Research on BIM-based Fine Management of Engineering Cost

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Abstract. As the core content of project management, project cost management is the ultimate value of the project. In recent years, China's engineering cost management level has been greatly developed and the relevant management system has been further developed. Perfect management methods and techniques are constantly updated. However, there is still a process to achieve total cost control. Several shortcomings limit the accuracy and effectiveness of cost management in China, such as the complexity of engineering computation. Huge project cost data is not easy to analyze while engineering information cannot be effectively shared and stable work platform is limited.

Keywords: Bim Technology, Project Cost, Fine Management

1. Introduction

In the process of project construction management, project cost management is a very important part of it. The effect of project cost management can be directly reflected in the economic indicators of project construction. In the process of China's national economic development, the engineering construction industry is the most important pillar industry and has maintained a rapid development in recent years. However, the industry is facing the situation of high investment and low profit and all construction enterprises in the market need to face the rapid rise in the cost of production factors. Carrying out corresponding activities on the project cost management, based on the current new environment and new requirements, we can reduce the error rate, enhance sharing and achieve coordination, etc., which help improve the work efficiency and enhance the management level at the same time[1]. This is a serious problem that the field of project cost should face. In recent years, the theory of fine management has been widely applied in the construction industry, which can effectively improve the endogenous power of enterprise management. Therefore, this paper takes the overall goal of project cost management to achieve refinement as the core and introduces BIM technology to accelerate the process of project cost management from empirical type to scientific one.

2. Concept

2.1. Connotation of fine management

From scientific management theory to lean production, from lean production to meticulous construction, for in-depth development in various fields, the main goal is to minimize complex theoretical management resources, can reduce management costs. Management method has become an inevitable choice of increasingly complex social division of labor.
2.2. Connotation of BIM technology
In the research report of BIM business value, McGraw Hill defines BIM as the process of using digital model to design, construct and operate a project.

According to the complete definition of BIM in the National Building Information Modeling Standard of the United States, BIM reflects the functional characteristics of construction projects with the help of figures and contains the information of the whole life cycle of construction projects.

The shared database will provide a reliable reference for decisions made during the life cycle from the beginning of the project to the dismantling of the project. In each stage of the project, different participants realize the collaborative work under their respective responsibilities by inputting, extracting, updating, modifying and other links in the BIM model[2]. This definition holds that the greatest value of BIM lies in collaboration and that BIM itself is the most important information base in the project life cycle.

The U.S. general contractor (CAGC) considers BIM to be a usage table. It is computer software development and USES multiple models to simulate facility construction and operation. The number of building information models that can be extracted from model views and data through rich object-oriented, intelligent, parametric formula construction projects. Different user requirements and analyses generate information that can be used to make decisions and improve the project implementation process. Improving the planning, design and construction process using BIM is also known as virtual design and construction.

The director of the quality and safety supervision department of housing and urban development engineering explained to BIM: the integration of BIM technical project information can realize the whole life cycle of relevant information during the construction, operation and maintenance of the project. Effective use of relevant engineering and technical personnel for correct decision-making services plays an important role in improving and optimizing the overall construction efficiency and cost.

From the current definition of BIM in the industry, BIM can be understood from two aspects. The first is the result. BIM (Building Information Model) is understood as a building information model that emphasizes the integration of information models related to the project's building life cycle. In other words, based on a 3D model (3D), you can add cycle dimensions to form 4D[3]. The model and integrated cost dimension information build the 5D model and realize the influence of ND model, then finally realizing the effect of the model and the interaction with information as well. BIM is not just a model and it is a model that can be formed. In essence, there are many models of uniform standards for different occupations, starting from different needs. These are based on the core BIM model to achieve each professional requirement.

3. Analysis on project cost management status quo
As a detailed blueprint for project construction and implementation, the project design document basically determines the cost direction of the project. The project cost management in the design stage is to match the advanced nature of the design and realize the economic rationality. According to the empirical data, the proportion of impact of design phase on project cost is about 70%-80%. The management role for project costs at this stage is only a small part of the overall process cost management effort. At present, the main concept of cost management in the implementation stage is to emphasize quota design. That is to say, based on the determined investment estimate, preliminary planning and design use the design budget as the design project cost management of the constraint management structure chart[4]. The function from the design stage is not only the accurate economic evaluation of the design, but also the effective guidance of the design. In practice, design budgets often lack comprehensive and accurate estimates of similar projects and are limited. The estimated results show that the budget of construction drawings is also due to time constraints, which
leads to inaccurate quantities of works, labor, materials and untimely machinery prices and affects the accurate evaluation of various indicators. As the engineering design process changes, each stage of change has a significant impact on the design budget. Project costs must be adjusted passively accordingly, requiring a great deal of adjustment.

4. Concrete application of BIM in project cost management

4.1. BIM collision detection realizing pre-positioning of cost control
During the design phase, stakeholders involved in projects such as buildings, structures and motors can build and apply BIM modeling techniques. The special detection software for BIM simulation collision detection can intuitively reflect the problems of structure, drainage, electricity and consumers, prevent the collision between different occupations in 3D space[5], improve the efficiency of traditional comments and achieve synergy. Collisions between experts can reduce the construction process at the source through BIM simulated collision checks between various occupations. Presets play a critical role in design change, early warning and cost management.

4.2. BIM technology-based cost management process in bidding stage

![BIM model-based bidding cost management process](image)

**Figure 1.** BIM model-based bidding cost management process

With bidding cost management process based on BIM technology, bidders can quickly design BIM model. With project quantity list and bid management price, bidders can also use the new BIM model in their bid documents to quickly review their work and use strategies to make a list of the quantities that are reasonably quoted. This process integrates all parties' workflows, greatly increasing the adoption rate. In determining the cost efficiency of the project, the bidder will meet all the economic requirements of the project[6]. The bidder should reflect the company's competitiveness in the quotation as far as possible. Figure 1 is the bidding cost of BIM-based technical management process. The optimization of this process will help
reduce the time and labor cost of the bidding process and help realize the bidding between people.

5. Conclusion
As the top priority of project management, project cost management has a direct impact on project price. In this stage, the development of project cost management has gone through a certain period of development and then entered a transitional period. Based on the effective and complex management of manufacturing industry, this paper focuses on the detailed analysis of the impact of the complex management of engineering cost, clearly accepts the power of data and information technology and realizes the key method of complex management of project cost. All these are worthy of our reference.

References
[1] Cheng Hu. Introduction to project management [M]. China Building Industry Press, 2011.
[2] Volk R, Stengel J, Schultmann F. Building Information Modeling (BIM) for existing [J]. Modern Computer (Professional Edition), 2013 (14).
[3] He Lintong. Current status of BIM in global response [J]. Construction Quality, 2013 (3): 12-19.
[4] Development and application status of BIM in three Asian countries [N]. Construction Times.2014.08.07.
[5] Fan Xiaojie. Research on the refined management of BIM project cost[J]. Building Materials and Decoration, 2018, 000(008):198-198.
[6] Yan Chengxia. Research on refined management of BIM project cost[J]. Shanxi Architecture, 2017, 43(024):210-211.