Research on Cost of Assembled Concrete Structure

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Abstract

The cost of fabricated concrete structures occurs at various stages of project implementation. Only in the early stage of analysis, the cost generation and control must have certain one-sidedness. Aiming at this problem, this paper analyzes the cost influencing factors of the whole life cycle of the fabricated concrete structure, clarifies the key factors affecting the project cost, and obtains the concrete measures for the cost control of the fabricated concrete structure, which is the fabricated concrete. Structural cost control provides a reference.

Keywords

Prefabricated concrete structure, full life cycle, cost.

1. Introduction

Construction industry is the pillar industry of China's economy. Building industrialization is a worldwide trend and trend. It is also an urgent need for China's reform and development. How to reduce energy consumption and achieve civilized construction is an important manifestation of current technological progress. In this context, prefabricated buildings are beginning to receive attention. The scale of fabricated concrete structures in China is relatively small, and the related integrated design level is relatively backward. This makes the cost of fabricated concrete structures relatively high compared with the cost of cast-in-situ structures, which seriously hinders the rapid development of fabricated concrete structures and their large scale. Application [1]. Therefore, the cost of the prefabricated concrete structure project is analyzed and found, and the key factors affecting the project cost are found, and the measures to effectively reduce the cost of the fabricated concrete structure project are of great significance for its future development.

2. Cost analysis

2.1 Pre-planning stage

In the process of development of prefabricated concrete structures, the cost is constrained by national policy guidance and related laws and regulations, especially in the early planning stage. Such as the government's financial subsidy policy, tax policy, financial support system, etc. In order to better develop the prefabricated concrete structure, the guiding role of the government's policies and regulations is crucial. It is necessary for all relevant departments to work together to form a joint force. Through the administrative mechanism, the integrated building construction will be gradually implemented, and supervision will be strengthened to ensure the construction quality and Safety; At the same time, it pays attention to market cultivation, speeds up the formulation of relevant incentive policies, and fully stimulates the enthusiasm of real estate enterprises.

2.2 Design phase

The cost source of the fabricated concrete structure in the module design includes the modular unit structure design, the installation and design of the module unit's hydropower, the interior decoration design, and the module connection design [2], which is mainly reflected in the personnel and technical factors, such as the quality of the staff. Design time, integrated design level, etc. In addition, the construction plan, construction organization design, process flow, etc., the determination of the construction plan is the key technical measure to reduce the cost. The assembled concrete structure

building is greatly influenced by human factors and technical factors at this stage, such as the quality of employees and design. Cost, labor cost per unit time, etc.

2.3 Factory production stage

The cost incurred by the fabricated concrete structure in the production phase of the factory is mainly the cost of the labor, mechanical, material, management and other expenses incurred by the module from the time the material enters the plant to the different prefabrication module units.]. In addition to the conventional cost and expense, the cost of this stage is also related to the degree of production technology (test and inspection technology, test technology, etc. in the production process), and plays a supporting role in cost control. In addition, component cost generation rate, component costing time, etc. will also have a certain impact on cost.

2.4 Transportation assembly stage

The on-site assembly phase of fabricated concrete structures mainly includes component transportation and on-site installation [4]. The transportation phase is the transportation cost from loading the modular unit to the construction site. This cost is mainly determined by the module unit volume, weight and transportation efficiency. The transportation distance directly affects the fuel power and maintenance warranty of the fleet. The longer the transportation distance, the higher the transportation cost. Promote various subsidies for the development of prefabricated buildings, and the government encourages or suppresses the personnel who undertake the transportation of fabricated building components. Consider the convenience and feasibility of loading and unloading.

2.5 Operation and maintenance phase

The operation and maintenance phase is the longest phase in the life cycle of a building, and its energy consumption is also the largest phase. The operating costs of fabricated concrete structures consist of general operating costs and module operating costs. The general operating cost consists of daily maintenance costs, repair costs, energy costs, and management costs. Module operating costs are operating costs based on the characteristics of the fabricated concrete structure itself. The prefabricated concrete structure itself has the basic attributes of ecological environment protection, which increases the cost of maintenance and replacement of energy-saving and environmental protection equipment and the cost of building ecological environment construction to a certain extent, but at the same time, the energy consumption cost is also due to the use of energy-saving and environmental protection equipment. And it has dropped dramatically.

