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The Application of BIM Technology in Cost Control of Prefabricated Buildings

Jinkun Sun[1,*]

[1] Rattanakosin International College of Creative Entrepreneurship
Rajamangala University of Technology Rattanakosin, Nakhon Pathom, Thailand,
*Email: paxf66290838@163.com
Corresponding author

Abstract

This paper studies the application of Building Information Modeling (BIM) technology in cost control of prefabricated buildings. The BIM technology control method is mainly studied for the whole life cycle of prefabricated buildings. Firstly, the assembly building, BIM technology, the whole life cycle cost of assembly building and its control problems are summarized, and the composition of the whole life cycle cost of assembly building is put forward. According to the division of the whole life cycle of buildings, this paper analyzes the cost control problems in six stages of prefabricated buildings: (1) the Pre-planning Preparation stage, (2) the Design stage, (3) the PC Production stage, (4) the Transport stage, (5) the Construction and installation stage, and (6) the Operation and recovery stage. Combined with the engineering practice, the researcher put forward the cost control method of the whole life cycle of prefabricated buildings based on BIM technology, and verified the effectiveness of cost management by combining with the case of prefabricated buildings. The research results provide a useful reference for the whole life cycle cost control of prefabricated buildings in enterprises.

Keywords: *Prefabricated buildings, BIM, life cycle, cost control*

1. Introduction

The development of prefabricated buildings is an important measure to promote the transformation and upgrading of the construction industry to industrialization, standardization and greening, and to achieve high-quality development. However, at present, the high cost of prefabricated buildings in China is one of the important factors that hinder its popularization and development (Zhang, 2019). And cost control is the most important of the "three major controls" of engineering projects, which will have a significant impact on the construction of engineering projects. Wang, Li & Wang (2017) pointed out that the market size of prefabricated buildings in China is not sufficient, the standardization degree is not high, the link between design and production is not close, and the technology of construction team is immature, which leads to the high cost and makes it difficult to exert the comparative advantages of prefabricated buildings.

Hong et al. (2018) considered the benefits of prefabricated buildings, established a cost analysis framework, analyzed actual cases and put forward countermeasures.

Building Information Modeling (BIM) originated in Europe and the United States, and has been a technological innovation in the field of engineering construction. It explores the key physical structure, functional characteristics and other comprehensive processes before the implementation of engineering construction projects in a digital way, improves the innovative design of projects by using coordinated and unified information in the integration process of projects, and simulates the appearance, performance, structure and cost of building entities through visualization (Zhou, Wu & County, 2014; Harhnann et al., 2012; Kim, Son & Kim, 2013). BIM technology, as a new computer-aided technology in the construction industry, has been considered as an effective means to promote the development of prefabricated buildings. It can improve the efficiency of the whole process of architectural design, production, construction, operation and management, and reduce the cost; so it has been widely used in the fabricated building industry. Barlow et al. think that information technology can greatly reduce the construction cost through the all-round application of information technology in residential industrial construction (Barlow et al., 2003). Bortolini, Formoso & Viana (2019) report that BIM model synergy can solve the complex problem of component scheduling.

In recent years, China's construction industry has gradually promoted the application of BIM, and the concept and value of BIM have reached consensus in the engineering construction industry. The application of BIM technology enables engineering and technical professionals to correctly understand and efficiently respond to all kinds of building information, and play an important role in improving production efficiency, saving costs and shortening the construction period. China's Ministry of Housing and Urban-Rural Development (2016-2020) proposed to actively promote the BIM-based construction management mode and collaborative working mechanism, build a project management information system, and give full play to the technical advantages of BIM in project planning, design, construction and operation. The application of BIM in China's construction industry is developing rapidly, but it is still being explored at the technical level for its relevant theoretical guidance. Ma, etc. discussed the application requirements of BIM from multiple demand levels, but did not point out the interrelation among various levels (Zhiliang, Zhenhua, Wu & Zhe, 2010). Cao, Wang & Huang (2017) analyzed the positive relationship between BIM practice and driving factors in China, and analyzed the resistance and motivation of BIM implementation at all levels in China's construction industry. In order to promote the application of BIM in the construction industry, China and various places have successively issued a series of policy documents to strengthen the popularization and application of BIM. For example, Beijing, Shanghai and other cities have successively launched BIM development plans and application targets. Local large-scale design enterprises and construction enterprises have set up BIM technology research and development departments to carry out collision tests and use models to analyze parameters such as environment, energy consumption and appearance (Li et al., 2014). However, they are mostly limited to the technical level and lack of theoretical guidance.

