



## REVIEW

# Research on Innovation of Engineering Project Management Mode and Intelligent Management

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### ABSTRACT

In order to realize the standardization and normalization of environmental protection project management. This paper uses the literature method to study the current status of the existing project management mode, and points out the problems: lack of a sound project management system, insufficient information application of project management, and unclear decentralization in project management; on this basis, this paper proposes optimization strategies from the aspects of perfecting the engineering project management system, clarifying the allocation of project management authority, and strengthening the construction of engineering project management information. And put forward the future development trend of project engineering management, on the basis of two mainstream management modes of BOT (Build-Operate-Transfer) and EPC (Engineering Procurement Construction), build a standardized project management platform to achieve intelligent management. Realize intelligent management of engineering project management to achieve standardization and standardization, greatly improving the efficiency of project management.

## 1. Introduction

In recent years, the rapid economic development has accelerated the process of urbanization in China, and the problem of environmental pollution has become increasingly serious. In order to promote the sustainable development of social economy, China began to attach importance to environmental governance and protection, and continuously promote environmental protection. Applying project management to environmental protection projects can not only improve the efficiency of project implementation, but also promote the construction of environmental protection in China.<sup>[1]</sup>

Project management is the systematic overall manage-

ment of engineering projects, and its connotation mainly includes: the first is project goal orientation, that is, project management should focus on the objectives of project management; the second is the limited nature of project management. Project activities must be carried out under the constraints of human, financial and time constraints; the third is the characteristics of project indicators. For environmental protection projects, the relevant indicators must be met to complete project management during acceptance. Therefore, project management is a series of targeted activities carried out under specific conditions. In order to achieve effective control of project management, it is often necessary to adopt a certain mode to achieve a reasonable allocation of resources, optimize design plans, save project

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costs, etc., to ensure that the goals are achieved<sup>[2]</sup>.

Although China's engineering project management mode has introduced advanced foreign concepts and project management modes, there are still problems, for example, the low level of project management standardization, the lack of project management compound talents, and unclear responsibilities and other issues have caused strong subjectivity in project management, making it difficult to effectively control project quality, schedule, and investment.<sup>[3]</sup> In this context, the analysis of the current status of China's engineering project management mode to identify problems and propose corresponding optimization strategies, and the combination of existing management modes and intelligent management, has practical significance for improving project management.

## 2. Methods

Literature research method: This paper consults the project management related literature and information data in the early stage, sorts out, analyzes, studies, and draws on, through the research on the current situation of the project management mode and points out the problems, explores the innovation of the project management mode.

## 3. Results

### 3.1 Environmental Protection Project Management Mode

At this stage, there are two main modes of environmental project management, namely BOT mode and EPC mode. The BOT mode is a government or government-authorized enterprise that authorizes a project to be built to a private enterprise through a contract, which is a "Build-Operate-Transfer" mode. It is a major mode for private enterprises to participate in government projects. Its process is that firstly the enterprise obtains the authorization of project construction through the form of bidding; secondly, the enterprise obtains funds for the implementation of the project through financing, and after the completion of the project, the enterprise obtains proceeds to repay the bank loan through operation; finally, after the project expires, the enterprise transfers the project to the government. Throughout the process, the government or companies authorized by the government have the right to supervise the project. The advantages of BOT include: solving the problem of insufficient government funds through rational allocation of resources; enterprises can obtain higher returns through projects and achieve a win-win situation.

The EPC mode is a design-procurement-construction management mode. The contractor manages the entire

process of the project, including pre-financing, project design, and construction. The contractor focuses on the completion and acceptance of the project. The advantage of this mode is that the contractor first assumes all the responsibilities of the project, manages the project as a whole, and always grasps the implementation progress and quality of the project; secondly, from the perspective of the contract issuer, the EPC mode can avoid its risks and simplify the project management process; finally, it can balance the rights and interests of both parties and achieve a win-win situation<sup>[4]</sup>.

### 3.2 Current Status and Existing Problems of Project Management

At present, many environmental protection companies use BOT and EPC project management modes. During the project management process, although some companies have formed a certain project management system according to the management mode, there are still some problems.<sup>[5]</sup>

#### 3.2.1 Lack of Sound Project Management System

The first is the lack of standardization of project management. There is a lack of standardization in project execution in project approval, project cost and schedule control, and engineering inspection and acceptance. Many environmental protection companies rely on project experience summarized by project managers for project management; the second is the lack of a complete project management process system, such as imperfect management systems, unclear key points of the process, and irregular processes; the third is the lack of effective supervision and evaluation in the process of project implementation. For environmental protection projects, the cycle is long, and the supervision function is often ignored in the late stage of project implementation.

