

Effective Approaches to Construction Engineering Cost Control in Construction Project Management

Jiasong Li

Baohe Construction and Development, Hefei, Anhui, 230000, China

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Abstract: In the current socio-economic environment in China, construction engineering takes an important part to be realized in the whole economic volume and regional economic development. The benefit of engineering construction should be the premise and foundation for the momentum of sustainable development in the construction industry. This requires enterprises to conduct precise engineering cost control work based on the construction process, focusing on many aspects of cost consumption in engineering construction such as human resource costs, material costs and equipment energy costs, so as to promote a flexible formulation of engineering cost control plans. Accordingly, this paper investigates cost control strategies for construction engineering in terms of project budgeting, controllable expenditure ranges and human resources management.

1. Introduction

Engineering cost management is vital to ensure the full day-to-day value of civil projects. However, construction engineering enterprises have to take the whole-process cost control concept as a guide of budget and cost control work. This includes examining and evaluating every stage of the construction project, predicting construction costs at each individual stage. As a result, after knowing the circumstances of expenses, it can serve as a real reference point when designing the plan for managing the construction of new projects. Based on the above reasons, it is necessary for construction enterprises to realize that different engineering cost control paths should be established according to the specific circumstances of each project in order to maximize the benefits of projects.

2. The Significance of Carrying Out Engineering Cost Control in Construction Project Management

2.1 Beneficial for Enhancing Project Economic Benefits

In order to make the construction projects bring comprehensive benefits, and also let construction engineering industry get broader development space, it is necessary actively in project economic benefit. Through implementing targeted construction engineering cost control work and applying the whole-process cost control concept, it can ensure rational allocation of materials, resources and energy during construction, promote efficient utilization. This is in ideal control of the cost of each construction stage, and protects the economic benefits of the project.

2.2 Beneficial for Enhancing Enterprise Competitiveness

In order for construction enterprises to take a firm foothold in the current highly competitive industry environment, improving their own industry competitiveness should be the point more attention. In particular, the rapid pace of socio-economic development in China and the acceleration of urbanization bring further expansion in the scale of construction industry. But during its development, the industry is plagued by many problems such as high homogenization of enterprises and falling real estate prices, leading to increasingly fierce internal competition. Under this backdrop, construction enterprises that pursue new development opportunities must adopt whole-process project cost management and control. We can achieve the greatest economic benefits through quality improvement, cost reduction and construction optimization to enhance their overall

competitive strength in the industry.

3. Principles to Follow in Construction Engineering Cost Control

3.1 Active Control Principle

Construction projects are more extensive, have longer cycles, and with multiple construction stages and technical points. Active control principle needs to be fulfilled so that the cost control becomes effective and consequently full project benefits become available. The construction enterprises need to reasonably divide the various stages of construction according to the specific conditions of the project, determine the corresponding human resources, materials and equipment in each stage, and use it as a basis for systematic cost control plans. Which means you take preventory measures to reduce costs, optimize the construction stages on a regular basis, and ensure effective full cost control ^[1].

3.2 Whole-Process Cost Control Principle

The whole-process cost control principle is one of the effective measures for ensuring the expected results in construction engineering cost control. Cost management and control must be an integral part of each stage of the construction project so as to facilitate better coordination across different stages, departments, and responsibilities. Cost control should be regarded as a key task throughout the entire process from project design to completion acceptance. Moreover, the project budget should be used as the foundation in defining the cost management plan. The cost management mechanism can be streamlined on a more practical basis according to the scale and functional characteristics of the project, thus ensuring optimized allocation of human resources, equipment, and materials for field construction in this paper ^[2]. In addition, according to the whole-process cost control principle, we need to fully understand that cost management is not just something that depends on designers, site managers, or project managers. When focusing on the application of strong cost, front-line construction workers should go further and avoid material and energy waste in certain specific construction tasks, which will also contribute to the improvement of project cost control effectiveness.

4. Exploring Approaches to Construction Engineering Cost Control in Project Management

4.1 Conduct Cost Control in the Investment Decision-Making Stage Based on Project Specifics

The traditional construction projects were generally less aware of the need of cost control stage on investment decision making, which greatly increased the possibility that it would exceed budget or estimation in later construction stage. So the cost control work in the investment decision-making stage must be placed in an important position. In this stage in particular, resource allocation and determining the scale of project funding have big effects on cost. When making decisions, they have got to look at objectively: How much you need to construct, and how large or small the fund needs to be has also Requires a full range of fund management plans. Most notably, specific focus is needed on the geographical environment, degree of economic advancement and variance in rates of resources and hardware which are necessary for a venture at the site location. Investment decision being able to effectively prevent the original blind investment and unscientific bidding, reduce enterprises investment risk, which is suitable for modern construction enterprise sustainable development needs ^[3].