The combination of prefabricated buildings and BIM is still in its infancy. BIM technology is still lacking in measurement, quantification, connotation analysis and systematic research on the application value of prefabricated buildings, especially on the whole life cycle of prefabricated buildings. The whole life cycle of a building is interpreted in Wikipedia as *the adaptation of product life cycle management (PLM)-like techniques to the design, construction.* (Zhang, 2018) explained the whole life cycle cost as the sum of the funds invested in a project, The project here refers to the whole life cycle process of the project, including the whole process from the project proposal to the final project termination (Gao, 2018). Therefore, this paper studies the value of BIM cost application in prefabricated buildings.

Cost control runs through the whole prefabricated buildings construction process, including not only the pre-construction planning and design stages, but also all the processes that affect the cost, such as the use of after-sales users. Nicolaou (2013) thinks that cost control management is the core of the whole life cycle management of prefabricated buildings. Anvari, Angeloudis & Ochieng (2016) rely on the advantages of algorithms to establish the model of the whole life cycle of prefabricated buildings, hoping to solve the resource allocation problem in the whole life cycle by optimizing the coordination among various departments. Bartlett & Howard (2011) measured the economic benefits of prefabricated buildings from the perspective of life cycle by collecting relevant data of completed projects, so as to decide whether managers should develop prefabricated buildings or not.

2. Dividing the Whole Life Cycle Stages of Prefabricated Buildings

The whole life cycle of an assembled building refers to the whole process of dismantling and recycling of an assembled building project from project planning to project completion and the end of its life. In this paper, the whole life cycle of prefabricated building projects is divided into six stages, which are Pre-Planning Preparation, Design, PC Production, Component Transportation, Construction and Installation, Operation and Recovery (Li, 2018).

On the basis of consulting a large number of relevant periodical literatures, Jiang (2021) also divided the cost control composition of the whole life cycle of prefabricated buildings into six stages, as shown in Figure 1.

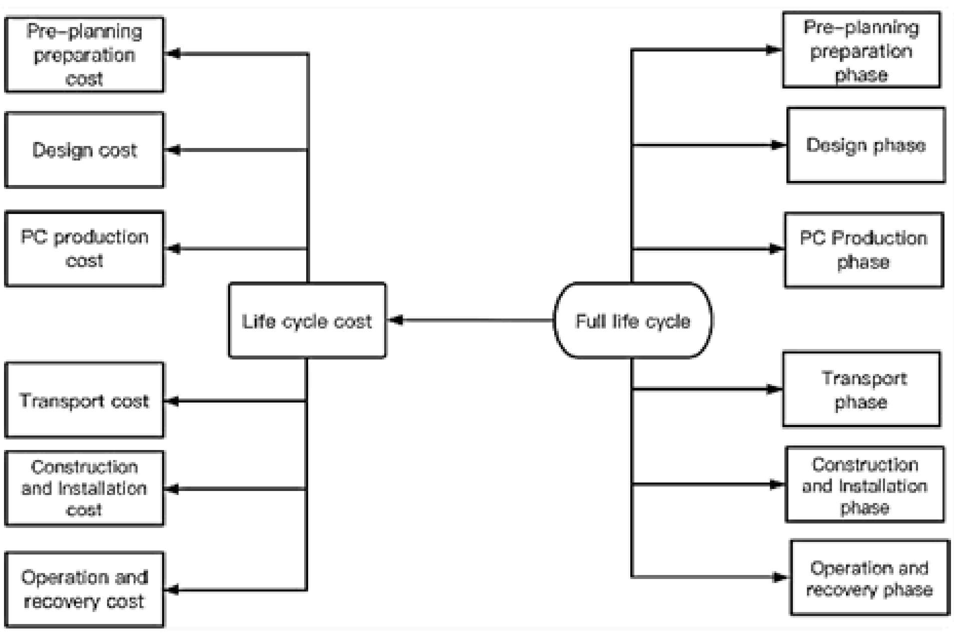

Figure 1: Six Stages of Life Cycle Cost of Prefabricated Buildings

Figure 1 shows the following:

(1) The Pre-planning preparation stage of the project (the first stage). In order to facilitate all subsequent construction activities, the total cost of the preparatory stage is collectively referred to the preparatory cost; for example, land requisition and compensation fees, bidding fees, and equipment purchase fees.

