Research on the Optimal Design of Soccer Robot based on the Mechanical Analysis

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Abstract. Based on the theory and research of building information model (BIM), this paper analyzes the advantages and necessity of building information model (BIM) in China's construction industry. At the same time, for the BIM application in the project cost management of the specific implementation methods, the whole process of cost management, information sharing and other aspects of the research ideas and development trends are analyzed and summarized. According to the current situation of China's construction industry, analyses the China will BIM application in the cost management of the existing obstacles proposed solutions, and prospects of application of Bim in the future trend of China engineering cost industry.

Introduction

Now it seems that the estimated project cost will be required to complete the measurement and description of the workload of project is not continuous but not for the accurate estimation of the project cost to provide a good foundation for the traditional method. With the development of science and technology, project cost management into the information age. Building information model (Building Information Modeling, BIM) is based on the 3D digital technology, data integration engineering construction project related information model. In this paper, the application of BIM in the management of project cost advantages, implementation method, the whole process of cost management, information sharing and other aspects of the specific methods or research ideas were summarized. At the same time put forward the current China BIM will be used in the cost management of the existing obstacles, predicts BIM will bring great change for China's future construction industry.

In 1975, the "father" of the BIM Chuck proposed by Professor Eastman in the future there will be a computer system can be intelligent simulation of buildings, which is named Building Description System". In the last century 80's, BIM's research is the impact of CAD, but the academic research did not interrupt. In Finland, some scholars have conducted the research on the computer model, this system is referred to as "Product Information Model". In 1986, American scholar Robert Aish put forward the concept of "Building Modeling", and this concept is now widely accepted the concept of BIM is very close to. Soon, the concept of Building Information Modeling is proposed. But by the computer hardware and software level, BIM also retained intelligence in academic research stage. After entering in twenty-first Century, the research and application of BIM has made a breakthrough. 2002, Autodesk company formally proposed the concept of BIM, then BIM this new term is widely accepted. Autodesk, Bently, graphisoft have introduced the BIM software and a number of projects in the world to achieve good results in practice. Now BIM seems to have become a practical problem can be solved in the engineering practice of production tools[1].

Advantages of engineering cost management compared with traditional cost control method based on BIM

We can see that using BIM model instead of drawing is used to calculate the cost of several major advantages: one is based on BIM automation method of calculating volume will liberate the

cost engineer from the relatively cumbersome calculations, saving more time and energy for more valuable work; the second is based on BIM automation calculation method is more precise than the traditional calculation method; the third is based on BIM automation calculation methods can be faster calculation workload, timely will involve the cost of the program back to the designer, easy in the early stage of design for cost control, can be better to deal with design changes.

Great changes and the current existing BIM technology to the field of engineering cost management brings, further explains the application of BIM in cost management advantages: one is the traditional method of optimization scheme greatly, it is difficult to find the conflict between the various professional before entering the construction phase, will lead to the waste of time delay, and BIM in the design of the early issues reflect the designer, the cost is also easy to modify; two is the engineering calculation more accurate, BIM greatly improves the accuracy of engineering quantity list; three is the progress payment is more reasonable, the actual cost of the BIM model and the establishment of 4D and relational database, we can accurately get the engineering quantity is four; dynamic cost analysis, the establishment of the project based on BIM 5D (3D, WBS, real time) relational database, time, space, process dimension can be established with the cost of the relevant data, the cost of Summary statistics and split corresponding was immediate; the fifth is to control material consumption, BIM can be through plan amount and the actual amount of contrast analysis, implementation of the implementation of dynamic management, establishing enterprise quota database, keep the quota of advanced and rationality, ascension based cost control ability, the total cost department, the financial department can be shared each project actual cost data and the realization of the project headquarters and the Ministry of information symmetry.

At present, there are three ways to estimate the project cost through BIM: first, the application program interface (API) in the BIM software and cost budget software to establish a connection. Two is the use of open database connectivity (ODBC) direct access to BIM software database. Three is output to EXCEL.

Now the general idea is to use BIM in the 4D time schedule based on the model to increase the cost of information, the formation of the 5 dimension of the cost model. There is a method that will involve additional data in the BIM model to extract the model, and import cost software, and cost information to establish a link. The first method is more recognized by the academic community, but also the inevitable trend of development in the future, but it is far from easy to implement second. Due to the quantity and price information is changing, the traditional cost management and design separates the, so the design of the program change need manual recount a set price, error prone, and the first scheme to avoid this problem, that is, to achieve cost comparison of different design and construction cost management integration and export, more efficient for decision-making to provide more scientific basis.

