Project Information Management Model Based on BIM Technology

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Keywords: BIM Technology; Engineering Project; Information Management Model

Abstract: BIM technology is a major innovation in the construction industry, and project informatization based on BIM technology is bound to be one of the effective ways to improve the efficiency and profit of the construction industry. Informatization is the main trend of engineering project information management and the key to improve the level of engineering management. Therefore, BIM technology is introduced into engineering project information management to promote the informatization development of engineering project information management. Especially in the current situation of fierce competition in the construction industry and the increasing difficulty of information data management caused by too large projects, the realization of BIM-supported construction project management informatization has promoted the effective growth of efficiency and profit of the construction industry. The purpose of this study is to construct the current BIM-based project information management model and development strategy in China. Through analysis, this paper concludes that BIM can play a great role in the construction project management, opening up a new way for project management, and becoming a bridge and tool for the construction industry to move towards information technology.

1. Introduction

As the second largest world economy, especially in the context of China's urbanization process, the implementation of large-scale construction projects has been fully rolled out in China [1]. In recent years, with the rapid development of the construction industry, the non-standardization trend of engineering projects has become increasingly obvious. In addition, there are many participants in the project, and the coordination work among various stakeholders is more complicated. China's construction project management faces a rare opportunity for development. All of these require us to introduce a modern project management model, and constantly improve and innovate, and actively explore, research and develop a project management model with the characteristics of China's construction projects. Therefore, the overall management level of China's construction projects will be improved to achieve good economic and social benefits [2]. It is reported that the informatization rate of China's construction industry is only about 0.027%, which is 11 times higher than the average rate of 0.3% in the international construction industry [3]. Under the overall strategy of the modernization, industrialization and informatization integration of the construction industry, informatization will be regarded as one of the effective ways to improve the efficiency and profit of the construction industry, and the informatization level needs to be improved urgently [4]. The most important significance of the emergence of BIM technology is that it breaks through the boundary between design and construction, improves the collaborative communication of various management systems from top to bottom in the entire construction industry, and realizes the information management of the whole life of construction projects [5]. Therefore, it is a difficult problem for many construction information workers to discuss how to realize the information management of construction engineering and construct a practical project information management mode.

Due to the extremely imperfect informationization of the construction industry, the poor effect of information transmission, the lack of information synergy, the unclear expression of information meaning and the low value of information utilization among the functional departments of the project have greatly weakened the economic and social benefits of the construction industry [6]. From the objective analysis of project management, we can not simply advocate that one model is

  DOI: 10.25236/ecomhs.2019.132

better than others, nor should we enforce a certain model. Each mode has developed into an organization mode adapted to the special needs of a certain project [7]. BIM technology is a multi-dimensional model information integration technology developed on the basis of CAD technology in recent ten years. It enables all participants in the project construction to operate information and model in the real digital virtual building model, so as to achieve the goal of improving work efficiency and quality in the whole life cycle of the building and reducing errors and risks [8]. BIM technology is committed to the unification of the whole process goal of engineering construction, creating the collaborative work mode of all participants based on BIM technology, promoting the development of informatization in the construction industry, and providing effective information technology support for the reduction of disputes in the construction industry and the improvement of production efficiency [9]. Based on this, it is proposed to construct the engineering project information management model based on the BIM technology platform, strengthen the information exchange among all parties, coordinate the construction work, promote the rapid flow of information, improve the coordination between all departments and all majors, and achieve the project management objectives [10].

2. Materials and Methods

BIM is a three-dimensional building model based on all kinds of information of construction projects. It is an information aggregate throughout the whole process of construction projects. It involves the innovation and change of the whole process of construction projects from planning, design to construction and maintenance. Under BIM technology, through the combination of information data model and behavior model, the data of information layer is transferred from model layer to management layer, and dynamic data association is generated. Traditional project management lacks efficient information exchange and communication mechanism. Information exchange and communication are the means to realize the collaboration of complex construction project management. On the premise of achieving the common goal, this means is particularly important and determines the success or failure of management collaboration. After adopting BIM technology, the information transmission method has become “point-to-face”, which has higher transmission efficiency and higher sharing degree. It not only solves the problem of information loss, but also maximizes the value of information. Today, with the continuous advancement of informationization and networking, the use of computer software as a carrier to realize the scientific and standardized management of information related to construction projects can be described as the needs of the situation and the requirements for development. The construction of engineering information management mode based on BIM technology has fundamentally changed the barrier of project information management under the traditional information management mode, and promoted the coordination of resources within the project system.

The practical application and research of BIM technology in the global engineering construction industry in the past 10 years of the 21st century has proved to be the core technology for upgrading the technology and management upgrade of the construction industry and real estate industry in the future. The realization of the project information management mode based on BIM technology can optimize the coordination of the professions in the traditional drawing design. The important parameter data or information involved in the related problems in the project construction process can also realize the simulation management to ensure the dynamic control management of the whole project. BIM's three-dimensional visualization technology can improve the competitiveness of enterprises, improve the accuracy of cost accounting and keep the owner lower unpredictable costs than the traditional construction model (Figure 1). The application of BIM technology can change the traditional concept of project management and lead the construction information technology to a more business level, thus greatly improving the integration degree of business building management. Table 1 shows the great value of BIM technology.

