



Application of BIM Technology to Project Management Objectives

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Abstract

Under the new situation, it is the general trend to carry out practical innovation and theoretical reform of engineering project management. We must break through the traditional thinking and re-establish the new thinking of project management with the three basic objectives of quality control, progress control and investment control. BIM Technology can play a great role in construction project management and open up a new road for project management, it has also become a bridge and tool for the construction industry to fully move towards informatization, so as to help project managers make scientific management and scientific decisions and create high-quality projects.

Keywords-*project management; objectives*

1. INTRODUCTION

The overall goal of project management is to strive for the best project. So what kind of project is the best project? In short, the optimization of the project is to complete the highest quality engineering tasks and obtain the maximum economic benefits with the shortest construction period and the least capital investment. At present, more and more construction projects will encounter various unknown factors in the construction process, especially temporary design changes, which will have a very adverse impact on project implementation and project management. In order to reduce adverse factors and achieve the required functions and quality, specified time limit, planned cost budget and other objectives, it is necessary to decompose the project, connect its different quality, time, cost and other objectives and requirements from each stage of the project life cycle through BIM Technology, and weigh the advantages and disadvantages of each stage by using big data platform and information means, only by solving the contradiction between the goal design of each stage and the implementation of the whole process management can the overall optimization be realized. This paper will discuss the basic objectives of project management from the perspectives of quality, progress and investment. Quality, investment and progress are the three most basic objective elements in project

management. There are strong constraints and connections between each goal.

2. ANALYSIS OF THREE BASIC OBJECTIVES OF PROJECT MANAGEMENT

2.1 Project quality control

Project quality control refers to all quality supervision and management activities throughout the project in order to meet the overall quality objectives of the project. The quality control of the project is to clearly specify the project value, project standards and owner's requirements. There are five influencing factors in project control and management, such as staff quality, equipment performance, material quality, construction method and construction environment. In order to strengthen the project quality control management, the above factors must be supervised. Firstly, improve the post operation ability, safety responsibility and on-site response ability of construction personnel; secondly, select the equipment that meets the construction requirements and meets the qualified standards, and establish various equipment management systems to avoid equipment damage; thirdly, pay close attention to the quality

TABLE 1 COMPARISON BEFORE AND AFTER BIM TECHNOLOGY INTRODUCTION

process	Before BIM introduction	After BIM introduction	Superiority
Project scope determination	Describe the project scope with words or charts to form the project scope specification.	Directly view the model information or sort out and analyze the model information and export the report for determining the project scope.	Provide detailed and visual materials for project scope determination: use the model to explain and define the project scope, so as to better reach the consensus of project members and customers.
Work breakdown structure	1. On the basis of written documents such as project scope specification, contract, CAD two-dimensional drawing and so on, it is prepared with reference to experience or WBS template of similar projects; 2. Two dimensional display in WBS chart or WBS table.	1. Realize the association between WBS element code and model component ID number, which can be viewed Type or prepared using model information: 2. The three-dimensional model deliverables corresponding to WBS elements of each layer can be directly displayed. And can view various attribute data; Milestones can also be marked in the model.	Rich information and visual interface can improve the efficiency of project work breakdown, ensure the accuracy of work breakdown structure and reduce a lot of repeated adjustment and modification.
Activity definition	1. Complete the activity definition with reference to the project scope and WBS to form the operation detail view; 2. Activity list and activity attributes need to be listed	Refer to WBS and model information to complete: some activity attribute information has been completed. It is completed with the establishment of the model, and the attribute information can be directly assigned to the model elements: :	Visually view the three-dimensional model associated with WBS deliverables to ensure the accuracy of activity definition
Activity duration estimation	With the help of experience, historical data, analogy estimation, expert judgment, Delphi method, parameter estimation and other traditional methods: allocate time from top to bottom according to WBS level or operation list, and complete the setting of progress information such as activity duration, start time and end time.	You can refer to the basic information of activity association model elements, combined with traditional methods, or simulation methods such as three-point estimation provided by the system to assist time estimation, and complete the setting of progress information.	It provides more basis and reality for activity time estimation.
Project schedule	Express the schedule through Gantt chart and network chart, analyze the key lines and optimize the schedule.	Four dimensional simulation can be carried out for the schedule and key work to check the rationality of working time and logical relationship.	Repeated simulation to test the feasibility of the schedule and realize the effectiveness and enforceability of the plan.
Project schedule control	Track the project progress through the network diagram and bar chart provided by the system, complete the comparative analysis between the planned progress and the actual progress, find the deviation, take corresponding measures to correct the deviation and update the target plan.	In addition to bar chart and network diagram, it can also carry out four-dimensional simulation and tracking of the project to realize Visual comparison of planned progress model, actual progress model and on-site image progress.	The abstraction and understanding difficulty of two-dimensional network diagram and bar chart are avoided. The WYSIWYG three-dimensional display and real-time viewing of full information realize the visual project progress control.

acceptance of construction materials. Check and accept all kinds of materials before purchasing, shipping, warehousing and construction, and put them into use only after they are confirmed to be qualified; fourthly, systematically analyze and compare the specific construction methods, take the cost, progress, quality and safety as the primary evaluation indicators, study the cost with quantitative methods, study other indicators with qualitative and quantitative methods, and select the best scheme on the basis of overall optimization; fifthly, eliminate various interference factors in the construction environment, create a good technical environment and labor environment for the realization of project management objectives, fill loopholes in time and solve problems in time [1-4].

