

# Analysis and Related Suggestions on the Whole Process Engineering Consulting Service Mode at Home and Abroad

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## ABSTRACT

This paper first introduces the basic connotation of China's whole-process engineering consulting. Immediately, analyze the organization model, service procurement model and charging standards of foreign whole-process engineering consulting (international terminology full-life cycle engineering consultant). Second, discuss the government's role in the development of engineering consulting from two aspects: service management and market access. Finally, combined with the above analysis, the specific problems faced in the implementation process of the whole process engineering consulting are compared. Provide relevant suggestions on how companies and individuals respond to industry development trends.

## 1. The Basic Connotation of Domestic Whole-Process Engineering Consulting

### 1.1 Policy Requirements

In March 2019, the National Development and Reform Commission and the Ministry of Housing and Urban-Rural Development issued the "Guiding Opinions on Promoting the Development of Whole-Process Engineering Consulting Services" Fagai Investment Regulations<sup>[2019]</sup> No. 515. Encourage construction units to entrust consulting units to provide full-process consulting services such as bidding agency, survey, design, supervision, cost, and project management. Meet the integrated service needs of construction units. Enhance the synergy of the project construction process.

### 1.2 Development Status

After several initial development stages of engineering consulting in my country, including the immature concept of engineering consulting, the unclear scope boundary, and the unclear content. At present, the breadth and depth of engineering consulting have been significantly improved. It is in a stage of concentrated and rapid development. Guobanfa<sup>[2017]</sup> No. 19, Development and Reform Investment Regulations<sup>[2019]</sup> No.515 and other related policies clarify the scope of the whole process of engineering consulting, organization methods and service technical standards. However, the government's policy documents have not yet been transformed into specific and quantifiable implementation regulations. The real progress of the pilot project

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of the whole-process engineering consulting service is not satisfactory.

### 1.3 Practice of “1+N” Model

Shanghai Tongji Engineering Consulting Co., Ltd. is one of the first pilot units of whole-process engineering consulting in China. Propose a “1+N” whole-process engineering consulting model. It is also the current mainstream service model. “1” refers to the engineering consulting management service chain that runs through the entire process of the project. It is the integrated management of planning, organizing, controlling and coordinating each stage of project decision-making, implementation and operation. “X” refers to a single project consulting management service in the whole process of project consulting management services. The consultant can undertake one or more of the professional engineering consulting services according to the needs and wishes of the client. Including preliminary engineering consultation, engineering survey, engineering design, bidding and procurement, cost consultation, engineering supervision, operation and maintenance consultation and BIM consultation.

## 2. Analysis of the Basic Content and Practical Problems of Foreign Engineering Consulting in the Whole Process

### 2.1 Organizational Model

There are two types of internationally-used whole-process engineering consulting service organization models-American and German. The core difference between the two is whether planning and design services and management services are undertaken by one unit.

#### 2.1.1 American Model

In the American model, the owner signs a contract with a company. This company undertakes the phased or whole process of engineering consulting. In the project decision-making, implementation, and operation stages. The role of the enterprise at each stage varies due to the different engineering organization models. The three common engineering organization models in the United States are DBB (Design-Bid-Build), DB (Design-Build), and CM (Construction Management).

In the DBB model, the implementation of engineering projects must be carried out in stages in the order of design, bidding, and construction. The rights, interests and responsibilities of the owner, design unit, and

contractor are relatively clear. Taking the design unit as an example, the designer self-regulates. In the design stage, after the initial design of the designer is approved by the owner. The designer chooses an architect as the project manager to assist in the deepening of the design and construction drawing design. In the bidding, the designer is based on its own professional knowledge and understanding of the project at the design stage. Complete the technical description of the bidding document. Assist the owner to analyze the bid price and complete the bidding. During the construction phase, the design unit is only responsible for quality observation of the construction. And review whether the construction party designed and constructed in accordance with the construction drawings. Whether the materials used meet the original requirements.

