

# Research on Pricing Model Control of EPC Project in China

—Based on Simulated Bill of Quantities Company

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**Abstract:** As a contracting model for large-scale construction projects commonly used in the world, the EPC model fundamentally resolves the drawbacks caused by the incompatibility of design and construction in the traditional contracting mode. However, due to the specific risk environment and trust situation in China, coupled with the lack of complete system of laws and regulations system, resulting in China's EPC model bidding at different times, the owners need to assume different risks. Therefore, studying the timing of the bidding for EPC mode in China and the bidding method can lay a solid foundation for the successful implementation of EPC project.

## 1. Introduction

Under the EPC model, due to the immature trust environment and risk culture in China [1], on the one hand, the owners hope that EPC can take the responsibility of design, procurement and construction for the EPC to save time, save capital and transfer risks Purpose; on the other hand, do not want the general contractor too much benefit from it. Based on this, the concept of simulation bill of quantities is introduced, hoping to constrain the contractor's behavior [2].

## 2. Analysis of Pricing Control Path of EPC Project at Different Intervention Time

### 2.1 EPC project bidding intervention time analysis

Due to China's specific risk environment and situation, coupled with the lack of a complete system of laws and regulations, as well as the different types of projects, resulting in EPC project bidding occurs in different stages of the project. Therefore, it is an important preparatory work to study the bidding process of EPC projects when EPC project is adopted. This paper first sort out the policy documents on the general contracting mode in different parts of China and summarizes the classification of the bidding intervention points in different places. Table 1 shows the specific content.

Table 1 Comparison of Bidding Involving Time of EPC Model in Each Region

	Ministry of Construction model <sup>①</sup>	Shanghai model <sup>②</sup>	Shenzhen model <sup>③</sup>	Hunan model <sup>④</sup>	Guangxi model <sup>⑤</sup>
Related policy documents <sup>⑥</sup>	<Several Opinions of the Ministry of Housing and Urban-Rural Development on Further Promoting the Development of General Contractor> <sup>⑦</sup>	<The Management Measures of Municipal General Contract Project in Shanghai> <sup>⑧</sup>	<EPC Project General Contractor Tendering Guidelines (Trial)> <sup>⑨</sup>	<Housing construction and municipal infrastructure contracting bidding management practices in Hunan Province> <sup>⑩</sup>	<Guiding Opinions on Promoting General Contracting of Housing and Municipal Infrastructure Projects> <sup>⑪</sup>
Intervention time points classification <sup>⑫</sup>	Feasibility study, program design or preliminary design as bidding intervention point <sup>⑬</sup>	Feasibility Study Report; Approval of Preliminary Design Document or Approval of Overall Design Document as Bidding Invasion Point <sup>⑭</sup>	Conceptual plan design; complete plan design <sup>⑮</sup>	After the project approval, filing or examination and approval formalities are completed, the project design documents or the preliminary design documents are approved <sup>⑯</sup>	Feasibility study, design or preliminary design is completed <sup>⑰</sup>

It can be seen from the above table that the main tendering intervention time points for EPC general contracting mode in China focus on the feasibility study and the preliminary design.

## 2.2 Analysis of the Influence Factors of Interventional Point Selection

For different intervention points corresponding to the project preparation is not the same. On the one hand, manifested in the capital construction project procedures, On the other hand, the performance of the project itself on the request. According to local and various sectors of the project practice combined with literature research, It can be found that the standard maturity of the project's industry, the project's own characteristics, the owner's control ability and the contractor's management ability are the main factors that affect the time of bidding for the EPC project.