(2) The Design stage of the project (the second stage). This stage is mainly the building, structural design and PC component design of prefabricated buildings. BIM technology visualizes PC components, aiming at improving the efficiency of producing and processing components, transporting components to the construction site in a shorter time and facilitating the installation of components. The cost incurred in this stage is the design cost. For example, the cost of labor for designing components is called labor cost.

(3) The component production stage (PC Production) of the project (the third stage). In this stage, PC components are mainly produced in the factory, and the expenses incurred from this are the production cost, such as the production cost of PC components.

(4) The transport stage of the project (the fourth stage). Different from the traditional transportation cost, the cost at this stage mainly refers to the cost of transporting components from the factory to the construction site after processing, production and maintenance, which is called transportation cost, such as the transportation cost of unit components.

(5) The construction and installation stage of the project (the fifth stage). After the PC arrives at the construction site, the construction personnel install the components according to different requirements and schemes. At this stage, the expenses incurred due to installation are called installation costs.

(6) The operation and recovery stage of the project (the sixth stage). After the completion of the project, the expenses for the convenience of subsequent normal operation and the expenses for dismantling and recycling components are called operation and maintenance costs. The costs at this stage mainly include operation and management costs, maintenance costs, renovation and upgrading costs, user use costs

3. Cost Control in the Whole Life Cycle Based on BIM

3.1 Assembly Building Life Cycle Cost Estimation Model

Life-cycle costing is an economic analysis method, which aims at all costs related to construction, operation and maintenance of construction projects within a defined time period (Yang, 2021). According to the whole life cycle cost composition of the above-mentioned prefabricated buildings, the whole life cycle cost estimation model of the prefabricated buildings is constructed, and all the costs generated in the whole life cycle of the project are estimated. The calculation method is as follows: Formula 1:

$$C = C_0 + \sum_{t=1}^{n} \varphi_t C_0 (1+i)^{-t} + \left[\mu C_0 (1+i)^{-n} - S(1+i)^{-n} \right] \quad (1)$$

In the formula:

C— $Building\ life\ cycle\ cost$

t— $Service\ life\ of\ building$

φ_t − $Service\ cost\ coefficient\ in\ year\ t$

C_0— $The\ construction\ cost\ incurred\ in\ the\ planning\ and\ design, production\ and\ transportation, construction\ and\ installation\ stages\ of\ the\ building$

i − Discount rate over life

μ − Correlation coefficient of demolition cost

n − Service life of the building

S − Recovery income from construction

By linking the cost data of each stage, the whole life cycle cost of prefabricated buildings and cast-in-place buildings can be calculated by using Formula 1.

3.2 Cost Control in the Preparatory Stage of the Project

3.2.1 Data Sharing

The visualization of BIM model can help bidders understand the conditions proposed by the tenderee, avoid the generation of information islands, ensure the common sharing and traceability of data, control the accuracy and accuracy of economic indicators, avoid the falsification of building area and height limit, and reduce the cost of data information acquisition.

3.2.2 Paperless Bidding

Achieve paperless bidding, thus saving a lot of paper and binding costs, and truly achieving green, low-carbon and environmental protection;

3.2.3 Integrate Bidding Documents and Cut Bidding Costs

Integrating bidding documents and cutting bidding costs can realize the trans-regional, low-cost, high-efficiency, more transparent and modern bidding, and greatly reduce the labor cost of bidding.

3.3 Cost Control in Design Stage

In the component design stage, the information stored in BIM software system is used to manage the cost of prefabricated buildings, predict and analyze the cost control, collect information using BIM as a platform, and perform the performance design and cost optimization of buildings (Ren, 2019). The schematic diagram of BIM application system is shown in Figure 2.

