An Analysis of the Impact of Engineering Design, Organizational Restructuring and Knowledge Integration on Project Performance in Bim Implementation

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Abstract: In the large-scale and complex project management, the fragmentation of the interface business process causes the problem of information integration, the weakening of the common project management plays a positive role, the implementation of large-scale public construction projects, and the application of BIM based design project management process driven information circulation and distribution chain information value chain theory, BIM scheme The new process cost is divided into three parts: information input factor, information processing domain factor and information output factor. This paper analyzes the impact of engineering design, organizational restructuring and knowledge integration on project performance, and puts forward some superficial views.

1. Introduction

2016 is the beginning of the 13th five year plan. With the continuous development of "link road" and other national strategies, the investment of various large-scale projects continues to increase. The total output value of China's construction industry is 195356.7 million yuan, an increase of 7.1% over the previous year, and the annual added value of the construction industry is 492.5 billion yuan, an increase of 6.6% over the previous year[1]. However, large-scale engineering projects have a long construction period, and large-scale investment is restricted by many uncertain factors, such as economy, politics, natural environment, etc. The complexity of project coordination management has increased significantly. Each stage of traditional project management is artificially decomposed into multi-channel separation process. Engineering project management activities are not continuous in different stages, which break the internal relationship between each link component, leading to the local block of information integration and common project management[2]. The weakening of affirmative effect. Since the introduction of business process engineering theory by Michael Hammer, an American Bachelor of management, in 1990, the theory has gradually been extended to the field of construction engineering management as an effective management method. The successful implementation of a construction project requires a series of unified management processes. In this paper, the actual project as an example, according to the past project management topics, the process of analysis and evaluation. This will optimize the process path and shorten the time of information transmission. Improve the efficiency of workflow transformation. Integrate the separated distributed process as a whole, support the collaborative work information provision, coordinate the construction and operation of the project, realize the rationality and purpose of the process, and finally achieve the overall best project.

Based on 3D digital technology, BIM integrates all kinds of information of construction project to realize the data model and functional characteristics of construction project facilities. The concept of BIM provides meeting points for the research and implementation of project management business process engineering[3]. From the perspective of cost prediction, dynamic resource management and on-site security management, domestic scholars and construction experts conducted a series of investigations on the core content of BIM Technology, such as data sharing and multi-dimensional integrated management. However, in order to carry on the research again, the literature of BIM Technology is very few. In this paper, the construction industry, how to

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optimize the construction schedule, assist management, management, and the value of integrated distribution, in order to maximize the realization of mature investment management, with the assistance of BIM, the construction method of parallel work innovation mode is studied.

2. Project Performance Analysis Based on Engineering Design

2.1. Principle Analysis of Implementation Path

The essence of engineering design is the reconstruction of information transmission, receiver, information transmission path and information transmission rules in the process of project management. Based on BIM data platform[4]. In this paper, based on the existing technology, the information transmission method is improved. BIM combines the information elements distribution method of each participant in the context to realize the possible way to explore the existing project management business process and the basic framework of information transmission, as the operation of information value chain, in order to jointly build the driving force of the project management business process of information transmission value chain mode We use BIM model information database and network interaction platform. According to the information of the information value chain, the participants of the project will carry out stage work, reconstruct the input, information flow field and value output end concretely and intuitively.

2.2. Information Value Chain Model Construction

This paper constructs three information value chain models: information input, information processing domain and information output. At the information input end, owners, designers, builders and super managers gather external information sources and integrate them into BIM collaborative network platform and information center of the project[5]. All parties may also obtain the necessary sources of information from the joint intelligence centre. The information in this process is messy and needs to be filtered and integrated through the information processing domain.