## 2.3 Bidding Mode Classification at Different Points of Intervention

In the EPC project, as long as the owners to complete the preliminary design of the project, you can carry out the preparation of the bill of quantities, Thus as a basis for the contractor to calculate the tender offer, Especially in the EPC contract pricing method for the EPC project, the project volume list to the total amount of the project price quotations. Therefore, the preliminary design of the EPC project can use the bill of quantities for bidding. In addition, the owner can also prepare a tender for tender at the feasibility study stage. However, at this time, the inventories are mainly based on the requirements of the owner and the conceptual design. The design depth can not meet the requirement of compiling a complete bill of quantities. Therefore, Volume list. Two different modes of bidding are shown in Figure 1.

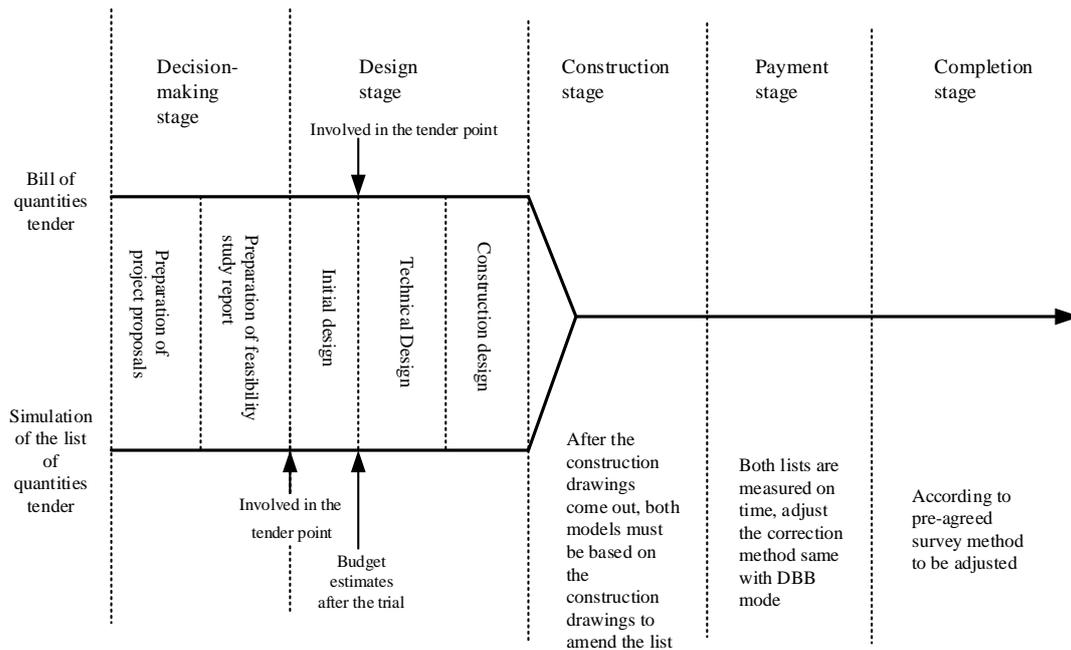


Figure 1 Two different bidding mode path maps

For the EPC project, the tender can be completed after the feasibility study report is completed by using the simulation quantity list. This project has the advantages of shortening the construction period and saving time and is suitable for the project where owners need to rush ahead [3] the amount is virtual, so bidders assume greater risk. However, when using the bill of quantities for bidding, bidding should be conducted at least after the preliminary design drawings of the project come out, but the accuracy is higher than the simulated bill of quantities.

## 3. Preparation of tender quantity list for simulative bidding in feasibility study of EPC project

### 3.1 The scope of application of simulation quantity list in EPC project

The use of simulation of the bill of quantities for bidding is to prepare the list without

preliminary design drawings or preliminary design is incomplete, need to use similar projects list items and technical indicators, the main structural shaped construction projects, you may need to compare a large number Of the reference project data, lists the project's bill of materials, and similar projects for the infrastructure, you need to compare similar project data less, and often select the most similar reference project can be easily compiled simulation project Volume list. Among them, the basic structure is similar to the main structure of the building structure similar.