At present, scholars have put forward based on parametric technology and international cooperative alliance IAI formulation of IFC Standard Based on creating building information model, core data of production, and technology, economy, management and other ancillary data and core data integration through the use of BIM programming interface (API) ligatures Bim and the tool software . This technology allows the building information model of the system to use the federated database, IFC standards to achieve 3D to 5D or even nD integration.

Based on the BIM projects the whole process cost management that in the project decision-making stage, design stage, bidding stage, construction stage and the completion of the transfer stage can the application of BIM Technology to identify and cost control of the project. We can explain the whole process of cost management from the following aspects: in the decision-making stage, the parameters of BIM and component computability can quickly according to the engineering quantity statistics the information model of the proposed project or simply built model, combined with the rapid inquiry cost system, to complete the project estimation work in the case of no drawings. In the design stage; BIM model can quickly and accurately split the physical volume, to provide data support for the design; in the bidding stage, the construction units can be quickly transferred quantity information based on the BIM model in data information provided by the design units, the preparation of accurate quantities; in the construction stage, can be used for

BIM engineering measurement, construction organization design optimization, engineering change, claim management, project payment settlement, the planned use of funds and deviation analysis etc. Multiple aspects of cost management; in the final stage, BIM model database has a engineering data, cost information, detailed material such as a variety of information on the various components of the building, in the construction process of the database is continuously updated, in the completion of the transfer stage the amount of information has been completely expression engineering entity, accuracy of BIM model to ensure the efficient clearing[2].

Compared with the ancient architecture, modern architecture generally save engineering materials, and infrastructure construction of the higher, more ambitious, more strong, and the appearance of the form is also very changeable. It all depends on the project cost management and the role of.

Investment decision making refers to investors in order to achieve the expected investment objectives, the use of - of scientific theories, methods and means, through certain procedures of investment necessity, investment objectives, investment scale, investment direction, investment structure, investment costs and benefits of economic activity in major issues of analysis, judgement and scheme selection. Investment decision-making is an important part of the production process. It includes several aspects of project proposal, feasibility study, project evaluation and decision making.

Importance in investment decision making process

In terms of the current system and reality, the project cost management and control is the budgets, the budget and final accounts personnel according to the construction have been identified in the calculating engineering quantity, preparation of construction drawing budget, or at the end of construction drawings and construction organization design and construction site visa records and other information compiled according to the completion final accounts.

It is necessary and useful. Only when there is no problem to determine the drawings in order to more accurately determine the budget, which is in the whole project quietly increased the process of a drawing check. But we should also see, when the budget personnel to prepare the construction drawing budget or final accounts, the construction plan and the design drawings are already identified, and the construction is in according to the construction drawing principle, then budget personnel's work just to calculate the design change cost variation and prevent overestimate risk. And if the project is not reasonable in economy, there are mistakes in decision-making; if design technically not feasible or not optimal, budget personnel helpless. That is to say, under the current system, budget personnel editing work only after the autumn harvest, only passively reflect already complete engineering quantity, can only passively reflect design and construction, which is obviously one-sided, not enough. Therefore, it is necessary to supervise the whole process of construction project cost[3].

Project cost determination and control of construction projects throughout the entire process, but the decision-making phase of the various technical and economic decision-making, has a significant effect on the project cost. Especially with the appearance of the construction site selection, selection, construction equipment, building structure, directly related to the project cost. According to the statistics, in the project construction in various stages, investment decision-making stage influencing the construction cost of highest degree, that is, to achieve the content of 80% ~ 90%. The decision-making phase of the project decision is to determine the project cost, a direct impact on the decision-making stage of the various construction phases of the project cost control is scientific and reasonable. In the construction project investment decision-making stage, the project of technical and economic decision-making and economic benefit of construction project cost and project completed and put into production, the decisive influence, is the important stage of engineering construction cost control.

Project cost management personnel need in the decision-making stage is the preparation of the feasibility study report and the proposed project were economic evaluation, technically feasible construction scheme selection, and on the optimization of construction scheme based on, the

preparation of high quality project investment estimates, in construction projects to control the total investment of the project is.