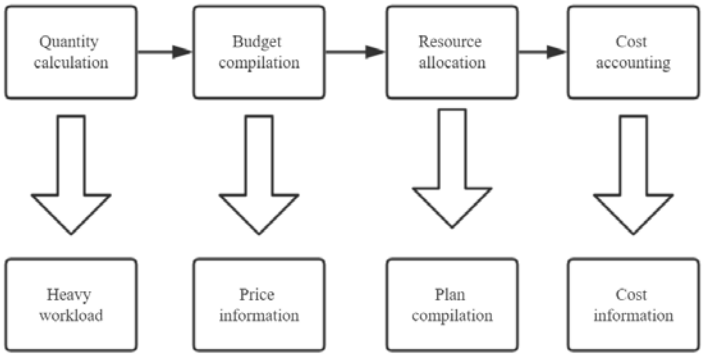

Figure 1 Problems in project performance

Information flow domain is divided into resource layer, interaction layer and information processing layer. Resource layer, BIM database, enterprise database coding database, enterprise BIM platform, project application standard, internal organization structure and productivity level function establish network platform and information center together according to condition BIM[6]. Resource database, indicator database, project management business process specific information activities and dialogues can be. The information processing layer establishes information flow area indicators, such as information acquisition amount, information utilization rate, information processing speed, intelligent integration rate and process optimization rate, and processes disordered information resources at the information input end. Through the path optimization and efficiency in the field of information processing, the lowest information loss at the information output end, the shortest information transmission link and the highest coverage dynamic output of the information receiver are realized to achieve the best business process.

3. Refine Knowledge Integration Process Domain Based on BIM

3.1. Implementation Path of Information Process Domain

In this section, the information process domain value link based on BIM Technology is improved for project management and business process redesign. Perform process analysis of regular processes to determine business process requirements. This achieves the highest coverage and three dynamic balances of the information receiver to achieve the minimum information loss, the shortest information transmission link and the best business process[7]. Set up information processing domain grading box, analyze business logic, design process, and establish information value chain model. Then, information acquisition and information use processing domain utilization ability and other information are filtered by the gray box input information, and the combined information chain business process information processing domain name gray box power applicable data access provides support for BIM database, resource database, etc. Through information aggregation, filtering and aggregation to establish information links, the information processing process is fed back to the gray frame to obtain effective information output[8]. BIM platform, cloud remote transmission platform, joint management of real world modeling and simulation platform, establishment and large-scale hardware system, such as scene rendering platform, staff and organizational structure, and improvement of application environment composition. For example, the input of cooperative management of information elements in each stage of the platform and cloud remote transmission platform, the work of all parties, in order to complete the transmission of information, the modeling and presentation of the real world platform image, is that in the real and reliable progress of current projects, the acquisition of UAVs, 3D printers, virtual glasses and other hardware systems and the visualization of resource factors can be achieved In the initial stage of building information processing domain system, the system realizes process optimization in the project management business process, whether it is confirmed or not. Continuously improve the system, maximize the comprehensive distribution value of the project, and optimize the business process. Information circulation based on BIM Technology

3.2. Advantage Analysis

Regarding the business process and information transmission of the transaction interface between the key stages of project operation, the work content and nature are totally different. It is necessary for participants to understand the change of process synergy from a macro perspective. From the micro level, it can be clear whether the current process adjustment point is the end point of the balanced operation of the business process control in this stage. Comparative analysis of advantages and disadvantages of BIM data platform and common information transfer value chain model based on traditional project management and business process.

4. Example Application

This section takes public construction projects as an example. This project is a large-scale major aviation industrial engineering project. That plan is difficult and complicated. It includes many organizations and many participating units, with many architectural details. In the process of design and construction, the specialty is strong and the requirement of joint operation is high. Bim-5d is well-developed management, the continuation and depth of BIM Technology in the application of construction projects, accurate information construction progress information, unified construction investment and cost information, schedule, as a digital real-time common platform for cost management[9]. In this case, the process of cost and other factors in BIM script, in the field of information input and information processing, the factors of factors and information output are divided into the responsibilities of each party, the information transmission links of each stage and all parties, and the optimized BIM includes collaborative system.