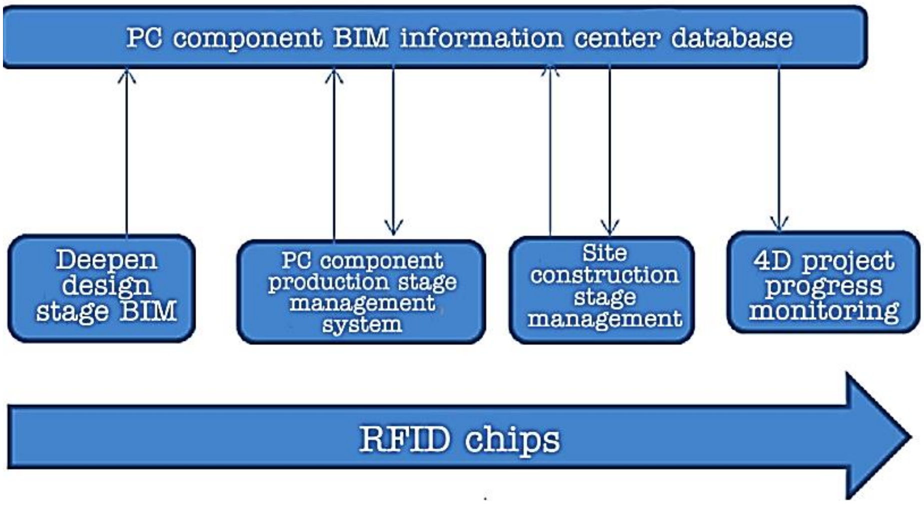

Figure 2: Schematic Diagram of BIM Application System

Using BIM technology to build BIM Component Model Library can improve the standardization of prefabricated components. Building BIM collaborative platform, forming BIM 3D collaborative design, summarizing professional information, and taking measures, such as pipeline synthesis and collision inspection can improve design quality and management efficiency, and avoid the cost increase caused by later design changes (Yang, 2021).

BIM technology provides the bottom support for collaborative design of prefabricated buildings and greatly improves the technical content of collaborative design (Ren, 2019). With the technical advantages of BIM, the scope of collaboration has also expanded from the simple design stage to the whole life cycle of the building, which requires the collective participation of all parties, such as planning, design, construction and operation. Therefore, it has a wider significance, thus bringing about a substantial improvement of comprehensive benefits.

3.4 Cost control in PC Production Stage

Different from traditional building methods, prefabricated buildings need to produce prefabricated components in the factory after the design is completed, which is also a unique link of prefabricated buildings. The direct application of BIM model in manufacturing can also form a natural feedback loop between manufacturers and designers, that is, in the process of architectural design--considered in advance to realize digital construction as much as possible (Wu & Pan, 2018). Sharing the component model with the manufacturers participating in the bidding is also helpful to shorten the bidding period, and it is convenient for manufacturers to prepare more unified bidding documents according to the required component amount. At the same time, the coordination between standardized components will also help to reduce the problems on site and the rising construction and installation costs. There are many kinds of prefabricated building components, and the manufacturing process of each component is a complex collection of information. Using BIM technology, information is embedded in components and links, combined with RFID technology, so as to manage the production, storage, transportation and hoisting of components. Then, according to the on-site production conditions, the results of the design stage are supplemented and improved, and finally the production and processing drawings of various types of prefabricated components are formed. With the information content of the deepened BIM model, the information that components have when they are manufactured in the factory has completely reached the precision of component manufacturing (Li, 2018). Therefore, when components are manufactured in the factory, the information needed for production can be effectively extracted.

During the production of components, the BIM model is used to design the mold according to the factory equipment conditions. Through its 3D model, the specification, size, strength of the mold and the positioning of embedded parts can be checked, and any problems found can be corrected in time (Li, 2018). Compared with other products, prefabricated building components are quite different, so it is required that the shape and size of their molds are absolutely accurate, and the larger errors will seriously affect the follow-up work. Therefore, the requirements for the production process of the mold are more stringent, so as to improve the universality, interchangeability and practicability of the mold, thus ensuring that the mold can be used many times in the production process so as to prolong its life cycle and save the production cost. As the model provided by BIM technology has very specific and detailed information, component manufacturers can prepare and arrange materials, funds and technologies in a shorter time, and production managers can purchase and use very accurate raw materials according to the information in components, so as to achieve intensive management of component production and reduce costs.

