

# Research on Project Cost Management under the Mode of Bill of Quantities Valuation

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**Abstract:** With the increasing demand of our country linking with the International Valuation Model, it is a trend to change the traditional project quota valuation model and Adopt The new valuation model of Bill of quantities. This pricing model is more close to the market economy, it is by each construction unit according to their own technical level and comprehensive strength of the situation independently quoted price, through market competition reasonable low price winning bid pricing model. If the enterprise wants to win the bid at a reasonable low price, it can only take measures to save the cost and reduce the cost. Therefore, in order to improve the competitive advantage of enterprises, to promote the profit maximization, list pricing model to strengthen cost management research has become a topic of concern to construction enterprises. This paper summarizes the advantages of the mode of bill of quantities valuation and the necessity of cost management under the mode by studying the methods and principles of quota valuation and Bill of Quantities Valuation. This paper studies the cost management in the construction stage under the mode of list quotation, and discusses in detail from the aspects of cost plan, cost control, cost accounting, cost analysis and examination. The study of this paper has played a certain guiding and reference role in standardizing the cost management of construction enterprises.

**Keywords:** Pricing mode of engineering quota, Valuation Model of Bill of Quantities, Cost Management

## 1. Introduction

### 1.1. Research background, purpose and significance

#### 1.1.1. Research background

The mode of quota pricing is that the government formulates the project quota<sup>[1]</sup>, plays the leading role in the planned economy, and controls the project pricing. The Management System of budget estimate quota under highly centralized planned economy has played a very important role in the process of engineering construction since its use. With the widespread implementation of the International Bill of Quantities Valuation Model. Gradually from the quota pricing to the bill of quantities pricing, from the government-dominated market to the government-controlled market, the passive acceptance of the enterprise into the enterprise's own mode of quotation. This mode provides the condition for the fair competition of the enterprise, and can embody the principle of winning the bid at a reasonable low price. The introduction mechanism of boq pricing model adds a new blood to China's engineering construction market. Compared with the fixed pricing model, the bill of quantities pricing has more development advantages, and can reflect the internal technical level and comprehensive management capacity of the enterprise. As an inevitable trend in the development of the market, it is urgent to study and apply the bill pricing model.

With the intense market competition, the deepening reform of the project cost management system and the development of the valuation model of Bill of quantities, the environment of quoting the market competition mechanism allows the enterprises to quote the price according to the internal quota. However, due to the short period of carrying out the bill of quantities valuation in our country, the lack of a thorough understanding of the bill of quantities valuation model, the lack of cost management awareness and execution motivation of enterprises, or the imperfect accumulation of cost experience data, the

construction industry market system is not perfect, there is no effective cost management measures, resulting in many construction enterprises themselves do not have the ability to quote according to individual costs. This inevitably requires a process of learning and adaptation.

### ***1.1.2. Research purposes and implications***

The purpose of this paper is to find out how to make profit by cost management under the condition of satisfying the quality requirement of construction period and winning the bid at a reasonable low price. The concrete practical significance displays in the following four aspects:

(1) This article is advantageous to strengthens to the cost management theory verification, Constructs the reasonable cost management mechanism.

In this paper, through in-depth study of cost management theory related concepts and methods, in view of the actual progress of the M office building project, cost management theory and project practice is a good combination. With a strong theory as a guide, the cost management of the practice can be carried out smoothly. At the same time, through the test of practice, it verifies the correctness and guidance of the cost management theory, and it is also a reverse supplement to the cost management theory. The continuous optimization of cost management theory is an important support for the establishment of cost management mechanism and the improvement of cost management system.

(2) The research of this paper is helpful to reduce the unnecessary cost and increase the economic benefit of the enterprise.

In the control process of each link of cost management, strictly check the cost schedule and the actual expenditure, try to control the cost expenditure within the scope of the plan, avoid unnecessary cost expenditure. It will help tenderers pay more attention to the cost management of enterprises and project department, reduce the cost consumption of the project, and improve the utilization efficiency of funds. Reducing the project implementation cost is of great practical significance for improving the economic benefit and promoting the development of the enterprise.

(3) To provide data support for establishing enterprise quota for construction enterprises and to promote dynamic management of project cost.

The Enterprise Quota is compiled in the enterprise, according to the enterprise's own technology and management level, the amount of resources needed to complete a project task. The special enterprise quota is the "Magic weapon" when the project contractor bids the quoted price, is also participates in the competition means for the profit. The amount of enterprise's quota consumption depends on the level of enterprise's cost management. Cost Management can not only provide data for the establishment of enterprise quota and ensure the optimal allocation of internal resources, but also dynamically control the pricing process of engineering construction projects to ensure the realization of target cost.