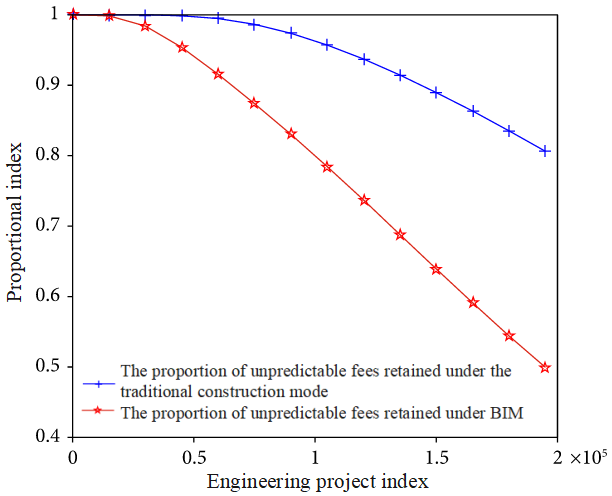

Fig.1. Application of BIM reserved amount item unforeseeable fee proportion diagram

Table 1 Statistics of BIM application value

	Contribute to subcontracting management	Contribute to cost control	Help schedule control	Operational phase should be used
Support degree	73	46	51	34
Proportion	35.8%	22.5%	25%	16.7%

In the traditional information management mode, information is wasted and redundant, information is constantly lost, information exchange efficiency is low, cannot be optimized from a global perspective, and seriously affects the effectiveness of information. With the continuous shortening of the project management cycle, the project information will be more and more, in this process, the end of a certain stage of the project will make some of the information out of date, at this time, it must be processed, or constantly accumulated, will inevitably make the information difficult to manage. Based on the information management model of BIM technology, the whole life and all-round information will be continuously connected and seamlessly connected, and the discrete information flow will be integrated to avoid the ambiguity and inconsistency of the information, as shown in Figure 2.

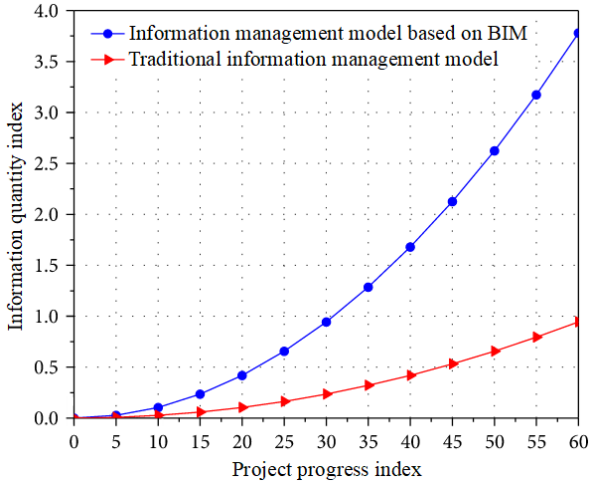

Fig.2. Comparison of BIM-based information management model and traditional information management model

3. Results

The BIM technology project information management model can fundamentally fundamentally

this situation, because the BIM information model is not a static model, but an intelligent system that can continuously update itself as the data parameters change during the project progress. So that it can effectively track the life cycle of the project progress, optimize the management service for the whole life cycle. With the deepening and progress of the project, the BIM information model is gradually deepened, gradually refined, constantly updated, revised and supplemented. Information on the life of the project is effectively organized and tracked. In the process of actual selection, on the one hand, it needs to be screened according to the application of BIM, on the other hand, it needs to be screened according to the application cases of BIM, in order to improve the application value of conflict detection and pipeline route synthesis, as well as the progress simulation in the construction process. Among them, special attention should be paid to the construction of information background, which can be used to store data and monitor the whole information workflow, and realize the integrated management of data and information. In addition, the application of BIM visualization, collaboration, simulation, optimization and drawability can change the engineering organization, formulate relevant supporting systems, quality control procedures and risk prevention measures based on BIM environment.

Information between BIM is in a state of sharing, which can prevent the problem of inconsistent coordination or slow update rate of information in the process of engineering construction. The most important feature of BIM technology based engineering project information management mode is information collaboration, timely, reliable and open information sharing. BIM information resource sharing can ensure that the information obtained by all departments is more obvious in the first time, and that all departments get first-hand information. General information should be managed not only for the purpose of the service at that time, but also for the purpose of reuse throughout the life cycle of the project, so as to maintain the integrity of the information. Through such setting, the boundary of information sharing is clearer and information security is improved to a certain extent. From the BIM-based engineering project information management model, we can know that the BIM central database not only breaks the drawbacks of the “professional collision” in the traditional information management mode, but also increases the difficulty of construction. More importantly, the resources and data of each integration stage are effectively linked, and the extremely complicated project information is represented in a digital way through intelligent and parameterized means. It is not difficult to see that BIM can express the design scheme very intuitively, extract specific information, form specific data or chart, thus reducing the occurrence of error, then the accuracy and effectiveness of the scheme are greatly improved.

4. Conclusion

Nowadays, more and more complex projects and tight budgets and deadlines put forward higher requirements for the engineering project environment, and more efficient communication methods and work flow management are imperative. With the emergence of BIM technology, great changes have taken place in the way of thinking and process of management, which brings a revolution to the conventional management mode. Based on BIM technology, the information management mode of engineering project is constructed. The functions of data collation and analysis, data storage and optimization of BIM platform are used to process information efficiently and reliably, so as to ensure the integrity, authenticity and reliability of information. BIM technology brings convenience to construction project management, and the goal of BIM is to make the whole life cycle process of construction work together. In project management, BIM brings new management mode and new management process, which is the beginning of fine management in the construction industry. In short, BIM technology has the characteristics of visualization, coordination, simulation, relevance and consistency, which can effectively solve the information management problems faced by construction projects in the process of project management.

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