3.5 Cost Control of Transportation Stage

In the component transportation stage, there are many factors that affect the transportation cost, such as transportation route, transportation batch, transportation batch and transportation price. In addition to the economic cost, the time cost should also be considered. If the transportation time and route are not properly selected, such as the route with heavy traffic or bad road conditions, the transportation cost will be affected. Therefore, it is an important task of cost control in the transportation stage to complete the spatial transfer of components in the most economical way, timely, accurately and safely (Yang, 2021).

BIM technology plays a positive role in realizing information and intelligence of transportation, improving transportation efficiency and reducing transportation costs. In the component transportation stage, BIM technology generates a 3D digital terrain model according to the topographic data (elevation, control points, and the like) of the project area, highly restores the original topographic features of the transportation terminal, and then simulates the transportation process of components. It can improve transportation efficiency and save transportation costs by selecting transportation tools according to the volume, quality and size of components, reasonably selecting transportation routes according to the location and road conditions of the transportation terminal, formulating the optimal transportation scheme, reasonably arranging transportation time and reducing on-site stacking.

At the same time, combining the advantages of BIM technology and RFID technology, the transportation route can be optimized in time according to the road conditions, the transportation process of components can be efficiently completed, the transportation cost can be reduced, and the transportation cost can be controlled.

Using BIM technology to standardize the design of molds can improve the turnover times and efficiency of molds and reduce amortization expenses. Simulate the loading and unloading sequence of components, and formulate a transportation route that efficiently cooperates with the site construction, can improve the full load rate and reduce the cost.

3.6 Cost Control in Construction and Installation Stage

3.6.1 Cost Control in the Early Stage of Construction

The cost control in the early stage of construction mainly includes the following:

3.6.1.1 Bidding Stage

This stage includes the preparation of the main business standard and technical standard. BIM software is used to calculate the cost, so that the cost personnel are separated from the huge memory and calculation, and the work efficiency is improved. In the production of technical bid, BIM technology is used for virtual construction, and the simulation of high-tech parts is used as an auxiliary explanation, which can increase the persuasiveness of technical bid. In addition, the use of BIM for collision inspection and optimization of pipeline scheme can also increase the recognition of the bidding unit for its technology. Therefore, in the bidding stage, the application of BIM can bring good results, whether it is a commercial bid or a technical bid.

3.6.1.2 Cost Control in Signed Contract

The signing of the contract is mainly based on the ownership of the project cost and responsibility. Using BIM software, the project cost can be easily calculated, and the cost generation process can be formed considering the time. In addition, using BIM for collision inspection can effectively reduce the problems existing in the scheme, reduce the occurrence of claims and ensure the smooth progress of the project. At the same time, BIM technology has the function of information sharing, which promotes the interaction of engineering information and improves the work efficiency.

3.6.1.3 Construction Preparation Stage Control

This stage includes construction organization design and cost planning. BIM technology can be used to optimize the construction scheme, design the construction layout, and show it in the construction organization design in three-dimensional form. In addition, the pipelines in the construction scheme can be optimized by BIM to prevent the construction progress from being affected by on-site pipeline problems. The cost plan is the guiding document of cost control, which can be compared with similar projects that have already been completed. BIM contains all the data of completed projects. Simulating the cost plan through BIM can not only ensure the accuracy of the data, but also complete it in a short time.

3.6.2 Cost Control during Construction and Installation

3.6.2.1 Optimization of Construction Organization

With the help of BIM simulation of construction organization, the project manager can intuitively understand the time nodes and installation procedures of the whole construction and installation process, and clearly grasp the difficulties and key points in the installation process. The construction party can further optimize and improve the original installation scheme to improve the construction efficiency and safety of the construction scheme. BIM technology is used to arrange the construction area of the construction site, set up passages and railings according to safety requirements, and realize visual management within the construction scope. The simulation function of BIM related software and platform can simulate the traffic organization at the construction site. With early warning of possible risks in the construction process by selecting different parameter settings and comparing various hoisting schemes, the final optimal scheme is formed to improve the efficiency of construction and installation and reduce the assembly cost of components. BIM can be used to realize the comparison of time and process, and determine the cost control of the project in different time periods.

