

The Research on Comprehensive Benefit Evaluation and Optimization Strategy of Prefabricated Public Rental Housing

Yao Wang, Qin Tao, Changnan Tao

Chongqing Real Estate College, Chongqing, China

Keywords: Prefabricated, Public Rental Housing, Comprehensive Benefits, Evaluation and Optimization

Abstract: with the acceleration of urbanization in recent years, the seriousness of the housing problem caused by rising house prices has also increased. In order to alleviate the pressure on residential housing, the government has increased the supply of public rental housing, and made the construction of public rental housing an important part of the urbanization process. Under the leadership of the municipal government, actively raise financial funds, sort out the basic situation of the continued construction of social housing in the city, actively raise public rental housing for talented apartments, and effectively solve the problem of introducing talented housing in the city. However, the main problem in the construction of public rental housing is how to promote the large-scale development of public rental housing efficiently and quickly. In general, the construction of public rental housing has the characteristics of large scale, small house area, and high standardization, which provides favorable conditions for the prefabricated house construction. This article will analyze the prefabricated houses in the construction of public rental housing, and conduct in-depth research on the comprehensive benefit evaluation and optimization strategies of public rental housing.

1. Introduction

Urbanization is a key proposition of the modernization of Chinese society. Urbanization is not only the urbanization of population and industry, but also the agglomeration effect of production activities. However, there are two prominent features in china's urbanization: on the one hand, urbanization of land is faster than urbanization of the population; one of the incomplete phenomena is that the “non-citizen” treatment of housing by urban “informal” immigrants such as migrant workers has severely curbed domestic demand, which is a major obstacle in china's economic development. Therefore, gradually transforming urban “informal” immigrants into urban residents is an important task to promote urbanization. Among them, the most important is to solve the housing problem of urban “informal” immigrants. In addition to the state's related policies on supplying low-rent housing for the lowest income group and affordable housing for the middle-income group, public rental housing is proposed as a new type of affordable housing concept that is different from low-rent housing and affordable housing. It aims to meet the housing needs of people whose income exceeds the application criteria for low-rent housing, but who cannot afford to buy affordable housing, and whose income exceeds the application criteria for affordable housing, but who cannot afford to buy commercial housing [1].

2. The Bim Technology

2.1 Definition and Concept of Bim

BIM is a concrete embodiment of the application of information technology in the construction industry. BIM technology uses three-dimensional modeling to add relevant information generated during the entire life cycle of the construction project to the three-dimensional model, to control and manage the design, production, construction, decoration, and management processes, and according to the completion of the project at each stage by continuously updating the existing database, a

multi-dimensional data model is finally established, and information related to various stages of the project is integrated through the information model to build a resource information platform that can be shared by all parties in the project [2].

2.2 How Bim Works

Before the BIM revolution, the design method of plane drawing adopted a three-dimensional architectural design method, which can visually show the full picture of the construction project, the connection of various components, detailed methods, and pipeline layout, so that designers can more clearly control the rhythm of project design and improve design quality and efficiency, shown as Fig.1. In addition, BIM technology integrates the data of relevant parties in the entire construction project to build a data platform [2]. The platform can provide complete and accurate information about the entire construction project.