In the DB model, design and construction are entrusted to a single unit. The two form an overall team, and the team leader is often taken by the construction unit. The DB contractor itself manages the design and construction. The level of the contractor has a greater impact on the design quality. Therefore, this model has higher requirements for the management ability of the enterprise. Usually, the owner entrusts a certain proportion of design work such as construction drawing design to the unit. Entrust the conceptual design and preliminary design to other design units. Or the owner directly designates the design unit in the contract.

The CM model contracts the project in stages. Construction is carried out at the same time as the design, this mode can effectively shorten the construction period. CM model is divided into agency type and risk type. The core difference between the two is whether the entrusted unit has contracted the construction work. The former means that the owner has signed contracts with the engineering consulting unit and the construction unit respectively. In the latter, the contract includes both engineering consulting services and construction contracting work. The construction contracting here is different from the general construction contracting. The entrusted unit shall obtain the consent of the owner when selecting construction subcontracting.

#### 2.1.2 German Model

In the German model, the owner is associated with two types of engineering consulting companies, namely, planning and design and project control and management. The first type of planning and design services includes not only basic design, but also extended service content. Specifically, basic services refer to the preparation of basic materials, concepts, prelimi-

nary, deepening, approval, and construction drawing design. Extended service runs through all stages of the project. Including the bidding preparation and bidding and contracting work before construction. Construction monitoring, acceptance, related design and project management during construction. As well as project inspections, filing, related design and project management during the warranty period. The second type of company is responsible for project control and management.

In terms of contracting methods, the owner can choose to sign contracts with two units separately. You can also choose to sign a contract with a consortium or cooperative. Project management, supervision, or cost consulting companies can all become members of consortia or cooperatives. Regardless of the contract method, the designer is the main body.

## 2.2 Purchasing Mode

The United States generally does not adopt competitive bidding laws. This is because engineering consulting costs account for a relatively small proportion of the entire project investment and service quality has a greater impact on engineering safety, progress, and quality. It is meaningless to pursue cost reduction at the expense of service effects. On the other hand, the specific workload, scope and content of the work are vague, and pricing cannot be clearly defined.

The commonly used procurement models are mainly divided into three categories. Including design competition, agreement review and proposal and negotiation. Among them, design competition and agreement review are common modes of procurement design work. As the name suggests, the organizer issues the design tasks of the competition project. Select the optimal design plan from many participating units. The protocol review is slightly different from the design competition. Participating design units are either recommended by professional institutions, or the owner sends an invitation to interested design units. Rank the submitted design materials according to the scoring principle, and select the best design unit.

## 2.3 Fee Standard

At present, the common international charging methods mainly include the following. For example, fixed price contracts, calculations on time, wages plus a certain percentage of other expenses, costs plus handling fees, calculations based on construction ratios, etc. Among them, the fixed price contract refers to the clear

engineering tasks and clear service content. If the risk does not exceed the scope agreed by the parties to the contract, the price will be fixed and no adjustment will be made. When calculating on time, the engineering consulting company charges by the hour. Employment costs are generally 2.5 to 3 times the hourly rate for engineers. Calculated by construction ratio means that the service fee is charged according to a certain percentage of the project budget. Generally 1%-5%, this method is more common in the world.

The German national standard is relatively clear, according to the "Statutory Standards for Architects and Engineers Service Fees" (HOAI). The standard divides the whole process into nine stages. In addition to stipulating the service content of each stage, it also formulated relevant regulations on service fee standards and the proportion of remuneration at each stage. The charging standards for the whole process of engineering consulting in my country are not clear. At this stage, most of the individual costs are superimposed. On this basis, increase the costs incurred in the organization and coordination of all parties. Although this method is relatively simple, it encourages engineering consulting companies to improve consulting quality. Encouraging companies to adopt mergers and acquisitions, or joint operations to broaden the upstream and downstream of the industrial chain will not help much. When the contracted parties have a long-term cooperative relationship. On the cost basis, part of the cost saved by the consulting company for the owner can be used as an additional cost. In this way, the improvement of service quality of consulting enterprises is encouraged.

