

# Analysis of the Whole-Process Engineering Consulting Management Model

Zheng Yang\*

China Petroleum Pipeline Engineering Corporation, Langfang, Hebei, 065000, China

\*Correspondence to: ZhengYang, China Petroleum Pipeline Engineering Corporation, Langfang, Hebei, 065000, China, E-mail: [cppeyangzheng@126.com](mailto:cppeyangzheng@126.com)

**Abstract:** The whole-process engineering consulting management model, as an innovative approach in the field of engineering construction, plays a significant role in improving project efficiency and quality. This paper analyzes the whole-process engineering consulting management model, which is characterized by its comprehensiveness, integration, professionalism, and clearly defined responsibilities. In different stages of engineering construction, the model covers: feasibility studies and decision-making in the planning stage; design management, optimization, and cost control in the design stage; construction management and supervision in the construction stage; and acceptance, post-evaluation, and document archiving in the completion stage. Key implementation elements include professional teams, advanced information technologies, and a sound management system, ensuring smooth project progress and overall effectiveness.

**Keywords:** Engineering construction; whole-process; engineering consulting; management model

## Introduction

With continuous development and transformation in the field of engineering construction, traditional consulting models are increasingly unable to meet the demands of more complex and integrated projects. The whole-process engineering consulting management model has emerged as a response, offering new management concepts and methods for engineering projects. This model spans the entire project lifecycle and is characterized by its comprehensiveness, integration, professionalism, and clearly defined responsibilities. From feasibility studies in the decision-making stage to post-evaluation at project completion, each phase plays a critical role. Moreover, professional teams,

advanced information technologies, and a well-established management system are key factors for its successful implementation. This paper provides an in-depth analysis of this model to offer valuable insights for engineering construction projects.

## 1. Characteristics of the Whole-Process Engineering Consulting Management Model

(1) **Whole-process nature:** This model runs through the entire lifecycle of a construction project. From the project decision-making stage, it covers feasibility studies and project planning; in the design stage, it includes design management and design optimization; the construction stage involves construction management, quality control, and schedule control; and in the completion stage, it encompasses project



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acceptance and post-evaluation.

(2) **Comprehensiveness:** This model breaks the barriers between professional services under traditional consulting models, integrating consulting services across multiple fields such as investment, surveying, design, supervision, bidding agency, and cost consulting, achieving organic integration.

(3) **Professionalism:** Whole-process engineering consulting places high demands on consulting firms, requiring multi-disciplinary, highly skilled teams whose members must proficiently apply knowledge and skills across various fields. Additionally, consulting firms must continuously update their knowledge base, keeping pace with the latest industry technologies and developments to provide professional and accurate consulting services.

(4) **Clear responsibility:** In the whole-process engineering consulting model, the consulting firm acts as the chief project consultant, assuming overall responsibility for project quality, safety, schedule, and investment. This clear division of responsibility effectively enhances the firm's accountability and initiative. To avoid project objectives failing due to their own errors, the consulting firm places greater emphasis on project management, thereby improving service quality.

## 2. Application of the Whole-Process Engineering Consulting Management Model in Various Stages of Engineering Construction

### 2.1 Decision-Making Stage

(1) **Project Feasibility Study:** During the decision-making stage, the whole-process consulting model plays a critical role in project feasibility studies. Consulting firms conduct comprehensive evaluations, including market analysis, technical feasibility assessment, and economic feasibility analysis<sup>[1]</sup>. By performing multi-dimensional and in-depth assessments, they provide project owners with scientific and reasonable decision-making references, helping them avoid blind project initiation and effectively reduce potential risks.

(2) **Project Planning and Programming:** Based on feasibility study results, consulting firms tailor detailed project planning and programming solutions for the owner. These plans include project positioning, goal setting, scale planning, layout arrangement, and construction schedule determination. Moreover,

consulting firms assist owners in completing necessary project approvals, verifications, or filings, ensuring that the project progresses legally and compliantly.

(3) **Investment Estimation and Fundraising:** Consulting firms prepare detailed investment estimation reports based on the project planning and programming. These reports serve as a crucial reference for owners to control project investment. Considering the project's financial needs, consulting firms also leverage their expertise and experience to help owners develop practical and feasible fundraising plans.

### 2.2 Design Stage

(1) **Design Management:** Whole-process engineering consulting firms assume responsibility for project design management. Their tasks include selecting appropriate design units, signing rigorous design contracts, organizing comprehensive design briefings, and strictly reviewing design documents. By strengthening the design management process, they ensure that design quality accurately meets project requirements, minimize design changes and rework, improve overall design efficiency, and guarantee smooth progress in the design phase of the project.

(2) **Design Optimization:** Consulting firms leverage their professional knowledge and skills to deeply optimize design schemes. Through comprehensive analysis of various project factors, they improve the design from multiple dimensions to enhance project cost-effectiveness. During optimization, a balance between functional realization and cost control is carefully considered, aiming to maximize project benefits within limited resources.

(3) **Budget-Limited Design:** Based on prior investment estimates and clearly defined project goals, consulting firms develop budget-limited design indicators. Design units are required to strictly control design costs while ensuring complete functionality and quality standards, preventing total investment from exceeding preset limits. Implementing budget-limited design effectively constrains project investment from the design stage, avoids excessive spending, improves investment efficiency, and provides strong support for smooth project execution and economic returns<sup>[2]</sup>.