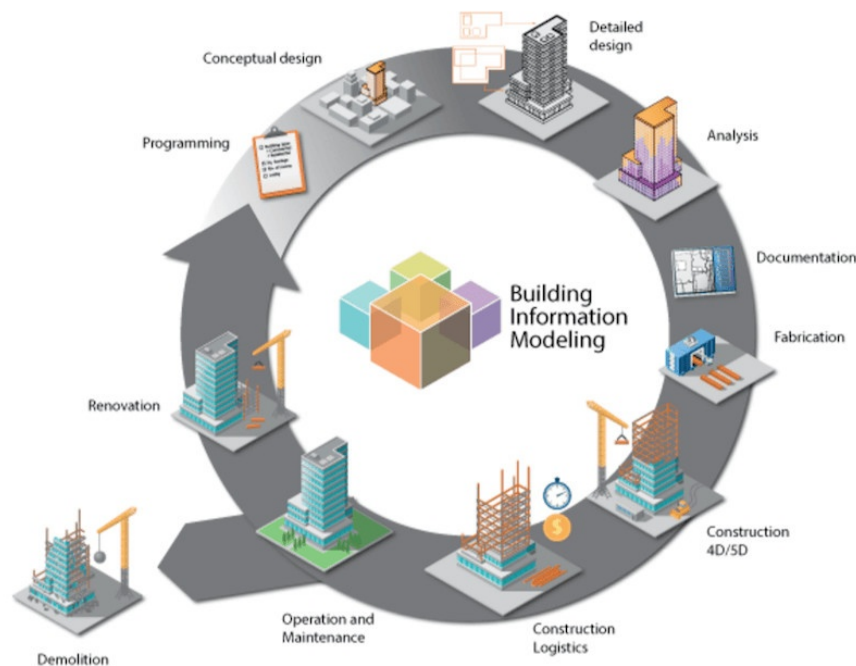


Fig.1 Application of Bim Technology in Prefabricated Buildings

3. Influencing Factors of the Application of Prefabricated Type in Public Rental Housing

The development of China's residential industrialization is relatively slow. The production of residential prefabricated components using industrialized production methods, followed by rent construction, can meet the rapid and efficient demand for public rental housing construction. In addition, prefabricated houses can maximize the use of resources, reduce the waste of resources and environmental pollution caused by traditional house construction, reduce the cost of houses, and improve the economic benefits of houses [3]. However, there are still many influencing factors in the application of China's prefabricated residential buildings in the construction of public rental housing, which will be analyzed in detail below.

3.1 Policy Factors

Although the current state strongly supports the construction of public rental housing, in the industrialization of prefabricated housing, the relevant policies and regulations are not systematic and complete, and there have been many ambiguities [3]. In addition, from a technical point of view, the industry production technical specifications are not complete. Due to the inadequate system of policies and regulations, in the process of promoting the industrialization of prefabricated residential buildings in many regions, their production standards lack a uniform basis, and the quality and safety of the components produced are not guaranteed [2]. The flooding of various components in the

market will affect the quality and safety of public rental housing, which will adversely affect people renting or purchasing prefabricated public rental housing.

3.2 Economic Factors

Under the condition that the prefabricated industry has not yet fully developed, the industrial scale is not sufficient to support the large-scale construction of public rental housing. The prefabricated components in the early stage are relatively expensive, the construction cost of public rental housing is increased, and the cost reduction caused by large-scale construction requires a period Time transition. However, due to the limitation of the income level of residents, there is insufficient support for public rental housing construction [3]. There are not many manufacturers of prefabricated components, and fewer manufacturers are proficient in related technologies. Large-scale production is a problem, which will lead to contradictions in construction costs and people's income levels. It is a bottleneck in the development of prefabricated housing in the construction of public rental housing.

3.3 Technical Factors

The construction of prefabricated components is special, and industrialized production and processing need advanced technology [4]. However, currently there are few technical talents in related industries, the degree of industrialization is low, the production art of some prefabricated components is immature, and the prefabricated assembly standards are not coordinated. At this stage, the production of prefabricated residential components is self-produced. The lack of mutual understanding between manufacturers and insufficient communication between industries has hindered the promotion of prefabricated components [4].

3.4 Market Factors

The promotion process of prefabricated housing in public rental housing is not smooth, the main reason is due to the imperfect market information, which includes factors such as low residential consumption structure, imperfect industrialization support, insufficient real estate business motivation, and poor environmental awareness. These are the main reasons affecting the application of prefabricated houses in public rental housing. Coupled with the insufficient publicity of prefabricated housing, people's lack of understanding of it has also affected its application and development in the construction of public rental housing to a certain extent [4].

4. Comprehensive Evaluation and Optimization of Prefabricated Public Rental Housing

4.1 Formulate Supporting Policies to Promote Development

Prefabricated houses, as a new method of building production, belong to the development direction of the construction industry and occupy a mainstream position in the international construction industry [5]. In China, the development of prefabricated housing is still in its infancy. Under the background of the accelerated urbanization process, the construction of public rental housing has brought greater opportunities for the development of prefabricated housing. Therefore, relevant state departments should give full play to macro-control functions and policy guidance, and promote the prefabricated houses in the construction of public rental housing [5]. Due to the high up-front cost, it is possible to build industrial parks, carry out pilot projects, and promote while exploring. Relevant government departments should formulate supporting policies, promote production technology, improve various policies, establish professional departmental institutions, provide financial support and preferential land acquisition policies, and encourage enterprises to carry out research and development and application of prefabricated houses.

