

# Discussion on Cost Budgeting and Cost Control Strategies for Prefabricated Construction Projects

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**Abstract:** In the process of China's national economic development, the construction industry is a very important component and has a direct impact on the level of China's economic construction. Nowadays, the development speed of the prefabricated construction industry is constantly accelerating. To effectively ensure the economic benefits of engineering projects, it is necessary to comprehensively strengthen cost budgeting and cost control. This article analyzes the cost budget of prefabricated construction projects, introduces the application advantages of prefabricated construction, and proposes specific cost budgeting and cost control measures, hoping to provide some reference for relevant researchers.

**Keywords:** Prefabricated building; Engineering cost budget; Cost control

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## 1. Introduction

With the rapid development of the modern construction industry, the application of prefabricated buildings has become more widespread. They have significant application advantages by not only simplifying construction processes but also having good energy-saving effects, which can further promote the sustainable development of the construction industry. In the process of carrying out prefabricated construction projects, to effectively ensure the investment benefits of the project, relevant construction enterprises need to do a good job in cost budgeting, increase cost control efforts, strictly control cost expenditures, ensure the special use of funds, and avoid resource waste problems, thus improving the cost management level of the project, enhancing the economic benefits of construction projects, and effectively promoting the healthy development of China's prefabricated construction industry.

## 2. The application advantages of prefabricated construction engineering

Regarding the analysis of prefabricated construction projects, relevant construction companies need to produce building components in advance in the production plant area according to specific design requirements before carrying out the actual project. Then, the prefabricated components should be transported to the construction

site and assembled according to specific requirements. Afterward, the relevant construction personnel need to use concrete or grout anchors to effectively connect the prefabricated components and ensure that they meet the construction standards. In the construction of prefabricated building projects, relevant components include walls, floors, beams, columns, and other parts. It is necessary to ensure that they meet the construction standards of residential buildings, effectively improve the application rate of components, and achieve a rate exceeding 53%. Adopting this architectural form can shorten the construction period, reduce labor consumption during construction, and further ensure the quality of prefabricated building construction. Therefore, the application advantages are very significant. However, when applying this type of architectural form, due to the influence of relevant factors, there are still some problems in cost management, and the advantages of cost budgeting have not been effectively reflected. In this regard, relevant personnel need to fully analyze the main factors affecting project cost, comprehensively strengthen cost budgeting work, effectively control construction costs, and thus improve the overall construction efficiency of prefabricated buildings <sup>[1]</sup>.

### **3. Control strategies for cost budgeting of prefabricated construction projects**

#### **3.1. Optimize design drawings**

For prefabricated construction projects, it is essential to do a good job of drawing design before construction starts and arrange cost personnel to fully study the design drawings. Based on the instructions of the design drawings, combined with the overall plan, and other factors, it is crucial to ensure a full grasp of the content of the drawings. This can better determine the dimensions and improve the installation quality of the components. After optimizing the design drawings, it is vital to fully utilize materials to prevent cost waste. In addition, during the meeting review process, it is required to determine the changes made to the drawings and supplement their content to effectively control component costs. For example, in the specific design work, if the components are not properly divided, it will have an impact on the transportation of the components, increasing tower crane costs, a decrease in material utilization, and ultimately a waste of resources <sup>[2]</sup>.

#### **3.2. Improve the construction plan**

In the construction process of prefabricated buildings, it is necessary to conduct an in-depth analysis of the design drawings and develop a reasonable construction plan. For project cost budget management and control, by determining the construction plan, the efficiency of project construction can be effectively improved, and the quality of project construction can be enhanced. During on-site construction, it is imperative to effectively process and install components to enhance the management and control of project costs. At the same time, relevant construction companies should also allocate professional construction personnel to ensure that they fully inspect the construction site, clarify the construction process, and effectively improve the rationality and accuracy of the project cost budget. After clarifying the construction plan, it is fundamental to use it as a reference and strictly implement it to prevent operational errors <sup>[3]</sup>.

#### **3.3. Prepare a bill of quantities**

In the process of cost budget management for prefabricated construction projects, it is essential to accurately prepare a bill of quantities to strengthen cost control. For prefabricated buildings, they have certain particularities. Therefore, before actual construction, relevant construction personnel should have a clear understanding of the structural technology and clarify the relationship between components and cast-in-place parts. This can better implement budget control work. For example, cost management work for stacked and

floor slabs involves the procurement and transportation of finished products, as well as effective lifting. During the construction process of the steel reinforcement body, relevant personnel should calculate the amount of steel reinforcement work, with the thickness of the concrete formwork as the main indicator, to accurately calculate the amount of formwork used. In this process, it is crucial to combine the process flow and accurately calculate the cast-in-place height. For composite beams, it is fundamental to clarify the precast thickness, cast-in-place layer thickness, and slab thickness, and construct a reasonable model to determine the beam height and cast-in-place height <sup>[4]</sup>.