4.2 Carry Out Cost Control in the Design Stage Considering Different Disciplines

Controlling cost during the design process is of utmost importance, as it relates to the involvement of different disciplines in construction projects. The number of disciplines involved makes the design for construction drawings and plans difficult because there is a wide variety of factors to consider but what poses greater challenge, however, are the obstacles presented with respect to cost control as it relates across such many different specialties. At the design stage, the

quantities of the project should be calculated precisely, for example. Such calculation should be based on the project specific scale, construction quality requirements, on-site management etc., to be accurate ^[4]. Additionally, the design require cost managers to communicate with designers of length in short time. So, cost managers need effective soft skills that can communicate because the final design needs to execute on the site so that often you do not change your design in the way of doing construction.

In order to guarantee the overall efficiency of cost control in the design stage, First, is that it needs to clarify the budget of project construction. The construction scheme, when prepared, needs to conform in all respects with prevailing laws, regulations and current industry standards as regards the phases of construction, personnel deployment and choice of materials and equipment. In this way, it avoids non-compliance or exceeding standards and is more conducive to cost control during construction as well as on-site management. When determining the project budget, it is necessary to fully consider the specific functional requirements of each component in order to improve the feasibility of budget standards ^[5]. Secondly, resist using Limit Design. It is important to innovate the traditional design methods for effective cost control in design. At present, the Limit Design method is used as a practical design method for large constructions. It includes details on scale and specific construction stages for the project, which supports using BIM technology to undergo a simulation of the entire building process. It assists in quickly locating the main points that are important for construction and problems of the design scheme to facilitate optimization work at an early point in time. It greatly minimizes the potential for design modifications and cost excesses during construction ^[6]. Based on the efficient utilization of BIM technology, this method can accurately determine the upper limit budget of construction project, which supports implement limit design for construction scheme.

4.3 Manage Material Prices and Machinery Costs Effectively, and Control Human Resource Costs

The contents of cost control involved during formal construction presents rich and diverse characteristics. Based on this, they can control three major aspects: material cost, mechanical equipment cost and human resource cost. Meeting these three dimensions effectively delivers specific cost savings on-site, while protecting the whole-life benefits of the project.

4.3.1 Material Cost Control

Buildings today make extensive use of raw materials. To facilitate smooth operations and quality control by matching the material's quality, performance and specifications to your on-site construction. However, only while guaranteeing the quality and rational material choice can material control also be carried out. However, due date of grand bulk building supplies like oil and metal should be studied effectively first. Based on the determined price variation range, it can cover comprehensive quality and performance to achieve best cost-effectiveness through tendering and bidding procurement. Small bulk materials such as fine aggregates and fittings can be bought directly from local distributors or manufacturers following the design of the project. Cost control can also be facilitated by establishing long-term relationships with local material suppliers ^[7]. But then when materials arrive on the site, they are often not used at the same time and need to be stored. Material stored should be kept in damp-proof and fire-proof storage areas to avoid degradation or damage down stream of the supply chain thereby lowering subsequent costs increases.

4.3.2 Mechanical Equipment Cost Control

The construction industry of today involves a large number of mechanical equipment, such as cranes, bulldozers, loaders, concrete mixers, excavators {tower cranes and the like}. Large Capital Items (Costly Updates) The price tag for these items is costly. Therefore, for effective cost control of the project, renting must be given preference wherever possible. Additionally, specific precautions should also be set to govern the utilization and daily storage of this equipment. For example, distributing dedicated technicians for regular inspections to detect harmful parts and functional data degradation or other faults. Any problems discovered should lead to either

immediate replacement or repair, so that equipment is always functional and operationally ready. The demobilization of equipment at the end of a project should be done within a short time after work completion. This not only minimises the rental periods and lowers overall expenditure but also allows an easier acceptance phase before site clearance.

4.3.3 Human Resource Cost Control

Apart from material and equipment, human resources also represents one of the most important cost in a construction process or any modern big scale project where large number of personnel with different types(designers, site managers, technical man power, inspectors, maintenance persons,supervisors etc) work together. To control human resource costs and effective work management systems, it is necessary to take into account the functions of different roles and their respective targets as per units of work. A rational functional division guarantees that any human resource: no matter what positions or departments on duties is going to make full use of its capabilities thus avoiding waste in terms of human resource cost.

Construction enterprises can build their teams through wider recruitment channels, a professional construction team, and high-quality technical workers. This indeed decreases the permissible margin of error in witness duty at site which eventually enables optimal utilization of human resource. Additionally, the number of designers, construction managers and supervisors will be relatively constant for most modern projects so optimization in these areas is also difficult.

The group of construction technicians is larger in comparison. Optimize Labor Costs for High-Quality Construction Technicians. E.g., Allotment of technical personnel shall be dependent on the respective site conditions, size & technical complexity so that right man is placed at right level to mitigate the consumptions in human resource.

5. Conclusion

In short, guiding the construction engineering cost control should be based on improving the efficiency of fund utilization and scientific project management. Engineering cost control can implement the whole process cost control concept, analyze and study each stage of engineering construction, technical points and construction material/equipment application of enterprises now it is one of the main ways to effectively carry out engineering cost control for new project and reserve energy into construction in order to promote the effect of economical benefit. In the future, we should flexibly apply BIM technology to gain a deep understanding of project characteristics so as to fully utilize whole-process cost control concept in leading modern construction engineering projects.

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