(4) The cost management research promotes the enterprise technology innovation, enhances the productivity.

In order to reduce the loss, save the cost, improve the competitive advantage, enterprises constantly seek cost management strategies and methods. One of the most significant is to promote technological innovation in enterprises, introduce "New materials, new processes and new technologies", improve the efficiency of enterprise construction, and ensure better and better engineering quality at lower and lower costs, so as to promote the sound and sustainable development of engineering construction industry.

## **2. Summary of related theories**

### ***2.1. Introduction of traditional fixed pricing model***

The engineering quota refers to the quantity standard of human resources and related expenses needed to complete qualified unit construction products and consume human resources and machines under the premise of meeting the prescribed requirements<sup>[2]</sup>. It is formulated by the construction departments in charge of various regions of the country, comprehensively reflecting the development of local productive forces, in order to reasonably control the good progress of the construction of various projects.

### ***2.2. Shortcomings of the fixed pricing model***

Being under the Unified Command of the state is not conducive to bringing into play the individual

competitive advantages of enterprises<sup>[3]</sup>. In the traditional fixed pricing model, the main body of pricing is the state and is under the unified command of the state, this kind of fixed pricing method causes the enterprise can not use the internal fixed independent quotation to obtain the individual cost competitive advantage, and then is disadvantageous to reduce the project cost, shorten the construction period, and finally seriously affects the healthy development of the construction market.

It can not reflect the market price flexibly. The establishment and management of the current quota in our country is the project quota in a specific period which is unified by all provinces, autonomous regions and municipalities directly under the central government, so the setting of the quota consumption in a relatively short time is invariable.

In violation of the will of the law on tendering and bidding, the method of fixed pricing is based on approaching the base price of the tender as the benchmark for winning the tender, which leads to the reluctance of enterprises to make efforts to improve their comprehensive strength and enhance their competitiveness, it is contrary to the establishment intention of the bidding project.

The cost calculation process is complex and the error is big, which is not conducive to the improvement of calculation efficiency. The complex and complicated process of the fixed pricing project is not conducive to the improvement of work efficiency and the control of project cost.

### **2.3. Introduction of boq Valuation Model**

Basic principles of Bill of quantities valuation<sup>[4]</sup>:The bill of quantities is “A detailed list of items, measures, other items, fees, taxes and so on”. The list shall be prepared by the tenderer in accordance with national standards, bidding documents, design documents and construction site conditions, and shall then be marked and confirmed by the contractor.

### **2.4. Advantages of boq valuation model**

(1) To meet the needs of the competition mechanism, to create a level playing field<sup>[5]</sup>

The valuation mode of Bill of quantities is the fair competition mode of enterprises under the market economy. The basis of this mode is enterprise quota and the principle of “Separation of quantity and price” is carried out. The valuation MODEL OF BILL OF QUANTITIES ADOPTS A unified format, work content and the same amount of works. The tenderer shall, in accordance with the content requirements of the tender documents, combined with the enterprise’s own construction methods, consumption levels, charging standards to fill in the comprehensive unit price. By the tenderer in not less than the actual cost of a reasonable range, the lowest price on who selected as the winner to sign the construction contract. In order to win the bid, the bid to lower the quoted comprehensive unit price, but the enterprise to profit, only through continuous cost management to reduce costs and increase profits. The bidding process of bill of quantities is the competitive process of whether the technical equipment is advanced, the construction scheme is reasonable and the management level is good. Therefore, the bill of quantities pricing model for the market to create a good competitive mechanism and competitive platform.

(2) The calculation rules and Project Division are simple, the quotation is flexible, and the time of bidding is saved

Different from the norm calculation rule which considers the construction organization design scheme, the bill of quantities calculation rule is based on the relatively simple net work, for example, the calculation of the bill of quantities of earthwork does not take into account the content such as the enlarging angle of the slope and the excavation of the working face. In addition, the detailed list valuation model divides the Engineering Project according to the construction position, the craft and the material, the concrete construction measure and the method are chosen flexibly by the enterprise. For example, the list pricing will be the original fixed pricing of two separate processes excavation and earthwork transport integrated; According to the construction technology, the wall decoration part of the original quota valuation is divided into Keel Installation, joinery board base, brush paint, fireproof shop pasting, panel making and so on. In this way, construction enterprises can choose construction procedures independently, more flexible.