### **3.4. Material price control**

In the cost budgeting work of prefabricated buildings, to effectively control the project cost, it is necessary to pay more attention to the cost of prefabricated components, strengthen their price control, and ensure reasonable inquiry and pricing. Nowadays, with the continuous acceleration of the development pace of China's construction industry, the production technology level of prefabricated components has also been significantly improved, and many new materials have emerged, which has also increased the difficulty of market inquiry. In this regard, relevant construction companies should establish an inquiry team to effectively implement the secondary deepening design, and based on specific circumstances, make tentative material prices, to scientifically and reasonably prepare a bill of quantities and improve the control level of project cost.

### **3.5. Effective cost budget planning**

In prefabricated construction projects, to effectively control the cost budget, the level of project cost should be reasonably controlled. For prefabricated construction projects, when their cost is high, it is vital to conduct an in-depth analysis of the main reasons for increasing their cost and implement targeted control measures. Generally speaking, compared to cast-in-place concrete construction, prefabricated buildings incur production, transportation, and miscellaneous expenses during the construction period. Therefore, in actual management and control of construction costs, it is crucial to accurately calculate the costs of materials, machinery, and labor, and combine them with market changes to effectively summarize the changes in market prices and accurately predict their future prices. To improve the cost budget level, it is also required to reasonably compress the cost of raw materials, which can reduce the budget.

### **3.6. Establish a sound cost budget review system**

Based on the analysis of the current situation of budget review work in prefabricated construction enterprises, it can be found that the review system of some enterprises is not yet perfect, and they do not have a correct understanding of the importance of review work. Specifically, for engineering projects, it is necessary to ensure their effective creation of benefits and achieve maximum benefits to effectively enhance the investment efficiency of the project. By improving the cost budget review system, it is possible to ensure the orderly conduct of pre-settlement review work, effectively play the important role of review work, and further enhance the level of engineering cost budget management. Therefore, in the context of the rapid development of the market economy, relevant construction enterprises need to pay more attention to budget review and improve the relevant review system to enhance their competitiveness and effectively ensure the scientificity and practicality of cost budgeting. In the actual construction of the budget review system, the first step is to prepare well, ensure the acquisition of complete information materials, and verify the authenticity of the materials. Secondly, in the early stage of the audit work, it is mandatory to fully consider the construction process, construction technology, and building scale based on the specific construction status of the project, to reasonably determine the budget

audit method and improve the quality and efficiency of the audit work.

### **3.7. Improve the professional competence of budget personnel**

For budget auditors of construction companies, it is required to effectively enhance their professional competence. In this regard, relevant audit departments need to organize staff to effectively carry out professional training activities, ensure their effective learning of professional knowledge and skills, effectively improve the quality of budget audit work, and ensure accurate audit results. At the same time, relevant construction companies should effectively enhance the work awareness of auditors and improve their work level.

Firstly, it is imperative to enhance the practical application ability of auditors in information technology. At the current stage, relevant construction companies have effectively applied various information software, and it is vital to ensure that auditors can operate this software correctly. Therefore, it is crucial to strengthen training in information technology operations, so that they can improve the efficiency of accounting work.

Secondly, it is essential to effectively cultivate the professional skills of auditors to ensure that they fully grasp the main content of budget review and can efficiently carry out accounting work. Finally, it is obligatory to fully integrate various types of engineering information. For example, after retrieving the engineering quantity, its authenticity should be verified to ensure that on-site visa work can be carried out in an orderly manner<sup>[5]</sup>.

## **4. Cost control strategies for prefabricated construction projects**

For prefabricated construction projects, it is necessary to comprehensively strengthen construction management work, to effectively improve the effectiveness of construction projects and control construction costs from multiple perspectives. In construction engineering, it is necessary to effectively ensure the construction quality and application effect, ensure that the later application of the building can meet relevant standards, and thus improve the cost control level of the engineering project. In prefabricated construction, it is vital to continuously improve the production technology level of its components, and optimize the production mode reasonably, to reduce production costs. Specifically, to effectively control the cost of prefabricated construction projects, it is vital to start from the following aspects.

### **4.1. Cost control during the engineering design phase**

For prefabricated buildings, it is necessary to effectively deepen component design during the engineering design phase. In the implementation process of engineering projects, it is essential to select multiple prefabricated solutions. At this time, it is mandatory to compare and optimize the design work from the perspectives of economy, technology, and other aspects to improve its completeness and further ensure the feasibility of the solutions. For prefabricated components, it is required to effectively deepen the drawings and complete the processing and production of the components to ensure the accuracy of component manufacturing, to effectively control project costs. In actual design work, it is obligatory to effectively enhance the professional quality of designers, so that they can carry out creative design, reduce the workload of designers, further improve design efficiency, and effectively control design costs. Simultaneously, it is imperative to effectively deepen the design, pay more attention to the component decomposition diagram, and increase its reuse frequency, which can improve the prefabrication rate. In design work, it is important to optimize the design template reasonably, and for similar or identical projects, a unified design template should be adopted, which can reduce the construction cost at the source. In addition, during the design phase, it is fundamental to pay

more attention to issues related to component production and installation, optimize the disassembly process reasonably, control the quantity and types of components, optimize their production and installation processes, and reduce the amount of mold investment.

