

Research on the Application of BIM Technology in Engineering Cost

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Abstract: Doing a good job in cost management of construction projects can maximize the value of construction resources and thus leverage the advantages of cost management. The application of BIM technology in engineering cost management can improve the level of engineering cost management. This article briefly introduces the key technologies in BIM technology, and proposes the application strategies of BIM technology in engineering cost management for reference.

1. Introduction

Artificial Intelligence (AI) is a comprehensive discipline, which aims to study how to use modern tools such as computers to design systems that simulate human intelligent behavior. With the development of computer science and technology, artificial intelligence technology has penetrated into various disciplines and industries, including the change of project cost. The use of this technology has greatly improved the quality and efficiency of project cost control, so it is very necessary to explore the application of artificial intelligence technology in project cost. Research on the Application of BIM Technology in Engineering Cost With the rapid development of China's economy, the development and construction of cities in various regions have also driven the development of the construction industry. In order to better ensure the construction quality of construction projects, control construction costs, and bring higher economic benefits to enterprises, various construction enterprises are paying more attention to the engineering cost management of construction projects.

1.1 Engineering Cost Characteristics

The construction project includes preliminary design, specific construction, and final quality acceptance work, each part of which will affect the final cost of the construction project. BIM technology can run through various stages of the construction project, and the BIM database can record and store relevant data information for each stage. This can provide detailed data support for design, construction, and quality acceptance, thereby improving the design quality. The construction quality can be guaranteed. By using BIM technology to establish a more complete data information chain for construction projects, relevant personnel can refer to relevant data information and carry out work on this basis. This not only improves the collaborative ability between departments, but also improves the work efficiency of each link, greatly shortening the construction period, and achieving the goal of saving manpower, material resources, and financial resources.

1.2 The Necessity of Applying BIM Technology in Engineering Cost

The necessity of applying BIM technology in engineering cost is a very complex and systematic project for construction projects, and various factors can affect the management level and effectiveness of engineering cost. In order to carry out refined management work throughout the entire process of the project, it is impossible to overcome layers of difficulties and ultimately achieve management goals solely by utilizing human power. The application of BIM technology can effectively compensate for the shortcomings in manual operations, making organic connections between various links and stages, better promoting the implementation of refined and intensive management systems, reducing the workload of staff, reducing errors caused by manual operations, reducing the complexity of cost management personnel's calculations, and enabling more scientific collection and provision of data information, Comprehensively improve the level of refined

management. It is helpful for the formulation of engineering cost plans. Based on the application of this technology, staff can develop very detailed and comprehensive budget plans, thereby better playing the role of budget work, utilizing funds more scientifically and efficiently, and strictly controlling the progress and duration of the project, saving project costs. In addition, this technology can better collect, organize, and share budget data, making it more intelligent and precise. It has good application value and can effectively compensate for the shortcomings of manual budgeting.

2. Exploring the Application of BIM Technology in Engineering Cost

2.1 The Application of BIM Technology in Bidding Work

Project investors usually use bidding to purchase engineering construction services. If the cost of the project is calculated solely by manual means, it will consume a lot of manpower and material resources of the company, and also waste a lot of time. The traditional manual calculation method mainly calculates the overall project amount based on the engineering project order. After applying BIM technology, the BIM software has strong data analysis capabilities, which greatly shortens the time for bidding unit cost personnel to calculate the engineering quantity, reducing the calculation amount by 40%. The large amount of data information inside BIM improves the accuracy of engineering quantity and project amount data calculation. In addition, the application of BIM technology in calculating engineering quotas and quantities will reduce a significant amount of workload for cost personnel, reducing the workload and pressure of operators. Applying BIM software to calculations can also reduce errors in calculations and improve the accuracy of engineering cost work.

2.2 Establishment of BIM Technology Database

By utilizing BIM technology to establish corresponding 3D model databases and comprehensive data storage centers for construction projects, high-quality data information support can be ensured for construction projects, and relevant information of construction projects can be presented more specifically and vividly to management personnel. In the early stage of construction engineering, designers need to carry out construction design according to the relevant requirements of the construction project based on the opinions of Party A. The engineering cost management then estimates the engineering cost based on the construction process and technology in the design plan. Both design work and engineering cost management require corresponding data information support. With the help of BIM technology, accurate and efficient access to information such as the surrounding environment, geological environment, climate environment, and market dynamics of the construction area can be ensured, thereby providing more detailed data support.

2.3 The Application of BIM Technology in EPC Work

In a complete EPC project, the procurement amount accounts for 60% to 70% of the total project price., The procurement process directly determines the cost-effectiveness of EPC projects. The procurement platform based on BIM technology runs through the entire procurement process, forming a deep intersection of design, procurement, and construction. During the design phase, material and equipment prices and supply cycles are thoroughly investigated, greatly reducing procurement time and procurement costs. At the same time, by integrating procurement into the design phase, the total cost of the project can be determined at the end of the design, enabling the EPC project cost manager to understand the cost management in the later stage. Based on the procurement cost, the construction feasibility of the design scheme can be analyzed to facilitate design optimization and modification, and reduce the cost of design changes during the construction process.

2.4 The Application of BIM Technology in Construction Phase Work

The construction phase involves complex cost factors, making cost control difficult. Utilize BIM technology to control costs during the construction phase from multiple aspects and perspectives,

and achieve the expected goals. The application of BIM in the construction phase includes the preparation of construction plans, determination of technical standards, construction safety management, and construction quality control. By using BIM technology to visually simulate the construction process based on the expanded information model of construction plans and progress, accurate and reliable data information can be provided for the overall dynamic process. Based on the BIM model, combined with the construction schedule and actual situation, conduct a thorough analysis of the site, and designate reasonable safe passages and work areas. Through the BIM integrated platform, track and analyze the on-site construction process to avoid adverse consequences and achieve the goal of construction quality control.

