

# Application of BIM Technology in the Phase of Project Tendering and Bidding

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**Keywords:** Project tendering and bidding, BIM

**Abstract:** Our country's engineering bidding system, as a way for construction units to choose partners, usually adopts paper-based bidding method. With the development of modern information technology, this method shows great limitations. BIM technology has many advantages for project management. This paper mainly studies the value of applying BIM technology in bidding stage.

## 1. The Preface

With the development of construction industrialization, more and more information technologies have been applied. BIM technology, as a hot direction, has become the focus of study for all participants because of its great advantages. BIM technology has the characteristics of visualization, strong correlation between model and real buildings, and is beneficial to optimal design. It is mainly used in the early investment decision-making and construction stage of engineering projects. In fact, BIM technology also has great application value in the bidding stage.

## 2. Present Situation and Problems of Current Bidding Model

### 2.1 Present Situation of Current Bidding Model

Since the reform and development, the number of construction projects is increasing, and the construction industry is growing. It is widely adopted internationally to select partners through bidding, which has been gradually applied to more and more domestic projects. The application of bidding method can make it easier for the owner to find suitable contractors, which is beneficial to the owner's investment control. At the same time, if the contractor wants to achieve better economic benefits in this competition mechanism, he must improve the competitiveness of the enterprise, strive to acquire advanced construction methods and technologies, and formulate more scientific and reasonable progress. Degree plan and so on.

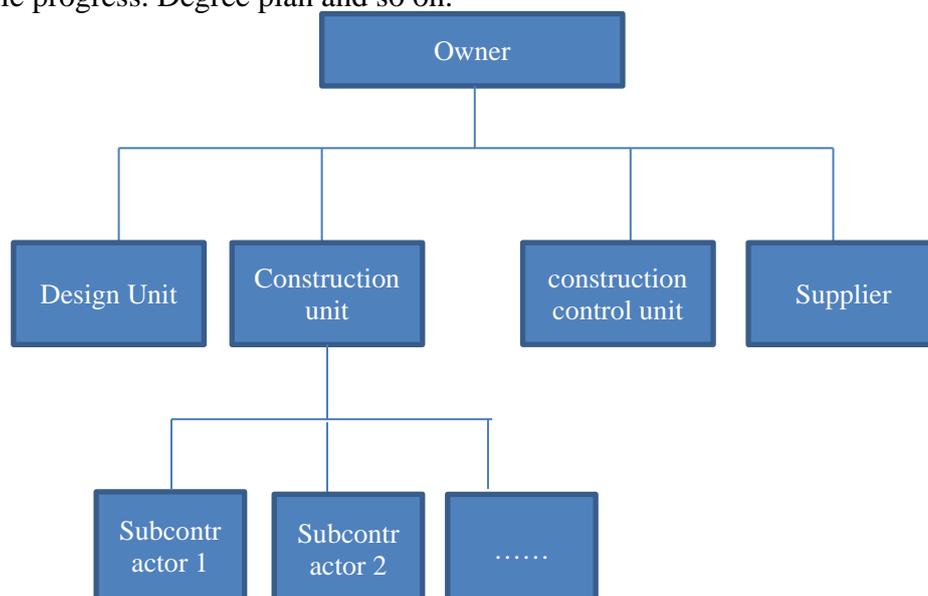


Figure 1 Traditional Bidding Model DBB

As a stage of the whole life cycle of the project, the main purpose of the construction project bidding system is to help the owners choose the ideal partners. The implementation of this system is conducive to standardizing the new order of the construction industry and promoting fair competition among different participants, which has great advantages. But in the past decades, it has also shown many problems.

## 2.2 Main issues

(1) Questions of bid inviting party. One aspect of the bidder's problem is the circumvention of bidding. Specific projects and projects exceeding the specified investment scale are compulsory bidding. In order to avoid the dismantling of contracts, some bidding units divide projects exceeding the specified investment scale into several contracts which are not exceeding the standard of scale, so as to avoid bidding. In addition, some tendering units will set up some clauses to exclude foreign enterprises and increase the probability of local enterprises winning the bid. In the process of bidding, sometimes the bidding unit can not convey the true intention and demand to the bidder, which causes the phenomenon of information asymmetry. In order to catch up with the progress, the bill of quantities provided by the bidder is often insufficient because the design drawings are not exhaustive enough. The rationality of the bidder's quotation is obviously insufficient, and the later cost is obviously insufficient. In the process of management, there may be large changes in cost and engineering, which is not conducive to investment control and the implementation of progress plans.

(2) Questions of bidders. A notable problem in the whole bidding process of bidders is the problem of bidding string around the bid, which is also unavoidable in the traditional bidding mode. The traditional way of bidding is mainly paper tender, which has a great possibility of potential bidding collusion and is difficult to identify, which is not conducive to rectification. Now the whole country is carrying out electronic bidding and BIM bidding, the author will also describe its role in the improvement of bid string. In addition, the bidding unit's problem is also reflected in the quotation, because the legal time limit for bidding, the time itself left to the bidding unit to prepare tenders is only a dozen days, in such a short time to check the amount of work, to complete commercial and technical tenders is more difficult. Often, bidders can only quote according to the cost information of similar projects in the past, and calculate according to the design drawings provided by the tenderer. If the drawings are not detailed enough, or the description of the project characteristics of the bill of quantities is not accurate enough, the function and significance of the bidding quotation will also be lost.