(3) To facilitate the disbursement of project funds during the construction process and the settlement of the project after completion

The bidding price of the winning bidder is the contract price, and the project content of each part of

the bidding is the component of the contract price. When the project funds are allocated in the course of construction section, they are paid by the comprehensive unit price on the list of winning bid, and the construction enterprises only need to determine the completed project cost according to the actual amount of work. In the stage of completion settlement, the bill of quantities valuation model completely avoids the work of accounting when the three parties' quantities are not unified. By multiplying the actual amount of each sub-item's quantities and the known unit price, together with the changes in the visa claims and other elements, together constitute the final account of the project price. This settlement model greatly reduces the unnecessary disputes and workload.

(4) It is advantageous to the construction unit to the project investment control

Under the fixed pricing model, because the quantity of the project is not fixed and the unit price is not fixed, it is difficult for the construction unit to grasp the increase or decrease of the project cost caused by design changes and other reasons before the project is completed and settled, you can't fully understand the state of the project investment. However, under the mode of engineering quantity list quotation, because the comprehensive unit price is determined and the budgeted quantity of engineering is determined, the range of the increase or decrease in investment needs can be determined according to the amount of the increase or decrease in the actual quantity of engineering caused by design changes and other reasons. Once the construction project changes, the owner of the amount of investment changes immediately clear, and then more rational choice of a reasonable construction program and investment direction.

### **3. The necessity of carrying out the valuation mode of Bill of quantities and the necessity of cost management**

#### ***3.1. The necessity of carrying out boq valuation model***

Due to the characteristics of quick quotation, high efficiency and market competition, the state strongly advocates the implementation of the bill of quantities valuation model<sup>[6]</sup>. In addition, the "Bill of Quantities Valuation Code" Mandatory Provisions: "For construction projects invested with state-owned funds, the valuation shall be based on Bill of quantities; for construction projects invested with non-state-owned funds, the valuation shall be based on Bill of quantities; for construction projects that do not use bill of quantities, other provisions in the code shall be implemented except for specific provisions such as bill of quantities." "Projects in which state funds are invested include projects in which all state funds are used or in which state funds are invested primarily (projects in which state funds account for more than 50 per cent of the investment or in which state investors have a substantial controlling stake, although less than 50 per cent of the investment) ”.

#### ***3.2. The necessity of cost management under inventory valuation model***

Along with the Engineering Quantity List Valuation Pattern Promotion, the market competition is more and more intense. The implementation of Boq Valuation Model can promote the long-term and stable development of enterprises only when it is connected with the cost management system of engineering projects in China<sup>[7]</sup>. Enterprises deeply understand the importance of cost management in adapting to market competition mechanism and obtaining enterprise benefit.

### **4. Basic Theory of project cost and cost management**

#### ***4.1. Project cost***

The meaning of construction project cost is the monetary form of value consumed by construction enterprises when they engage in construction activities. This value is partly due to the transfer of labor materials in the construction process, and partly due to the necessary labor of laborers<sup>[8]</sup>. In other words, the construction project in the construction process of all costs of consumption summary, usually divided into direct costs and indirect costs.

#### ***4.2. Project cost management***

Construction project cost management refers to the use of a series of construction technology, technology and methods, cost forecasting, planning, control, accounting, analysis and assessment as the

content, to Guide, adjust and control the economic activities related to the production and operation of engineering projects. Finally achieve the target of cost control on the basis of meeting the demand of time limit and quality, and get the maximum economic benefits. The six links of cost management are interrelated and influence each other. The cost forecast is the premise of making the cost plan, the cost plan is the basic guarantee of cost control and accounting, and the cost control checks the implementation of the cost plan to ensure the smooth implementation of the cost plan; The cost accounting is the final checkpoint to check the cost plan. The data and experience summarized in Cost Accounting, in turn, provide the theoretical basis for other links, and guide the cost forecast and plan Cost assessment is the measure and guarantee to accomplish the target of cost management.

#### **4.3. Summary of project cost management process and links**

The process of cost management is through the study of each link of project cost management, according to the enterprise quota, investment and allocation of labor cost, material cost, machinery cost and other resources, carry on the cost management with the dynamic management idea throughout the whole construction project.

##### **(1) Project cost forecasting**

The cost prediction refers to the estimation of the proposed project before the start of construction<sup>[9]</sup>. The Construction Party, based on the available data and practical experience, analyzes the existing cost theory and the actual situation of the project construction, and adopts specific technical methods, scientifically and reasonably estimate the future development trend of the project and the possible cost level.