3.6.2.2 Construction Schedule Simulation

With the link of BIM with the construction schedule, the spatial information and time information are integrated into a visible 4D (3D & Time) model, which can intuitively and accurately reflect the construction process of the whole building. Simulation technology can reasonably formulate a construction plan, accurately grasp the construction progress in 4D, optimize the use of construction resources and scientifically arrange the site, and manage and control the construction progress, resources and quality of the whole project in a unified way, so as to shorten the construction period, reduce the cost and improve the quality (Cui, 2021). In addition, with the help of the 4D model, construction enterprises will gain competitive advantage in bidding for engineering projects. BIM can help bid evaluation experts to quickly know from the 4D model whether the bidding units control the main construction of the bidding projects, whether the construction arrangement is balanced, or whether the overall plan is basically reasonable, so as to effectively evaluate the construction experience and strength of the bidding units.

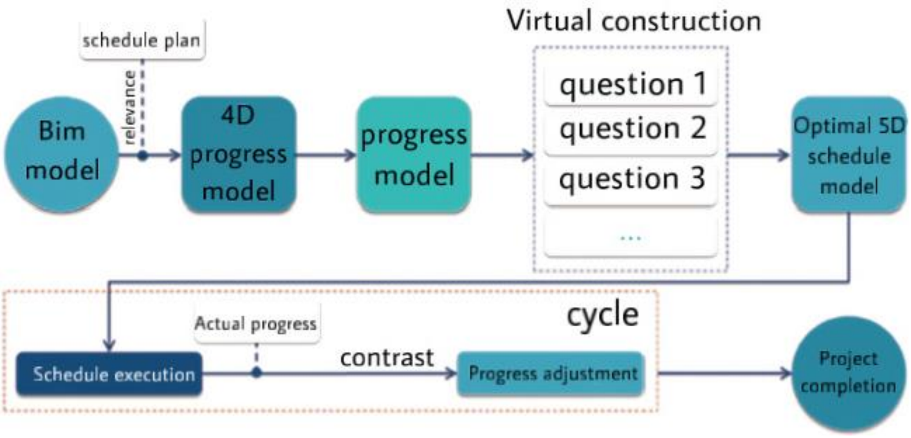

Figure 3: BIM-Based Construction Schedule Management

3.6.2.3 Optimization of Construction Scheme

In the construction stage, using BIM to simulate construction is beneficial to reduce construction collision and the possibility of rework. On-site safety management with BIM can effectively reduce the occurrence of safety accidents by marking and enclosing dangerous areas (Li, Hong, Xue, Shen, Xu & Mok, 2016). At the same time, using BIM for technical disclosure can more intuitively and profoundly convey the information to the field operators, thus preventing the loss caused by improper operation. BIM is used for simulation analysis, supply of materials on demand, and reduction of inventory and cost. According to the progress data of BIM and the cost software, the project cost can be monitored in real time to prevent the cost from getting out of control. The perceptual judgment in the project can be reduced while taking the engineering data as the standard to guide the subsequent construction. The value of funds can be maximized and waste reduced.

3.6.2.4 Cost Control in Completion Settlement Stage

Completion settlement plays an important role in the process of project cost control, and it is also an important link to determine the total project cost. The traditional settlement process is carried out according to two-dimensional CAD drawings, and the workload is huge. The establishment of BIM model is gradually supplemented with the progress of the project, and it contains almost all the information of the project. Using the professional module of BIM software for accounting is simple, convenient and quick to operate.