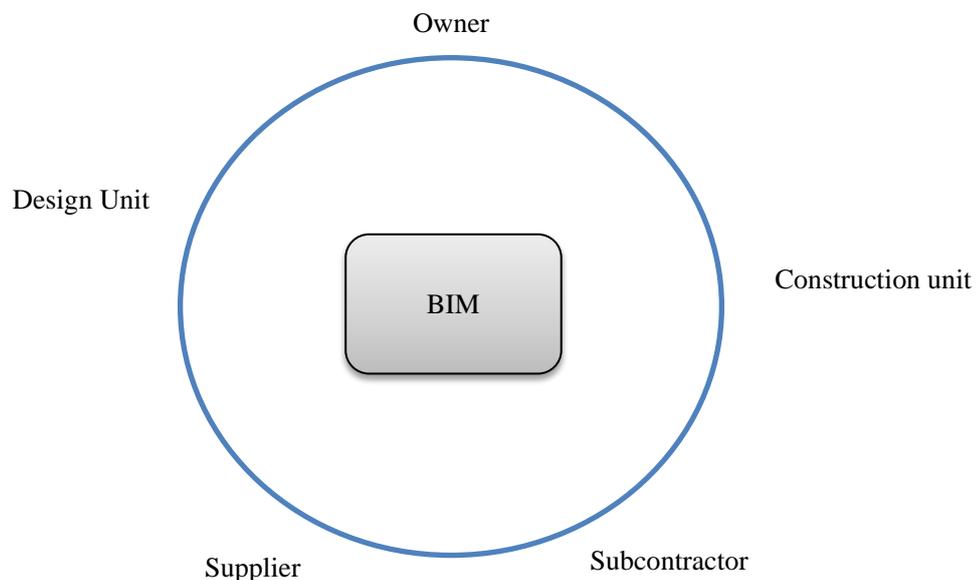


Figure 2 BIM Bidding Model

### **3. Application Value Analysis of BIM Technology in Bidding Stage**

#### **3.1 Overview of BIM Technology**

BIM means Building Information Modeling, which is the result of the application of digital and information technology in the field of architecture. Building information model integrates all process information of construction project and simulates real building scene. All participants in the project can edit the model conveniently and analyze the data in time. BIM building information model has the characteristics of visualization, collaboration, modelling and optimization. It can make the complex project three-dimensional and improve the communication efficiency between different units. Through this information model, different subjects can grasp the content and progress requirements of project construction more clearly, and the time and schedule of important project nodes. Cost can be controlled beforehand, and BIM information model can also be used to model the construction process ahead of time, compare the effects of different construction schemes, and select the optimal scheme or optimize the selected scheme.

#### **3.2 Application Value Analysis**

##### **(1) Optimal design.**

The optimization design mentioned here includes two aspects. On the one hand, it refers to the optimization of design drawings, on the other hand, it refers to the optimization of construction organization design. First of all, we can see the optimization of design drawings. Using BIM technology, we can change the traditional two-dimensional graphic design drawings and build a three-dimensional building information model that can reflect the appearance, functional layout and spatial structure of the building. The construction unit can see the drawings problems reflected by the model intuitively, such as lighting, ventilation and structure. In the bidding stage, the optimization and modification are carried out. Secondly, for the design of construction organization, it is the arrangement of construction schedule, labor, material and equipment organization in the bidding stage, which is beneficial to the cost and schedule control of the project. The application of BIM technology can optimize the content of construction organization design, including according to the network schedule of BIM, according to the key construction period. To control the progress, organize the entry of labor subcontracting and professional subcontracting units in time, and organize the construction in an orderly manner. The quantity and time of materials and equipment needed for construction can be accurately estimated in advance, so as to realize seamless docking between processes.

##### **(2) Accurate Statistics of Engineering Quantity**

In the bidding stage, the tenderer is required to provide the bill of quantities in the bidding documents, and the bidder gives the quotation on the basis of reviewing the bill of quantities. Therefore, in this stage of work, on the one hand, the tenderer needs to prepare the bill of quantities, on the other hand, the tenderer also needs to check whether the calculation of quantities is correct, and then hedge the price. It is very complicated to calculate the price according to the traditional two-dimensional design drawings, and there is also the risk of miscalculation. The above problems can be effectively solved by using BIM three-dimensional model. Because in the BIM model, the engineering quantity information of each component is included in it, which can realize the rapid extraction of Engineering quantity, and the bidding unit does not need to re-check, so it can quickly organize the price and compile the bidding quotation. At the same time, combined with the progress plan, it is easy to obtain different stages of funding needs, and improve the efficiency of cost control.

##### **(3) Collision check**

In architectural design drawings, water supply and drainage, electrical, HVAC and structural pipelines are interlaced and distributed, which is extremely complex, and pipeline cross-collision is likely to occur. However, in traditional two-dimensional design drawings, these problems can not be observed in advance. Only in the construction stage, site dismantlement and rework are carried out, which is not conducive to progress. Degree and cost control. Using BIM technology to build a visual model, the distribution of pipelines in different specialties can be intuitively understood.

Using collision inspection to adjust and modify the problematic lines can greatly reduce the problems of rework and claims in the construction stage, and achieve the control objectives of construction period and cost.

#### **4. Conclusion**

In summary, we can see that BIM technology can effectively control the cost and schedule of each stage of construction, reduce the workload, and make use of the relevance of the model to achieve more refined management and pre-control.

Introducing BIM technology in bidding stage is an important direction of future development. It can help bidders to obtain scientific and reasonable bidding quotation, reduce the impact of design bidding on subsequent construction. It is very important to improve the competitiveness of enterprises. It should also be a technology that bidders need to focus on and learn.

#### **Acknowledgement**

Supported by Youth Research Fund Project of Chongqing Jianzhu College (No.QN2018008)

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