2.2 Project schedule control

Project progress control refers to the duration management and supervision activities throughout the construction process in order to ensure the construction progress speed and meet the progress time requirements in the engineering design. The objectives of project schedule control include the successful time of load linkage test run of industrial project and the planned time of civil project delivery, that is, the planned time of final use of the project. Project progress control runs through the whole project, that is, from the beginning of project decision-making, to project design and planning, to the actual commencement of the project, and finally to the acceptance and delivery of the project [5-7].

2.3 Project investment control

Project investment control refers to the management and control of project capital throughout the project process in order to ensure the project quality and

schedule meet the design requirements. Project investment control, quality and progress control are integrated. When discussing and demonstrating the project investment objectives, the project management director should comprehensively consider the coordination and optimization of the three major objective elements from the overall perspective, so as to ensure that the project investment does not exceed the project plan, and that the project quality and progress also meet the requirements of the design scheme. In view of this, in the project input management, the construction party should take the overall requirements of the owner seriously, constantly innovate the design concept, deal with the relationship between quality, progress and investment, and realize the optimal allocation among them. We can't simply analyze the capital investment in isolation. When we take corresponding capital control measures, we must combine the impact of capital investment on project quality and project progress. When setting the limit of funds, it is necessary to ensure that the use of the project meets the quality standards and that the project can be successfully completed within the planning period. The investment control of the project should also be analyzed from the perspective of the overall economic cost of the project, and should not be limited to the capital investment in one link. In a word, this coordination ability is indispensable in project management [8-11].

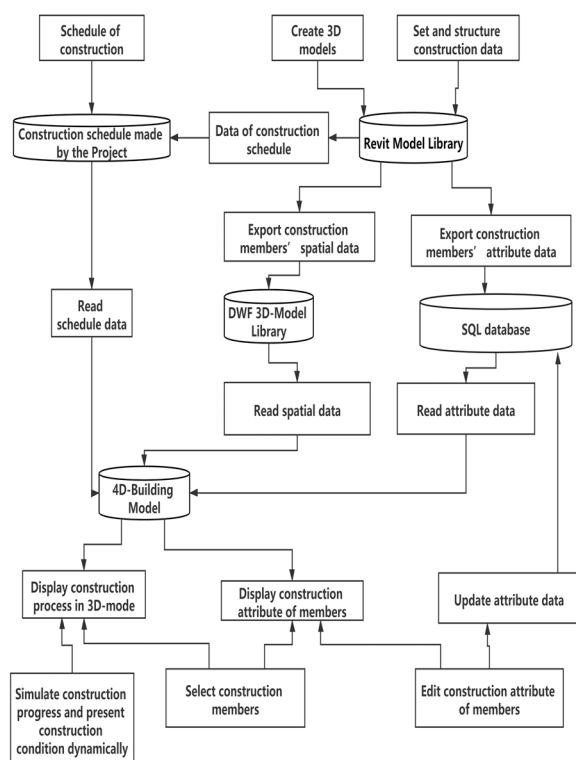


Fig.1 Application of BIM Technology in Schedule Management

3. PROBLEMS EXISTING IN THE THREE BASIC OBJECTIVES OF PROJECT MANAGEMENT

3.1 Narrow quality connotation

Traditional project management simply emphasizes the technical standards of project quality and ignores the implicit requirements of ecology, green and environmental protection under quality control. In other words, it is considered that the quality performance of the project lies in the technical level of structural safety. The management concept not only stays at the technical level, but also ignores the cost of project management quality control in the coordination and unity of the three. Therefore, the connotation of project quality management under the traditional mode is narrow and full of limitations. It is difficult to adapt to the overall objective requirements of project management under the new situation and the requirements of green, environmental protection, sustainable and recyclable buildings of the owner.

3.2 Imperfect schedule management

In the current practice of project management, CAD can solve the technical problems of sketch design, but it can not solve the problems of actual construction. This is the difference between traditional schedule management and BIM schedule management.

Traditional schedule management is to gradually solve the problems in guiding construction, while BIM Technology is to predict the actual problems encountered in project management and even later stage through scientific calculation in schedule management optimization, which not only solves the problems that may be encountered by the construction party, It will also estimate the problems that will occur in the future [12].

3.3 One sided investment objective

The stages in the whole life cycle of the project are separated. Due to different implementation subjects and insufficient information communication, it may be difficult for the activities in this stage of the project to fully absorb the work results of the previous stage, and the implementers rarely consider the impact on the work of the later stage. The interest conflicts among the project participants and various departments of the team are large, resulting in tense organizational relations, low work efficiency, inhibiting the enthusiasm and creativity of all parties, and a large amount of cost, time and energy are consumed in the coordination of various work interfaces.