3.7 Cost Control in Operation Recovery Stage

3.7.1 Cost Control in Operation and Maintenance Stage

During the service life of a building, both the prefabricated building structure facilities (such as walls, floors, roofs, and other parts) and equipment facilities (such as equipment and pipelines) need to be constantly maintained (Kamali & Hewage, 2016). The BIM model combined with the operation and maintenance management system can give full play to the advantages of spatial positioning and data recording, make a reasonable maintenance plan, and assign special personnel for special maintenance work, so as to reduce the probability of unexpected situations in the use of buildings. Through BIM technology, we can intuitively see the material type and size of the damaged parts, and the diameter of steel bars, specifications and manufacturers' information, which makes the maintenance work more convenient and efficient, improved at the maintenance level of construction projects in the operation and maintenance stage, while reducing unnecessary cost waste. For some important equipment, you can also track the historical records of maintenance work, so that you can judge the usage status of the equipment in advance. These help improve the performance of prefabricated buildings, reduce energy consumption and repair costs, and lower the overall maintenance cost.

With the help of BIM technology, environmental facilities around prefabricated buildings can also be managed. For example, electronic tags are installed on the access control system through BIM and RFID technology. Managers can quickly locate the equipment to be repaired through the electronic tags, and then record the maintenance on the electronic tags.

3.7.2 Cost Control in Dismantling and Recycling Stage

3.7.2.1 Accurately Formulated the Demolition Plan

When BIM technology is applied to the establishment of the demolition scheme of prefabricated buildings, comprehensive and effective data information from the planning and design stage to the operation and maintenance stage of buildings can be obtained, and the demolition quantities can be comprehensively grasped in advance, so as to establish a scientific and reasonable demolition scheme, optimize the whole process and reduce the cost from the source.

3.7.2.2 Improve Demolition Efficiency

When BIM technology is applied to the actual demolition site, demolition simulation can be carried out before the actual demolition, which can reduce various risks in the process of demolition, not only improve the efficiency of site demolition, but also avoid the increase of cost and minimize the loss.

3.7.2.3 Improve the Recycling Rate of Components

When dismantling prefabricated buildings, BIM technology can be used to screen out recyclable resources through BIM model for secondary development and recycling, so as to improve the recycling rate of components as well as the cost-effectiveness.

Through the above cost control analysis of six stages of the whole life cycle of prefabricated buildings based on BIM technology, it can be proved that BIM technology can act on each stage of the whole life cycle of prefabricated buildings, and all of them play a key role (Wang, 2018). It is equivalent to the main line of "integration," which links all the subjects and stages involved in the building together. According to its own natural advantages of visualization, coordination and simulation, it integrates all the information of the project efficiently and centrally to achieve the effect that information can be shared, consulted, added and modified at any time, facilitate the dynamic updating of data and ensure the accuracy of data (Han & Golparvar, 2015). Not only that, it can find and solve problems at any time by simulating the process of construction and demolition, and effectively control and reduce the cost of prefabricated buildings (Long, 2018).

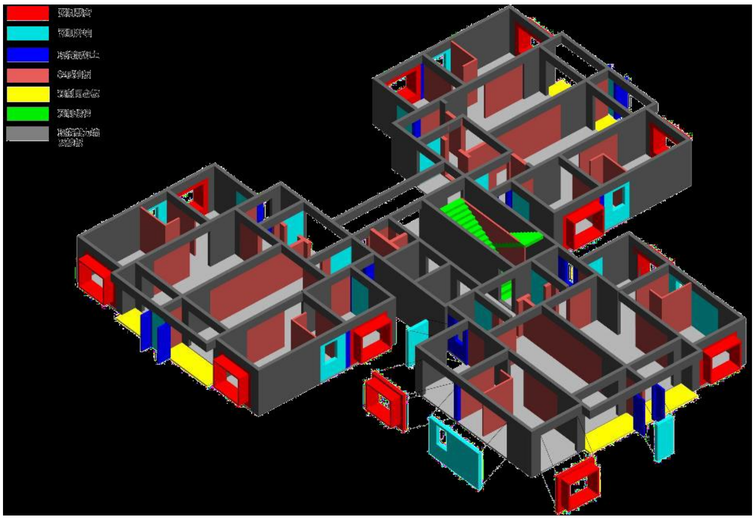

Figure 4: A Prefabricated Housing Project

4. Case Analysis of Prefabricated Engineering Project

General situation of the project: a demonstration project of a prefabricated affordable housing project: 32 floors, with a height of 2.9m, with a single building area of 14,793 m^2, with a prefabrication rate of 24.32% and an assembly rate of 57.45%. The project adopts BIM technology for construction, and Figure 4 shows a building model adopting BIM technology, which adopts structural and mechatronics design to realize the control of the whole construction process.