In our country, now the rapid development of the construction industry, but the degree of development of project management, the project cost is far from enough, a lot of, between enterprises lack rational specialized division of labor and cooperation, making the allocation of resources in the low level of long-term. Many local and enterprise regardless of the economies of scale and layout of rationality, to repeat the introduction, redundant construction, project investment and resources serious waste; some industry many enterprises low level redundant construction, low level competition and fight in the civil war, which is extremely unfavorable to the development of national industry, is not conducive to integrate with the international practice, to participate in the world economic cycle. In the global economic integration, if a construction project in the early decision-making errors, regardless of the late stage of construction and implementation of cost management efforts, can not make up for its losses.

Construction of cost information sharing

BIM model is conducive to the construction of the whole life cycle management in the construction of engineering information in the sharing of the parties to reduce the level of information exchange barriers. According to BIM's core ideas, architects, structural engineers, control engineers, civil engineers, cost engineers and so on are working on the same building information model . If the project is related to the parties to the cost of staff can quickly and easily get BIM data, you can avoid repeatedly, repeatedly calculated data. BIM in the whole life cycle of the project to achieve data sharing, to effectively respond to changes in engineering design, saving a lot of manpower and material resources. Based on BIM engineering quantity calculation and cost management system management system can realize engineering quantity and all engineering entity data sharing and transparent, design, construction units, construction units commissioned institutions, construction side, supervision, such as can be unified project called Bim and the realization of data transparency, openness, sharing, greatly ensures the parties to the project objective entity data of the information symmetry[4].

existing problems

At present, BIM Technology has in our country developed rapidly and achieved certain results (such as Hangzhou Olympic sports center that was founded in 2007, and is by BIM provides basic data support and cost control), but Bim in application of our country is still in the primary stage, of potential value in terms of cost management haven't fully excavated. Problems exist in the development of different companies have not formed a unified system of software, the phenomenon can not be imported, resulting in technology and cost information is not shared .

Another difficult problem BIM for cost management is the material, the component will be different from different users, the use of BIM database information may appear to be unable to identify and match the problem. BIM information coding and classification system. The United States will have a classification system of UNIFORMAT 2 and MASTERFORMAT. Each component or material has a global unique identifier, the IFD (International Dictionary framework), China's existing "construction engineering quantity list valuation standard, the criteria for the classification is not direct application to BIM[9]. Therefore, in the future, to realize the automation and information of BIM, the need to be standardized, the various building elements and attributes to be clearly defined and classified, and the classification of information to be detailed and accurate.

BIM software to enter the China market due to the different industry norms and data interface, at present, the software is mostly used to the design level, want to realize the project cost information and the process of management, in conformity with the standards of construction industry in our country application software and data interface are indispensable. Relevant BIM technology standard system needs to be determined.

future trends

It appears from the present study, the multidimensional model of BIM is still in the stage of conception, project reality still less use of BIM, but BIM 3D model has in many projects expose

advantage. China is also actively developing BIM software. In the future, BIM 3D model will join dimension of time and cost dimensions and 5D building models are established, which is conducive to more rational arrangement of capital plan, material planning, personnel plan and plan of mechanical and to achieve real-time monitoring. In 5D, engineers can master the work of any time period, so as to calculate the cost of the time period, can be more accurate in the development of labor plans and funding plans. At the same time, in each member of the model of the BIM3D were unified coding problems solved, this in 5D building model under conditions of arbitrary statistics, separation, analysis will be possible[5], which not only can let the decision makers in multi dimension scheme contrast, but also can help to timely present problems and rectification engineering cost.

Conclusion

BIM model is conducive to the construction of the whole life cycle management in the construction of engineering information in the sharing of the parties to reduce the level of information exchange barriers. According to BIM's core ideas, architects, structural engineers, control engineers, civil engineers, cost engineers and so on are working on the same building information model . If the project cost personnel related parties can easily and quickly access to BIM data, you can avoid repeated and repeated calculation data. BIM in the project life cycle to achieve data sharing, can effectively deal with the engineering design changes, save a lot of manpower and material resources. Based on BIM engineering quantity calculation and cost management system management system can realize engineering quantity and all engineering entity data sharing and transparent, design, construction units, construction units commissioned institutions, construction side, supervision, such as can be unified project called Bim and the realization of data transparency, openness, sharing, greatly ensures the parties to the project objective entity data of the information symmetry.

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