Secondly, the construction party can use the BIM platform to timely and efficiently split the construction process, extract the expected and actual costs of each sub item, clarify the deviations between the two and the reasons for their formation. Based on this, the management focus can be determined as soon as possible, and through precise management, the deviations between the expected and actual costs can be effectively controlled. In this project, the construction party chooses to use BIM to compare the actual and expected costs of each sub item, dynamically analyze the cost deviation, and then obtain a cost management plan that is consistent with the project characteristics, so that the role of management work can be realized. BIM technology can also complete comprehensive statistics on the data generated after engineering changes, accurately calculate the costs of each construction stage, develop project liquidation plans based on cost changes, comprehensively protect the rights and interests of the construction party, and achieve the goal of refined management of project engineering costs.

2.5 Application of BIM Technology in Design Phase Work

The application of BIM technology in the design phase of a project. The architectural design, structural design, and water and electricity installation design of a project are often not the same designer, so in actual construction, there may be conflicts between the components of the building construction drawing and the structural construction drawing, as well as mismatches between the equipment drawing and the structural construction drawing. By utilizing the visual modeling function of BIM technology, various problems with drawings can be identified in a timely manner to avoid such phenomena.

2.6 Application of BIM Technology in Design Phase Work

In the investment decision-making stage of a project, the main task is to determine the investment plan, study whether the investment plan is feasible, and if the investment plan is feasible, further determine the design requirements and scale of the plan as the direction for the next stage of design. Enterprises establish a BIM database, extract key indicators for investment plan comparison, and finally determine the investment plan. BIM software can calculate the cost data of different investment plans based on their content, facilitating the comparison and selection of investment plans. For example, Guanglianda's BIM5D software increases project construction time and engineering cost based on a three-dimensional model to form five dimensions. It links the 3D model with time and cost, and can classify and summarize the quantities and costs of different time periods of the project, making the confirmation and payment of project progress payments more efficient and accurate. BIMMAKE from Guanglianda Company can model the layout of construction sites, create refined terrain, machinery, facilities, and temporary equipment based on construction drawings, and complete three-dimensional on-site layout, which helps construction management personnel prepare detailed construction plans.

2.7 Application of BIM Technology in Engineering Settlement Work

In recent years, the competition in the construction industry market has become increasingly fierce. In order to promote the healthy and sustainable development of enterprises, it is necessary to effectively implement engineering cost management work. At present, in cost management, the engineering settlement stage plays a crucial role, mainly because in the settlement stage, the data is complex and diverse, coupled with the cumbersome nature of engineering quantity verification.

Therefore, the entire process will directly affect the quality of cost management, and the accuracy is relatively low, which seriously affects economic benefits. In the process of engineering settlement, the application of BIM technology not only optimizes and improves the settlement methods and methods, but also effectively saves funds, ensuring the reliability and accuracy of settlement. And the construction of BIM model is very beneficial for data aggregation, data organization, and data storage, which can promote the orderly implementation of verification work and ensure the transparency and fairness of project settlement. Overall, the application of BIM technology can ensure its completeness and accuracy, which is extremely beneficial for improving work quality and level. Even for complex and cumbersome calculation processes, it plays a crucial role.

In BIM construction project cost management, planning is extremely crucial. In order to further achieve cost management of construction projects, for investors, it is necessary to collect the operating costs, geographical location, equipment status, etc. of buildings under the existing BIM model. And for the planning stage, it mainly covers two levels: cost and property reality, which can improve the accuracy of management methods while ensuring the overall planning. At the same time, BIM based construction project cost management can ensure the completeness and coordination of design drawings while accurately expressing the construction equipment in the planning stage. Not only can various errors in construction project costs be avoided, but it also plays a crucial role in promoting the efficiency of management decision-making.

3. Prospects for the Application of BIM Technology in Engineering Cost

In the completion stage of construction projects, the application of BIM technology can better store information related to contracts, construction periods, and prices. At the same time, this information can be compared and analyzed with actual data input, strengthened auditing, and strict testing of data results. On this basis, the settlement of funds can be completed. Based on the application of this technology, relevant information and data of the project can be obtained, so as to better complete maintenance operations in the future. In addition, at this stage, the application of BIM technology can strictly control and manage fund settlement operations, shorten time, fully ensure the scientific and accurate nature of settlement, and ensure the overall efficiency of settlement. Moreover, during the settlement stage, the application of BIM technology can effectively prevent and reduce conflicts between contractors and investors, thereby comprehensively improving the cost management level during the completion stage. In the field of construction, BIM technology is progressiveness. Compared with traditional technology, it has a very important role and advantages in the application of this technology in the process of construction cost management. The application content covers engineering quantity calculation, data information sharing, fine cost management, and involves in project design, decision-making, construction, bidding and other aspects.

4. Conclusion

In summary, the intelligent building industry is developing rapidly. However, the application scope of intelligent buildings is not limited to the intelligence of building facilities, but also includes the intelligence of building materials, building structures, and ecological buildings. In order to meet the more reasonable and broad needs of intelligent buildings, China needs to further develop relevant systems, standards, and methods, and continuously develop advanced intelligent products. Software technologies such as BIM, MIS, and GIS provide information models and technical analysis basis for the implementation of intelligent buildings. With the increasingly perfect development of information technology such as integrated technology research and development and the Internet of Things, the development and maintenance of smart cities will enter a new era.

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