of engineering information in order to improve their overall construction level and technology level, so as to do the corresponding empirical management work well. In order to ensure the progress and quality of the work, technicians can introduce BIM technology, and then analyze the previous survey data, which is beneficial for the construction unit to effectively control all kinds of costs in the construction.

3.3.1. Determination of Pre-Tender Estimate

In the process of bidding cost management, technicians can improve the quality of work by introducing new technical means. With the support of new technology, relevant managers can evaluate the project quantity, and then put forward scientific and targeted suggestions on the design scheme, thus significantly reducing the project risk; The calculation software can also provide relevant personnel with the latest market price information, and then strengthen the ability of drawing audit and budget through the audit of various data, providing effective reference for the determination of the pre-tender estimate of the project.

3.3.2. Generate Bidding Documents

After the pre-tender estimate is determined, the relevant personnel need to issue the bidding documents. At this stage, technicians can use BIM technology to model it, and then send the bill of quantities to the higher authorities. At the same time, this technology combines the relationship between construction and engineering company to provide a list of bidding quotations, and through model establishment, the audit accuracy can be improved on the basis of reducing the audit time.

3.4. Application in the Construction Stage

3.4.1. Project Settlement

The related work is that the contractor settles the project stage according to the contract content during construction, and the cost control in this process needs to compensate the capital consumption, so as to avoid the deviation in construction. In order to ensure the overall engineering quality, it is necessary for relevant personnel to settle the actual engineering quantity of the project, and then the supervision unit will accept the results until the construction project is completed. In this process, technicians introduce BIM technology, and then import related calculations and generate data according to the progress and difficulty of the project. Through the establishment of technical model, the remaining project cost can be calculated and the cost data can be obtained, and the fund allocation and procurement plan can be adjusted reasonably in the process of purchasing raw materials.

3.4.2. Engineering Change and Claim Management

The change of engineering quantity is very frequent, which means that the management unit

should do the relevant work well. In the actual operation process, even though BIM technology can not completely solve the problem of project cost change, it can significantly reduce the cost waste caused by project change. In the process of construction, the relevant units will face many uncontrollable factors. In order to avoid disputes, the relevant supervisors can analyze the construction time and progress through the model of BIM technology, then compare it with the cost, and complete the payment through the statistics and calculation of the construction progress payment. The introduction of BIM technology in this link can not only give good task instructions to each control link, but also visually display the relevant information of each payment in detail, so as to avoid the claim cost caused by overtime or late payment.

3.5. Application in the Stage of Completion Acceptance

In the traditional completion acceptance link, the enterprise acceptance personnel conduct detailed investigation on the site according to the construction drawings and related calculations, and judge the project acceptance standard after calculating the information collected on the site [10]. This work form is more complicated, involving a lot of manpower and material costs, and there may be detection data errors due to manual collection, which will affect the authenticity of the acceptance work. BIM technology can effectively improve the efficiency and quality of acceptance work. In the acceptance work, the inspectors fully reflect the quality of every detail through the application of this technology, and fully express the specific construction effect. In the field information collection, collecting and comparing with computer equipment can not only save the time and cost of manual calculation, promote the improvement of economic benefits, but also ensure the accuracy of data information, and effectively reduce the error rate through a large number of collection and repeated calculation. In a word, BIM technology can provide fast and accurate acceptance results in the completion process by combining database information.

4. Conclusion

Since entering the new era, BIM technology not only plays its application value, but also can collect and sort out relevant data information in different stages of construction, and then build a three-dimensional building model, which is beneficial for the staff to design and manage the project as a whole. In the practical application process, technicians can combine the specific information of the corresponding building components to restore them to models, and staff can also communicate in time, which can greatly improve the work efficiency and quality and solve the problems existing in practical work. In order to promote the development of China's construction engineering field, we need to further analyze the connotation of BIM technology and deeply grasp its application advantages, and then explore the application of brand-new technology in decision-making, design, bidding, construction and acceptance.

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