This project combines BIM technology with prefabricated buildings, and has the following technical characteristics:

(1) This project combines BIM technology with geographic information system (GIS) to obtain on-site information and data, in which GIS technology is used for data analysis and BIM technology is used for modeling. Therefore, decision makers can make reasonable planning. For the information of components, BIM technology can also be used to determine the size of component and material database. At the same time, because BIM modeling can provide complete engineering data, cost personnel can use BIM technology to calculate in the cost budget stage, which not only reduces the work intensity but also improves the cost accuracy. In the construction stage, the 5D visual management of BIM technology (Smith, 2016) is adopted to integrate labor, materials, machinery and other related resources in the construction process, compare the construction situation with the construction scheme at any time, and coordinate and adjust effectively. In order to ensure that the constructors, supervisors, owners and other personnel can clearly understand the project situation, the data of the whole building will also be stored for a long time, so as to facilitate the later management of the building construction.

(2) Unity and standardization: the project implement Standardized modules and diversified combinations, Assembly of the main structure, Finished enclosure structure, Industrialization of interior parts, Informatization of design, Construction and operation, and Two-star green building with 65% energy saving. Balcony, wallboard, floor slab and stairs are used as unified components. BIM technology is used to design standard components and modules, which are then delivered to the factory for production.

(3) Integration: The core of prefabricated buildings is integration. The designer adopts the mechatronics design of Revit building structure, from the solution to the construction drawing, factory production, transportation and site assembly, and takes into account the future demolition of buildings, so as to realize the integrated design and control of the whole building life cycle.

According to the calculation formula 1 of the life cycle cost estimation model of prefabricated buildings, the cost data of each stage can be linked, so that the life cycle cost of prefabricated buildings and cast-in-place buildings can be compared. The life cycle cost of fabricated buildings and cast-in-place buildings are calculated. [The details of the calculation and statistical analysis

are not shown in this paper].

Through calculation and analysis, it can save 64% of consumables, 37% of water consumption, 29% of energy consumption, and 34% of construction period. Compared with the traditional cast-in-place building, BIM technology is adopted for management and implementation, and the cost savings of the standard floor structure of the prefabricated building is 79,200 yuan,

which is considered cost-effective.

5. Conclusion and Prospect

The researcher concludes the study and suggests its prospect ac follows:

(1) By studying the theories of BIM and the cost control of prefabricated buildings at home and abroad, and the research and application status of BIM in the cost control of prefabricated buildings, the researcher found the expounded value of BIM in the cost control of prefabricated

buildings. Combined with the theory of building life cycle, the formation process of prefabricated building project is divided into six stages: preliminary preparation stage, design stage, manufacturing stage, component transportation stage, construction and installation stage, and operation and recovery stage. Combined with engineering practice, the cost control method of each stage of prefabricated building life cycle based on BIM technology is put forward, and the conclusion is drawn: BIM technology can control the whole life cycle cost of prefabricated building, making the project cost more reasonable.

(2) According to the analysis and demonstration of the actual project case cost, the cost control of prefabricated construction project based on BIM has obvious advantages compared with the traditional construction cost control, which is worth popularizing.

(3) The research results provide a beneficial reference for the whole life cycle cost control of prefabricated buildings in enterprises.

(4) Limited by the lack of reference to actual engineering cases of cost control in operation and recovery stage of the whole life cycle of prefabricated buildings at present, further research and accumulation of more data on the whole life cycle cost control of prefabricated buildings with the use of BIM technology are expected to yield good benefits to the construction industry in the near future.

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7. The author

Jinkun Sun has a Ph.D. in Management from Rattanakosin International College of Creative Entrepreneurship, Rajamangala University of Technology Rattanakosin,Bangkok 10700, Thailand. His research interest lies in the areas of financial management, BIM technology, and cost control of prefabricated buildings.

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