4.2 Optimizing Economic Costs and Promoting the Development of Prefabricated Buildings

The main reason for the lack of motivation for the development of prefabricated housing in China's public rental housing is due to its high cost, especially in the PC accessory structure. Therefore, in order to ensure that the prefabricated house can be used as efficiently as it is cast-in-place, we can start by reducing the cost of the PC structure. The scale of public rental housing construction is

constantly expanding, and its simple and unified units have a large scale, which is very suitable for the construction of prefabricated housing [6]. In order to reduce costs, it is necessary to work out a system-specific pricing list, uniformly design building standards, and improve assembly rates. In addition, through reasonable establishment of amortization period, reasonable setting of equipment depreciation costs and optimization of processes, etc., the cost of PC components can also be better reduced.

4.3 Promote Assembly-Type Development by Optimizing Construction Technology

Prefabricated buildings have gained considerable development in the international construction industry. Many developed countries such as the United States, Japan, South Korea and other countries have established prefabricated construction technology systems suitable for their own characteristics, which has promoted the prefabricated houses in the country [6]. In China, due to insufficient economic foundation and technological accumulation, in the development of the market, prefabricated houses have not yet formed a perfect structural system. Therefore, in the development process of China's construction industry, it should learn from foreign technical experience and institutional structure to form a technical system that belongs to the development of China's construction industry [7].

4.4 Optimizing Industrial Management to Promote the Sound Development of Prefabricated Buildings

Optimizing industrial management can maximize the positive development of the prefabricated building application industry in the construction of public rental housing. We should start from the design of public rental housing and the production, construction and building system of prefabricated housing. Improve the quality and safety of prefabricated houses and lay a solid foundation for the large-scale construction and development of public rental housing [7]. The development and progress of prefabricated houses require the production and processing quality of prefabricated components, and strengthen communication between construction enterprises and construction units before construction [5]. In the cooperation of enterprises in various industrial chains of prefabricated housing, an effective communication and management mechanism should be established, enterprises within the industry should be strengthened, unified standards should be established, and the application effect of prefabricated housing in public rental housing should be improved.

4.5 Development Prospects of Prefabricated Residential Buildings in Public Rental Housing

The development of prefabricated housing in China is at an important period, especially in first-tier cities. The construction of public rental housing has brought new opportunities to the development of prefabricated housing. With the rapid development of China's society and economy and the continuous progress of science and technology, the construction industry will make even faster progress. In the field of prefabricated residential buildings, its development prospects have three directions: first, standardization [6]. In the future construction of public rental housing, prefabricated residential buildings will be more standard, and the number and specifications of prefabricated components will be unified with industry standards, laying the foundation for public rental housing construction and future repair work, and reducing construction costs and expanding the scale of public rental housing. Second, generalization. With the development of prefabricated houses in the future, the prefabricated components are continuously standardized, and the same components can be used in other types of buildings. Third, the information age has already arrived. Prefabricated houses in the construction of public rental housing will also be connected with information technology operations to realize BIM design → virtual reality → construction → maintenance and other informationization processes [7].

5. Summary

The application of BIM technology in prefabricated buildings will greatly accelerate the advancement of prefabricated projects across the country. With the continuous application of BIM

technology in prefabricated buildings, the advantages of BIM technology will continue to be manifested in practice. With the acceleration of urbanization in China and the large-scale construction of public rental housing, the rapid development of prefabricated houses can effectively solve people's housing problems, improve people's living standards, and make great contributions to the country's prosperity and development.

Acknowledgement

The paper is supported by the Foundation for School-level Scientific Research Projects of Chongqing Real Estate College in 2019. The Project Number is 2019011.

References

- [1] Z.S. Fan and X.W. Li, BIM Method of Prefabricated Building Design, Architectural Skill, vol.6, pp.68-76, 2014.
- [2] Y.T. Fu and W.F. Li, Application and countermeasures of BIM technology in prefabricated house construction, Urban Housing, vol.11, pp.102-105, 2014.
- [3] Y.Q. Yang, Design and Construction Technology of a Prefabricated House, Construction Technology, vol.5, pp.141-143, 2017.
- [4] N.M. Hu, Research on Risk Management of Public Rental Housing Construction in Shenyang, Dalian: Dalian University of Technology, vol.8, pp.11-14, 2016.
- [5] R.J. Tan, Architectural Design of Prefabricated Public Rental Housing, Beijing: Beijing University of Architecture, vol.11, pp.81-83, 2014.
- [6] J.T. Zhan, Research on the Application of Prefabricated Housing System in the Construction of Public Rental Housing, Chongqing: Chongqing Jiaotong University, vol.7, pp.121-123, 2017.
- [7] Y.Y. Bai, Research on design strategy of Dalian public rental housing based on PCa assembly, Dalian: Dalian University of Technology, vol.9, pp.65-68, 2018.