### **3.2 Preparation of simulation quantity list in EPC project**

In the EPC project, bidding can be conducted under the feasibility study stage by adopting the method of simulating the bill of quantities. For projects with similar main structure, the list of simulated quantities is easier to list. For the main part of the main building or the special part of the building, the list may be prepared by referring to the bill of quantities of similar projects and their construction drawings. For an EPC project, the accuracy of the simulated quantity list affects the bidder's bid. Therefore, experienced inventory compilers should be found to simulate the bill of quantities with similar projects so as to minimize the number of Therefore, when looking for similar projects, we should not simply conduct a simple basic comparison of the projects. We should make detailed comparisons between the various elements of the buildings and select similar projects for reference.

Looking for a similar project is the key and difficult point in the preparation of simulation project quantity list of EPC project. Firstly, screening basically similar projects according to the requirements of the owners, the main structure of the project will be similar to the project to be built. However, some of the similar projects selected at this time may still not be able to match exactly. It is also necessary to find an auxiliary project as the basis for the listing. Based on the project information given under the feasibility study stage, similar projects for the project to be built are found, and the selected project is selected to simulate the bill of quantities according to the experience of the inventor. However, even though the project may not be exactly the same in details, it is important to adjust the list when preparing the simulation-volume list.

### **3.3 Simulation of similar projects to find ways to find ways**

A similar project can be identified by matching the characteristic elements of the project after basically determining the project category. Firstly, the AHP method is used to analyze the weight of each project in the project and select the items with the highest weights as the main factors of matching. Secondly, compare the deviation between the index and the matching factor of the project to be built, obtain the similar degree of the project through calculation, and then select the similar project. The search process for similar projects is shown below.

### **3.4 EPC project to simulate the preparation of the bill of materials process**

After a similar project has been selected, a list of simulations of the proposed project can be started. The specific preparation process is as follows:

(1) A clear definition of the scope of project selection reference project. Clarifying the scope of preparation is an important precondition for the preparation of a list of simulation quantities. After the construction scope of the project is clearly defined, it is necessary to know the tenders corresponding to the tendering and the corresponding items.

(2) Items that limit the list of simulations. The list of proposed simulations should be based mainly on the bill of quantities and construction drawings of the projects under consideration, as well as the conceptual design of the project to be constructed and the relevant engineering specifications and data by the owners, taking the bill of quantities of the project as a template.

(3) Add or delete list of items of simulation project. Compilation of staffing in the preparation of the list, the need is to combine multiple indicators for comparison. After comparing each of the project quantities for each similar project in turn, it is easy to find out the differences and the required sub items of the project quantities, and then correct the omission of the list items in the project amount list.

(4) To adjust the number of projects and project characteristics. Because of the inaccuracy of the

simulated bill of quantities, the number of projects and the characteristics of the project need to be adjusted. There are two main methods for determining the number of projects: calculating the number of projects directly. At the conceptual design phase of the project, if the main structures of buildings are similar, the number of some projects can be directly estimated through years of experience of compilers; Indirectly applying index data, In terms of quantity of works, we can make a general estimate based on the index data of common buildings and make corrections based on the project's own situation.

(5) According to the simulation of the bill of quantities for bidding. Through the above steps, a list of simulation quantities for bidding can be compiled. In the bidding documents, the problems that may appear in the simulation volume need to be described and the general contractor selected through reasonable bid evaluation.

(6) To review the simulation of the bill of quantities revised. Since the list of simulation quantities used for bidding is not completely accurate, the revision of the list of simulation quantities needs to be reviewed, mainly after the preliminary design is carried out and the preliminary estimate of the simulation quantity list is conducted based on the preliminary design drawings.

#### **4. Conclusions**

The first studies of this paper's different pricing paths under EPC mode. By comparing the relevant policies in various regions of China, this paper classifies the time points for the bidding of EPC projects in China. Then focuses on the feasibility study of the simulated engineering quantity list bidding in the feasibility study stage and obtains the method of compiling the simulation engineering quantity list in the EPC project

#### **References**

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