### 2.3 Construction Stage

(1) **Construction Management:** Whole-process consulting firms undertake construction management,

including reviewing construction organization designs to ensure scientific and reasonable plans, controlling construction progress through detailed schedules and supervision, strictly managing construction quality according to design requirements and relevant standards, and reinforcing construction safety management by identifying hazards and preparing emergency plans.

(2) **Project Supervision:** Consulting firms carry out full-process supervision during construction. Supervisors conduct site inspections, detailed checks, and strict acceptance procedures to promptly identify quality issues, potential safety risks, and schedule deviations, taking effective measures to keep the construction process under control.

(3) **Cost Control:** During construction, consulting firms review bill of quantities to ensure accuracy, audit progress payment requests to prevent unreasonable expenditures, review change order costs to control modifications, and assist project owners with final accounts and settlement, ensuring project costs are genuine and reasonable.

(4) **Contract Management:** Consulting firms manage contracts, including drafting, reviewing, signing, performance, and modification. Strengthened contract management clarifies the rights and obligations of all parties, standardizes behavior, prevents disputes, and provides legal assurance for smooth project implementation.

## 2.4 Completion Stage

(1) **Project Acceptance:** Firms organize acceptance work strictly according to relevant standards and contract requirements, conducting thorough inspections of project quality, functional fulfillment, and safety. This includes checking structural stability, equipment operation, fire safety compliance, and environmental impact, ensuring the project meets design and operational requirements and is ready for formal handover.

(2) **Post-Evaluation:** After acceptance, consulting firms conduct post-evaluation, systematically summarizing lessons learned, analyzing investment efficiency, assessing social benefits, and evaluating environmental impact. This comprehensive review provides owners with references for future decision-making and accumulates experience for similar projects<sup>[3]</sup>.

(3) **Documentation and Handover:** Consulting

firms carefully organize and archive all project-phase documents, including planning materials, design drawings, construction records, and acceptance reports, and transfer them accurately to project owners and archives management, ensuring completeness and traceability.

## 3. Key Elements for Implementing Whole-Process Engineering Consulting Management Mode

### 3.1 Professional Personnel Team

Whole-process engineering consulting involves multiple professional fields, including investment consulting, surveying, design, supervision, bidding agency, and cost consulting. Therefore, a multi-disciplinary talent system must be established, with professionals in each field playing key roles at their respective stages. Additionally, project leader positions should be set, with personnel possessing comprehensive management and coordination skills, responsible for overall coordination of different professionals, ensuring resources are allocated reasonably, conflicts resolved, and the project progresses according to plan. Personnel training and continuing education are also indispensable. As the construction industry evolves, new technologies and methods continuously emerge. Consulting personnel must update their knowledge systems to meet industry demands. Consulting firms should organize training and continuing education programs with diverse methods, including internal training, industry seminars, and academic exchanges<sup>[4]</sup>. These activities enable personnel to communicate with peers, broaden perspectives, stay abreast of industry trends and technological developments, and apply knowledge to practical work, enhancing professional skills and overall competence, thus laying a solid foundation for the successful implementation of the whole-process engineering consulting management mode.

### 3.2 Advanced Information Technology

(1) **Project Management Software:** Utilizing advanced project management software enables dynamic control over project schedule, quality, and cost. Such software allows real-time sharing and transmission of project information, ensuring different departments and personnel can access necessary data promptly, reducing delays and errors, improving

management efficiency, and supporting scientific decision-making to keep the project on track.

(2) **BIM Technology:** Building Information Modeling (BIM) creates a 3D digital model of the project, achieving three-dimensional visualization. Construction processes can be simulated in a virtual environment to identify potential issues in advance. Collision detection can pinpoint conflicts between different disciplines, allowing problems to be resolved at the design stage, optimizing designs, reducing rework, and improving project quality and efficiency.

(3) **Big Data and Intelligent Technologies:** Big data and intelligent technologies enable comprehensive collection, in-depth analysis, and extraction of valuable insights from project data. This provides robust data support and reliable decision-making evidence for the project.

### 3.3 Comprehensive Management System

(1) **Quality Management System:** Establish a complete system with detailed quality management regulations and processes, clearly defining the responsibilities and authority of each role in quality control. Quality is strictly managed across all stages, from early planning to project acceptance, covering design, materials, and construction quality, ensuring the final project meets standards and contractual requirements, providing a stable foundation for operational use.

(2) **Safety Management System:** Develop comprehensive safety regulations and emergency plans for potential accidents. Strengthen safety supervision during construction, conduct regular inspections, eliminate hazards promptly, and organize regular safety training to enhance awareness and skills, effectively preventing accidents and ensuring safe project execution.

(3) **Risk Management System:** Establish a risk management system to identify, assess, and analyze potential risks throughout the project lifecycle. Develop targeted mitigation measures according to risk type and impact<sup>[5]</sup>. Continuously monitor and adjust strategies

based on risk status to keep risks within acceptable limits, ensuring the project achieves its objectives.

## Conclusion

In summary, the whole-process engineering consulting management mode, characterized by its comprehensiveness, integration, professionalism, and clear accountability, demonstrates strong advantages across all stages of construction. From scientific planning in the decision stage to meticulous control in design and construction, and comprehensive post-evaluation, it provides a solid guarantee for project success. Professional personnel teams, advanced information technology, and a comprehensive management system are the foundational elements for successful implementation. As the industry develops, this mode will continue to improve, enhancing efficiency, quality, and assurance in construction projects, promoting sustainable and healthy growth in the sector.

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