## 3. The Role of the Government in the Development of Whole-Process Engineering Consulting

### 3.1 Service Management

Foreign engineering consulting has a high degree of marketization. Under the guidance of laws and regulations, relevant policies, and standards, market order is effective. In developed countries where the engineering consulting market is mature. Industry norms, industry self-regulatory associations and internal corporate systems are combined. Better restraint on market behavior and escort the healthy development of the industry. Specifically, the government formulates industry overall plans, relevant laws and regulations, policies, and various service standards. Industry associations transform government laws and regulations and related policies into specific rules and regulations to restrict

the behavior of members. At the same time, in order to maintain the authority of the industry association among member companies. Industry associations not only assist the government in the self-discipline management of the engineering consulting market. It must also represent the legitimate rights and interests of companies and consultants. In addition, industry associations are also responsible for promoting the healthy and high-quality development of the industry. Including formulating professional education standards, formulating vocational continuing education and training plans, vocational qualification management, and holding regular academic exchange activities.

At present, the level of my country's consulting industry is not high enough, and the market system is not perfect. The government mainly plays a guiding role, and the market operation still focuses on the internal management system of the enterprise. Such loopholes often lead to phenomena such as mutual borrowing of qualifications, false and unfair competition among enterprises. Further hinder market development and form a vicious circle.

### 3.2 Market Access

Foreign countries have stricter requirements on the personal qualifications of practitioners. The government's management model of qualifications is more reasonable. Professionals form related organizations such as the society. Register with the government and organize professional qualification examinations after being recognized. And conduct exam certification management for candidates. Candidates who pass the exam must be registered with the government before they can engage in engineering consulting related work. In doing so, on the one hand, the government conducts examination qualification management through the society. It is convenient for the government to control the market access of the engineering consulting industry. On the other hand, candidates who pass the exam are registered by the government as the rule maker. Can effectively restrain the professional behavior of practitioners.

In my country, enterprise qualifications are the center, and personal qualifications are supplemented. One reason for this situation is that most of the large-scale construction project owners in my country are state-owned enterprises. The audit system is relatively strict and requires higher qualification management for enterprises. Foreign countries are only allowed access to practitioners who have a qualification certificate. There are no qualification requirements for consulting companies.

## 4. Actively Follow the Development Trend of Engineering Consulting Throughout the Process

Through the above comparison of several major characteristics of the whole process engineering consulting industry, government, enterprises and individuals at home and abroad, we can get the following lessons:

For the government, the organizational model can be inspired by the experience of the American and German models. Construct a development model of full-process engineering consulting in line with my country's national conditions. In the procurement mode, the owner can use quality and cost as the basis for selection. Use proposals and negotiations, design competitions, agreement review and other methods to select high-quality cooperation units. Regarding the charging standards, my country currently uses multiple fee stacks and prescribed rewards to calculate fees. Can learn from foreign experience. According to the specific conditions of the project such as whether the content of the consulting service is clear. Choose a fixed price contract, charge according to the investment ratio, and charge by stages, etc. to choose the most suitable plan.

For enterprises, use financial means to merge and reorganize enterprises. Extend the upstream and downstream of the industrial chain and expand the scale of enterprises. Actively learn from foreign excellent enterprises that can undertake the entire process of engineering consulting business. Such as AECOM in the United States, ARCADIS in the Netherlands and ARUP in the United Kingdom. Broaden industry types. Cultivate a group of high-quality compound talents with international vision. Give full play to the advantages of professional technology and management capabilities. Make reasonable use of BIM tools to improve the ability of information integration. Promote industry innovation and sustainable development.

For individuals, high-quality, comprehensive talents are the talent trend of the industry. With the further improvement of the government's market access rules. Individual qualification requirements will be more stringent. Participate in the qualification examination as soon as possible before the relevant national systems are perfected. Prepare in advance for the development of the engineering consulting industry. It is not difficult to find after studying the whole process engineering consulting service model. This way of integrating multiple services requires practitioners. It has comprehensive strength including design, construction, and man-

agement capabilities. This undoubtedly puts forward higher requirements on the overall quality of designers.

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