Application Analysis of BIM in Modern Architectural Design and Renovation: A Systematic Study

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Abstract:Application analysis of BIM in modern architectural design and renovation is studied in the paper. he BIM technology has great advantages, BIM cloud platform technology can realize three-dimensional visualization dynamic management, file sharing, real-time communication and other functions, so that project management tends to be simplified and also faster. BIM technology is based on the establishment of the three-dimensional model to add information and data related to the project, through the establishment of the building model, and the use of digital information on the proposed building a high degree of simulation. This paper studies the novel ideas of the BIM to construct the efficient ideas.

Keywords: Systematic study; BIM; application analysis; architectural design; design and renovation

1. INTRODUCTION

BIM technology is called "building information model". It mainly integrates traditional two-dimensional construction drawing data with the three-dimensional digital technology to form a new engineering data model. The BIM technology has great advantages, BIM cloud platform technology can realize three-dimensional visualization dynamic management, file sharing, real-time communication and other functions, so that project management tends to be simplified and also faster, and then can further strengthen quality management and improve management efficiency.

Application points of the BIM technology in infrastructure management can be considered as the follows.

(1) In the general design phase, the main application of BIM technology is reflected in collision detection. The generation of 3D simulation diagrams on the basis of engineering design parameters can not only help the designers and technicians understand the situation of the construction materials more intuitively, but also help to verify design results, and further clarify the problems existing in the core design through the comprehensive collision detection.

(2) Based on BIM technology, it is still possible to carry out simulated construction before then formally entering the construction site, and timely predict and deal with possible problems in the project to reduce construction risks and also hidden dangers.

(3) The BIM design model is an important part of information management and smart construction. It is mainly reflected in precise positioning and three-dimensional display in the cloud platform. It is similar to the role of a chain to connect various engineering design, construction, operation and maintenance information in series.

Therefore, the data obtained by the traditional method of cost analysis cannot meet the requirements of the detailed cost analysis, and at the same time it is difficult to conduct report analysis, and it is also difficult to find the cost problem corresponding to a single project or a certain process, or to find out the specific cost problem. reason. The traditional cost analysis tends to the core financial analysis stipulated in the contract, because the cost statistics and analysis are often carried out after the whole project is completed or after a certain stage of construction, which has little influence on the cost control in the construction process. In the figure 1, the BIM structure is presented.

Figure. 1 The BIM (from: https://www.wsp.com/zh-cn/services/building-information-modelling-bim)

2. THE PROPOSED METHODOLOGY
2.1 The Application Analysis of BIM

BIM technology is based on the establishment of the three-dimensional model to add information and data related to the project, through the establishment of the building model, and the use of digital information on the proposed building a high degree of simulation. Demonstrate the excellent information collection function of the BIM technology, quickly call the surrounding environment of the site, draw 3D topographic basic data maps, and effectively analyze the environment of the production site.

Through the simulation and analysis of the site environment, combined with a new route optimization algorithm, simulate and generate relevant transportation routes suitable for the site environment. The different stage of the BIM applications can be summarized as the follows.

(1) The construction team uses the BIM technology and the information data to manage the staffing, building material usage, equipment and also equipment in each link of the construction, and adjust the general construction procurement behavior in a timely manner according to actual construction situation and market price changes, so as to avoid additional

cost changes during the construction stage. , so as to ensure that cost management of construction projects is scientific.

(2) Import the construction plan of the construction unit into the BIM model in advance, clarify the construction cycle of each process, and help the on-site construction personnel to fully understand the construction steps and site conditions by simulating the construction environment, and strengthen the progress control as a whole.

(3) In the decision-making stage, cost staff can simulate the proposed building model based on the built BIM model, information, and cost, and then calculate a more accurate investment estimate, providing a basis for the investment decision-making and financing, figure 2 shows details.
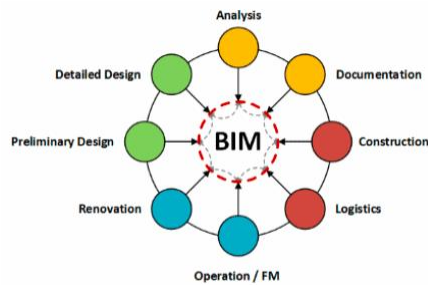

Figure. 2 Application Analysis of BIM (refer: https://www.dormakaba.com/tw-en/sales---support/bim-application)

2.2 The Modern Architectural Design and Renovation

There are usually two forms of the renovation of existing buildings: overall renovation and partial renovation. In the overall renovation, only the main structure is retained, and all electromechanical systems are redesigned.

Although the design of the system is similar to that of a new building, the design of the main engine room and main routing will be then restricted by the current civil engineering conditions. Reinforcement and transformation must ensure that it meets the purpose of the use, ensure the safety and durability of the building, facilitate construction and the later renovation and maintenance, and coordinate the economy with the environment.

Different structures have different performance requirements. When modifying structural performance, it is necessary to consider the remaining service life, the purpose of design and use, the importance of the modification and other factors. Specifically, combined with the two-dimensional drawings and the actual construction site conditions, BIM technology was used to model and design the building monomer and the construction site.

With the help of the parameters and visibility of the BIM technology, the design efficiency of the renovation project was improved, and at the same time It also allows operators to understand the microscopic structural space characteristics of the renovation project through the data model, and optimize the layout of the construction site.

3. CONCLUSION AND SUMMARY

Application analysis of BIM in modern architectural design and renovation is studied in the paper. The emergence of BIM technology has brought new ideas and solutions to China's existing residential buildings for energy-saving and emission reduction transformation, which helps the modern China's

existing residential buildings to then solve the real problems encountered in the transformation project, such as analysis of building structure, analysis of the building energy-saving and emission reduction capacity.

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