4. NEW THINKING OF THREE BASIC OBJECTIVES OF PROJECT MANAGEMENT

In the era of traditional two-dimensional CAD, the inefficient production efficiency of the construction industry has always been one of the difficulties in the industry. The reason is that the too decentralized construction process and the low degree of integrated management seriously lag the development of informatization in the construction industry. BIM Technology integrates the information of the whole life cycle of engineering project based on three-dimensional digital technology, and creates a collaborative work platform to make the engineering project management process continuous, improve the integration of engineering project management, and provide an idea to solve the above problems [13].

4.1 Expand the connotation of quality management

Modern engineering requires comprehensive, whole process, a high level and sustainable quality management. It is required to meet high-quality standards from project planning and preparation to project design and equipment purchase. As mentioned above, with the passage of time and the progress of the times, the project quality is no longer limited to the project entity and external structure, and the modern development concept of green architecture, environmental protection, sustainable, recyclable and

the integration of heaven and man can also be extended to the project quality management. Therefore, the design concept of energy-saving, green and environmental protection strengthens the constraint and force on the project quality, pays more attention to the application of modern information and BIM Technology, realizes the coordinated development of all aspects, and realizes the sustainable development of the project and environment. This multi-dimensional, multi-factor and multi-level quality connotation concept is a scientific understanding of the concept of quality under the new situation. The concepts of green, environmental protection, sustainability, ecology and energy conservation advocated by it are not only conducive to the realization of the objectives of project quality management, but also conducive to the improvement and development of the whole construction industry and construction market. Therefore, we must consciously establish the quality concept of sustainable development. For example, in terms of quality management, pre analysis can be carried out for key parts, BIM Technology can be used to discharge bricks and blanking for secondary masonry, masonry pre-processing can avoid material waste, and on-site control can be strengthened; BIM Technology is used to deepen the BIM design drawing of form work steel stairs.

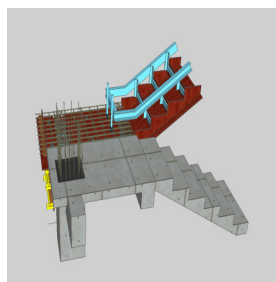


Fig.2 BIM design 3D drawing



Fig.3 Site entity diagram

4.2 Schedule management attaches importance to market factors

BIM related technical software and system are used for comprehensive progress management. It is formed by the combination of BIM Technology and 3D building technology, which is mainly used with the specific construction conditions and data in building construction. After the software analysis of professional

platforms and building software types, the implementation process of MVC system can be composed.

4.3 Investment objectives from opposition to win-win

There are various actors in the upstream, midstream and downstream of the construction industry chain, forming a complex stakeholder group. In view of the unfairness of traditional investment benefits, we should promote the improvement of the investment and income of project stakeholders, strengthen the effective management of stakeholders involved in the project, improve the management level of stakeholders, use BIM Technology Information management platform, establish good communication and cooperation relations, and clarify the responsibilities and rights of stakeholders. For the implementation of differentiated management for different stakeholders, it is necessary to set a region within which the project stakeholders can accept and realize benefit sharing. Under the win-win investment mode of project participants, all parties can maximize their own interests within a specific scope, whether from a static point of view or a dynamic whole process. Not only will the interests of all parties be met, but also the adverse impact on society and the environment will be reduced to the lowest point. In this way, not only the stakeholders have realized the positive transformation from sword to mutual benefit and win-win in the competitive state, but also the integration and coordination ability between man and nature, man and environment has been guaranteed, so as to truly realize the harmonious and win-win of project management. In addition, BIM Technology is used to control the cost management in each stage and link. Cost forecast, cost adjustment, cost accounting, cost analysis and cost assessment are the specific divisions of cost management. Reasonable and scientific control of the cost use of each link is of great help to save capital costs and human and material resources.



Fig.4 BIM design pipe gallery drawing

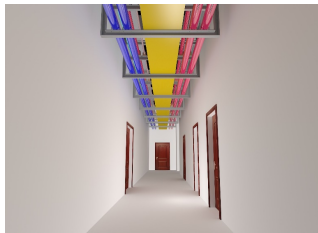


Fig.5 Site entity drawing of pipe gallery

In addition, we should also pay attention to the cost management in every stage and every link. Cost forecast, cost adjustment, cost accounting, cost analysis and cost assessment are the specific division of cost management. Reasonable and scientific control of the cost of each link is of great help to contract capital cost and human and material resources.

5. CONCLUSION

BIM is the general trend and will be a major industrial innovation for the construction industry. The three basic objectives of project management are unity of opposites and interrelated. We must correctly analyze the relationship between the three. Through the continuous application and exploration of BIM Technology in the construction industry, the general awareness of personnel in the industry has been improved. Through the thinking mode of using data in the data age, the public will be more recognized. Through the joint efforts of various parties, we will jointly promote the application of this technology, Make overall planning and innovative thinking to ensure the successful completion of the project.

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