2.6 Disassembly and reuse stage

When a prefabricated concrete structure is used for its durability, it will be removed and recycled. The cost of these work is the cost of demolition. Similarly, in the process, the environment will be damaged, so environmental costs will also be incurred, and administrative costs will be paid for the services provided by the government; the dismantling machinery will be used when dismantling the prefabricated concrete structures, and It will consume labor, so the cost of dismantling will be incurred; after the demolition work is completed, the site needs to be cleaned up. All the cost of this work is the site cleaning fee; the residual value income refers to the residual material recovered after the demolition of the prefabricated concrete structure building. The value is mainly the value of spare parts, waste materials, etc. that are available for sale or use after being demolished.

3. Screening of cost factors for fabricated concrete structures

Before the analysis of the factors affecting the cost of the project, the boundary of the system should be clarified. The so-called boundary refers to the boundary between the influencing factors contained in the system and the influencing factors not included in the system. The system is surrounded by such a boundary. . This paper adopts the necessary and simple principles to determine the boundary of the system. It will put the factors with a large impact on the cost into the system, and will not be included in the system if the impact is small or not, and then it can be considered and simplified. It will be simplified. This paper analyzes the factors affecting project cost from the perspective of the

whole process of prefabricated concrete structure construction. According to the above mentioned principles, the main influencing factors affecting the cost of prefabricated concrete structure construction are shown in Table 1.

4. Cost control measures for fabricated concrete structures

4.1 Focus on scientific and technological innovation and personnel training

The government should pay attention to strengthening the basic research of prefabricated buildings, encourage universities, scientific research institutions and construction enterprises to jointly solve the difficulties in the development of key technologies and industries of prefabricated buildings, increase the research and development of new supporting technologies for prefabricated buildings, and promote the design of prefabricated buildings. Technical implementation of standards, technical standards, testing and testing, and promote technological innovation and theoretical innovation in the entire industry chain. In addition, we must pay attention to the cultivation of talents. The promotion of prefabricated buildings in China is relatively lagging behind. One important reason is that industrial workers need time to train, and professional and technical talents are lacking. In order to solve this problem, it is necessary to establish a personnel training mechanism for the entire industrial chain system, improve the overall quality of the assembled construction workers, and ensure the quality of the construction products.

4.2 Strengthen quality supervision

At this stage, due to the lack of technical standards and construction specifications, the lack of processes and industry supervision mechanisms for the inspection and acceptance of components, the supervision departments and enterprises need to strengthen quality supervision. In addition, enterprises should pay attention to on-site management. For example, the order of on-site stacking components should be consistent with the construction hoisting sequence. The stacking position also needs to be within the working range of the corresponding vertical transportation equipment, reducing the secondary transportation cost and improving the hoisting efficiency. Arrange the construction period and reduce the use of heavy lifting equipment. These measures can take advantage of the rapid construction speed of the assembled building, which in turn saves costs.

4.3 Reinforcement, mechanical cost control

The PC components are large in size, and must be hoisted by professional machinery at the PC construction site. The cost of heavy cranes and various reinforcement measures is high, which may cause damage or even economic loss due to operational reasons. Therefore, the technical personnel management system and mechanical inspection and maintenance system should be improved, such as professional training for mechanical operators to improve lifting skills, regularly check maintenance registration records, improve mechanical operation efficiency, increase lifting speed and reduce costs.

5. Conclusion

Through the analysis of the main cost factors of prefabricated buildings and cast-in-place buildings, the cost of prefabricated buildings is high and recommendations are made. According to the demand, the prefabrication rate is adjusted, the prefabricated components are assembled reasonably, the transportation cost of the prefabricated components is reduced, the cost of on-site assembly and connection is saved, and the standardization and integrated development of the prefabricated building are promoted. The development of prefabricated buildings is in line with the needs of China's transition period and promotes the transformation of production methods in the construction sector.

Table 1 Factors affecting the cost of fabricated concrete structures

Numble	Stage	Factor
1	Pre-planning stage	Managerial level, policies and regulations
2	Design phase	Design cost, labor cost per unit time, quality of staff

3	Factory production stage	Component cost increment, transportation cost generation rate, component costing time, production factor demand, PC component production cost, employee skill level
4	Transportation assembly stage	Component transportation increment, transportation cost generation rate, transportation costing time, transportation efficiency, unit component transportation cost, PC component transportation cost, adjustment parameters, management level, installation efficiency, installation cost
5	Operation and maintenance phase	Routine maintenance costs, energy costs, management costs
6	Demolition and reuse stage	Environmental cost, labor cost

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