Firstly, the cost forecast is based on the enterprise quota, historical data of similar projects, current market situation and policy information Then according to the actual situation of the project, daily price changes and material and machinery consumption, find out the main factors that affect the project labor cost, material cost, machinery cost, management cost and risk; Finally, according to these factors to prepare specific construction project cost budget table, cost forecast.

The cost forecast includes qualitative forecast and quantitative forecast, the qualitative forecast method mainly has the Delphi method, the Brainstorming, the forum law and so on. Quantitative cost forecasting methods include: weighted average method, moving average method, index average method, grey forecasting method, regression analysis method and so on.

##### **(2) Project cost plan**

The project cost plan is a specific plan formulated in currency, including in the whole project construction phase of the planned duration of operating costs and cost consumption, cost reduction and reduction rate and cost reduction measures taken in the process of planning. It guides the smooth progress of cost management and is the important premise and guarantee of establishing the responsibility system of cost management.

The construction cost plan includes direct cost plan and indirect cost plan. A direct cost plan indicates the planned reduction in direct costs and the rate of reduction. The indirect cost plan refers to the amount and rate of reduction of the indirect cost of the construction project.

##### **(3) Project cost control**

Cost control refers to the use of specific technical methods and measures, supervision and control, and timely detection and correction of deviations, in view of various factors such as human, material and financial resources of the project cost<sup>[10]</sup>, during the cost generation stage of the project, ensure the cost target is achieved smoothly.

Cost Control in the cost management of each link in the core position, but also the most basic, the most complex, the most easily changed management content. Cost control should run through the whole process from bid stage to margin return. The cost control in the construction phase includes the cost control in the construction preparation period (ex ante control), the construction process (in-process control) and the completion settlement period (ex post control). Cost Control is the whole process, all staff, all aspects of the control system. Cost Control methods are: Cost Analysis table method, time-cost synchronous analysis method, earned value method, value engineering method.

##### **(4) Project cost accounting.**

The project cost accounting is through the accounting system, the statistics induction in view of the

project construction process each kind of actual expense, and a summary of the unit, individual project costs and total project costs of the project management. Usually the object of cost accounting is the unit project, but can also be flexible according to the actual conditions of the project.

The steps of cost accounting are: First, calculate the actual consumption in the course of construction according to the components of each cost contained in the unit project cost, and then, according to the specific cost accounting object, step by step statistics of the project unit cost and the total cost of the entire project. Finally, check and compare the actual expenses with the budget cost and the target cost<sup>[11]</sup>, and draw up the cost accounting table to lay a good foundation for the cost analysis.

(5) Project cost analysis.

Cost Analysis of engineering project is a process to reduce the construction cost of engineering project by studying the producing process of cost accounting results and the influencing factors of cost. Only through the various stages of the project, can the value of cost analysis play a role. Cost analysis methods are: Comparative Analysis, factor analysis or chain replacement method, ratio method and so on.

(6) Project cost assessment.

The Cost Assessment of Engineering Project refers to the performance evaluation of cost management of enterprises, project department and other units at all levels after the completion of the project. Then according to the evaluation results, the system of rewards and punishments is adopted. Cost assessment is the theoretical basis for formulating and realizing the decision-making goal of project cost<sup>[12]</sup>.

## 5. Conclusion

In this paper, from the construction stage of the cost of each link control, the final actual cost control in the bid budget under the cost, saving the project unnecessary cost expenditure, expanding the profit space. The good results obtained in the aspect of cost management play a certain reference role to the cost management of the scientific system in the later stage of the enterprise. The main conclusions of this paper are as follows:

(1) With the introduction of the internationally accepted list pricing model in China. It is mainly that the tenderer provides the bill of quantities, and the tenderer makes the independent quotation according to his own construction technology level, construction scheme and comprehensive strength. The unit price quoted by the Enterprise has become the decisive factor, the reasonable low price winning the bid has become the weight of the winning bid. Construction enterprises should not only win the bid at a low price but also make profits. Only by constantly strengthening cost management can they improve their core competitiveness.

(2) In order to implement cost management under the mode of list valuation, the first thing is to set up the thought of cost management and improve the consciousness and execution of cost management. Secondly, improve the cost management system, improve the cost management system, clear the responsibility of cost management, deal with the right relationship of cost management responsibility. Finally, we should be familiar with the principles and components of the list pricing model, understand its competitive mechanism, collect data and information, master and make use of the relevant calculation parameters, methods, models and indicators in each link of cost management, etc. , and equipped with the cost management incentive and restraint mechanism to mobilize the enterprise, the project department and the Construction Team and other staff cost management enthusiasm.

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