4.1. Information Input Terminal

In terms of information input, BIM platform relies on a variety of construction technical data such as common management, construction plan, schedule plan at all levels, website layout, and

secondary component deployment to provide drawings, BIM model for progress management and adjustment and assistance consultants, cost data of budget and budget cost, and regular monitoring. The above progress factors are used to determine the target progress, and they are incorporated into the collaborative work management platform as the input factors of progress management information to optimize the construction cycle and dynamically update the scheduling instantaneous data. Through the remote collaboration platform in the cloud, the cloud platform data of the project is updated in real time and the image data is uploaded, and all parties share it together.

4.2. Value Output Terminal

The completed network plan is associated with 3D model through BIM progress simulation platform, which can realize dynamic display and interactive transmission of progress information. Then, the visual simulation ends. Before the project is executed, the project manager can obtain the overall and local progress information of each node of the project more intuitively and quickly, and manage the construction progress of the project effectively. The above progress can be realized through simulation of information processing field, direct analysis and comparison of actual progress and schedule information, rationality and feasibility of construction schedule management and management, optimization and adjustment of project schedule. Taking the project as an example, the main structure was capped on October 19, 2016. Due to the effective utilization of BIM model and improvement of business process, the restart rate of the structure is zero. At present, the accuracy of the pre open inspection of the website is 100%, and the shape inspection of the special shape of the board edge meets the design requirements. At the same time, the correct modeling of styrene bar can reduce the turning of traditional styrene bar. Each construction process stores about one calendar day, the main construction phase, the planned construction time is 488 days, and the BIM mature model application effectively ensures about 23 days of the main structure.

4.3. Impact Analysis on Project Performance

Please establish a professional 3D information model according to the preliminary design drawing; model maintenance and packaging plan compilation, model information integrity, configuration naming and identification constraints. Then, other nodes control the calculation model to realize the effective transformation of 3D design model. All kinds of cost factors in the input end of value chain information of cost management process reengineering need to meet the requirements of accurate measurement and payment, accurate statistical information in the completion stage and data integration between the construction stages.

BIM based cost management business process this process focuses on reconstruction of 3D model-based estimation process and budget cost verification process in reconstruction and construction stage, complementing the actual case. The main application of redesign of cost management process in design stage. The design model is used to count the quantities and determine the estimated unit price of each sub item. This method optimizes the calculation model of the calculation model, and improves the accuracy of the BIM auxiliary estimation process by comparing the BIM calculation with the existing calculation of multiple algorithms. Project level "conservative and encapsulation plan of Revit pattern information", improve the naming of model information and components, control of key nodes of optimization calculation such as part identification of BIM model, and implement effective calculation model of 3D design pattern. As shown in Figure 6, the standard process of project level BIM calculation is established. In this example, the Revit model enters the calculation software through the plug-in, sets the list quota, and generates the scale BIM calculation model generated by calculation. Through comparative analysis, the minimum time limit of existing calculation is about 15 days, while the time required to obtain the project quantity after modifying, mapping and checking the model based on BIM model is about 10 days, saving nearly 1 / 3 of the time.

5. Conclusion

This paper explores the redesign of business process for project management based on BIM

Technology. This is the collaboration system of BIM, the responsibility connection of parties, the communication of poverty caused by the fragmentation of effective process, and the solution of the active unification of information in all stages and the role of joint management of projects, so as to enhance the implementation efficiency of practical work. In addition, with the introduction of information value chain theory, the new process in BIM context can be divided into information input factor, information processing domain factor and information output factor. Moreover, it can reconstruct the value chain with the same process brought by the effective participating architecture, and integrate all links and information transfer links to establish them in the interconnection state. According to the above embodiments, the advantages of business process engineering in the design stage are summarized. The application of collision detection, pipeline synthesis and other technologies in the design stage of construction drawings can greatly improve the design reliability and avoid the subsequent work delay caused by design change. Strengthen the controllability of the owner for the overall promotion of large-scale construction projects, and ask the builder to improve the timely submission of the project. For example, in the design phase of this project, 4209 conflict points have been solved, and the cost of more than 1 million yuan has been effectively saved. As for the construction cost budget, according to the modeling rules of the selected cost management BIM platform, the model modification model transformation method is used to convert it into a calculation model, which effectively reduces the calculation time and improves the accuracy of the processing amount.

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