#### **4.2. Cost control during the production and manufacturing phase**

Compared to the on-site pouring of components, the factory production cost of prefabricated components is relatively high, mainly including labor costs, raw material consumption costs, water and electricity costs, component storage and production costs, as well as supporting pipeline, production mold, embedded device, and others. Firstly, when controlling the production cost of prefabricated components in practice, it is mandatory to effectively improve the production technology level and adopt the form of an assembly line to carry out production work. This can reduce labor input and effectively ensure production efficiency. In the actual production process, non-destructive connection devices should be used and production platforms should be built reasonably to improve productivity, extend the operating life of the platform, reduce the amortization of mechanical costs, and effectively save the production cost of prefabricated components. Secondly, in the production process of prefabricated components, it is necessary to collaborate with fixed factories to strengthen cooperation and ensure the effective production of prefabricated components. By adopting this approach, construction waste can be effectively collected, achieving a centralized collection mode and preventing the impact on the ecological environment caused by the dispersion of waste. For structural components, it is required to use energy-saving and emission-reduction technologies, and effectively control the temperature of the components to reduce energy consumption, ensure that the last shift can be recycled, shorten the maintenance time, and reduce production costs.

#### **4.3. Cost control during the transportation phase of components**

After the production of prefabricated components is completed, they need to be effectively transported to the construction site of prefabricated buildings. Before carrying out transportation work, it is vital to make reasonable planning and design of transportation routes, and scientifically and reasonably formulate transportation plans, to effectively control transportation costs. Before the construction of prefabricated buildings, it is crucial to effectively transport prefabricated components to the site, mainly for the installation of components on the first floor, and make reasonable transportation arrangements for the remaining components according to the usage progress, to avoid stacking a large number of components on-site. From the perspective of transportation costs, the starting point and destination of the transportation are the factory and the construction site, respectively. The transportation route should be planned according to the traffic situation, and vehicles should be selected reasonably. During transportation, it is also mandatory to closely contact the site, label the components according to the construction sequence, and place them in order. This can improve transportation efficiency, ensure effective lifting of components on-site, and save secondary handling costs. During this period, analysis should be conducted based on road conditions, taking into account the number, weight, and size of components, to make reasonable choices for transportation routes, lifting devices, and vehicles, to optimize the transportation plan. At the same time, for prefabricated component manufacturers, it is advisable to choose manufacturers that are closer to the construction site as much as possible, which can reduce transportation costs. If essential, temporary component manufacturing plants can be built. Relevant management personnel also need to pay more attention to the size of prefabricated components. When their size is large, it can reduce transportation costs. To better complete transportation work, relevant transportation personnel should fully consider the size and shape of the components, maintain their weight within 5 t, and control their length at

around 5 m. This not only improves transportation efficiency but also saves transportation costs. Moreover, it is imperative to pay more attention to the handling methods, which usually include three types: vertical, inclined, and horizontal. The handling method should be selected based on the shape of the components to accelerate the transportation progress and save transportation costs.

#### **4.4. Cost control during the construction and installation phase**

In the on-site construction process of prefabricated building projects, the specific cost includes machinery, labor, materials, vertical transportation, component installation, and other aspects. To effectively control the cost of this stage, relevant construction enterprises are required to achieve synchronous construction. Initially, when installing prefabricated components in practice, it is important to first divide the overall construction work reasonably, transform it into different streamlined forms, and ensure that multiple processes are carried out simultaneously. This can shorten the construction progress of the project and comprehensively improve the construction efficiency. Simultaneously, construction companies need to arrange professional talents and adopt scientific and effective repair methods to ensure that gaps between components can be effectively repaired, thereby avoiding the risk of grout leakage and reducing maintenance costs in the later stage. Secondly, it is necessary to optimize the engineering structural system and design a reasonable construction plan. For prefabricated buildings, it is fundamental to effectively improve the prefabrication rate of the building, and effectively separate prefabricated components, to further improve production efficiency and reduce the difficulty of installing prefabricated components on site. For the prefabrication rate, relevant management personnel need to strengthen control. Once it is too high, it will lead to an increase in mechanical and labor costs. Therefore, it is required to carry out reasonable design for the prefabrication rate and effectively improve assembly efficiency to effectively control costs. Finally, in the current stage of construction project management, the application of Building Information Management (BIM) technology has gradually become more widespread, which can greatly meet the needs of engineering construction, construct three-dimensional information models reasonably, effectively utilize relevant data information, combine data analysis results, simulate on-site construction, and predict possible problems in advance. During the construction of prefabricated buildings, the use of such technology can effectively simulate the on-site installation process of prefabricated components, and adjust the construction plan reasonably based on the simulation results, further ensuring the quality of installation construction, improving installation efficiency, and reducing the cost of engineering installation construction.

### **5. Conclusion**

In summary, for prefabricated construction projects, to improve their construction efficiency, relevant construction enterprises need to attach great importance to the cost budget management of the project and adopt scientific and effective cost control measures to strictly control the construction cost, ensure the accuracy of the cost budget, avoid exceeding the budget, improve the level of project cost management, enhance the economic benefits of prefabricated construction projects, and promote the sustainable development of the prefabricated construction industry.

### **Disclosure statement**

The author declares no conflict of interest.

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