#### 3.2.2 Insufficient Information Application of Project Management

At present, the progress management and project quality management of many environmental protection companies in the project management process are still mainly based on manual management, which has greatly restricted the efficiency and progress of project management, which mainly reflects in: first, the multi-project coordination at the same time is difficult and the communication is poor. The communication of the project manager including the implementation personnel depends on WeChat, QQ, etc., which will lead to the lag of project information and is not conducive to multi-project management; second, the lack

of information technology support for the implementation of the project has caused the project to lack strict control and supervision in the specific implementation, making it impossible to make correct and reasonable decisions or response measures; third, the project lacks information sharing, information management and other information about project management has not been unified, and a large amount of data is left on the project site. As a result, the data between projects cannot be used for reference and lack decision-making basis, which increases the difficulty and risk of project management to some extent.

### **3.2.3 Unclear Powers and Responsibilities in Project Management**

The projects of many environmental protection companies are scattered throughout the country, which requires the company to be able to coordinate the projects simultaneously within a certain period of time, which also requires matching the corresponding decentralization authorization system. However, at this stage, many environmental protection companies lack a project responsibility system, resulting in unclear rights and responsibilities. Firstly, the procurement rights of each project site are restricted, mainly because the procurement of project materials is mainly concentrated on procurement to reduce their costs. Various projects often have insufficient material procurement or lack of certain materials, but due to the lack of procurement authority, the project implementation progress has been slowed down and the project implementation efficiency has been reduced; secondly, the project manager's authority is insufficient, since the company's project management generally adopts centralized management, it also weakens the project manager's authority in procurement, major matters handling, employment, etc., and also affects the project management implementation process to a certain extent.

## **3.3 Project Management Optimization Strategies**

### **3.3.1 Improve Project Management System**

This paper can improve the standardization of project management by formulating a standardized process management manual, mainly including clarifying the scope and target of the process manual; draw a flow chart according to the specific situation of the project, master the process nodes and key nodes of the project process. The second is to improve the project process management system, set project management, cost budgeting, implementation progress, project closure and other management as a first-level process. The project team and the middle and high-level of the company formulate strategic goals, as

well as the optimal allocation of resources, decision-making for major projects, monitoring projects and key point decisions, etc., on this basis, a two-level process system is built, and the project supervisor ensures the execution of the task. Next, a three-level process system is built, and grassroots employees conduct specific activities. Finally, refine project management responsibilities. Refine the responsibility of each project, so that the person responsible for each project bears certain responsibilities, which can not only ensure the quality and quantity of management tasks are completed, but also effectively evaluate, supervise and manage the project, laying the foundation for the realization of project management goals.

### **3.3.2 Strengthen the Information Construction of Engineering Project Management**

With the development of science and technology, the informationization of engineering project management has a good momentum of development. The reality is that the project management of many companies is not fully informatized, which limits the efficiency of project implementation. Therefore, in order to improve the efficiency of project management, it is necessary to strengthen the informationization of project management. The first is full network coverage, at the same time, you can use high-tech means or introduce advanced technologies from the world to develop innovative new technologies for environmental protection projects, plan for the engineering situation, use scientific technology and information management methods to strengthen the effectiveness of environmental protection project management, and improve the management level of managers<sup>[6]</sup>. The second is to realize project management information sharing and build an enterprise project information sharing platform. Through this platform, project personnel can obtain project-related information, mainly including project implementation progress, project budget costs, project quality and other information, which can not only obtain information to help project decision-making, but also find problems in project management in time. The construction of the information system of the project system can realize the real-time monitoring of the cost of project management and the quality of project implementation, and can also obtain detailed information of project management to provide a guarantee for the smooth progress of project management.

### **3.3.3 Clear Assignment of Project Management Authority**

In order to improve the synergy efficiency of multi-proj-

ect management implementation, environmental protection companies must first clarify the allocation of project management responsibilities. Specifically, it is based on different management issues to determine the operational procedures of authority including proposal, review, meeting review, approval, resolution, and filing. To ensure a reasonable allocation of management authority, first of all, relevant management systems, such as project management system, procurement management, and capital management system, should be improved to ensure that they are carried out in accordance with process specifications. In order to avoid risks in the implementation of the authority operation process specification, enterprises still need to improve the internal management system, adjust project management authority, and respond to risks.<sup>[7]</sup>

#### 4. Development Trend

The popularity of computers, the Internet, and intelligent technologies in China has provided technical support for the standardization of engineering project management in the environmental protection industry. Environmental protection enterprises can use the original technology and project management experience, and use the Internet technology to connect equipment and management for the characteristics of project management, such as decentralized, technology-intensive, and accumulated experience. At the same time, the project management equipment, capital, manpower, materials, information, technology and other resources are optimized and integrated to simplify the project management process, reduce management costs, improve project management efficiency, and help realize the intelligent management of engineering projects.

In order to realize the intelligent management of the project, Based on the mainstream project management mode, the environmental protection company established a project management intelligent management team to conduct in-depth investigations of the enterprise, and referred to the intelligent production management mode, using Internet technology to combine it with project management to develop a standardized project management platform. The first module in this system is the equipment management module, which takes the equipment ledger as the center and manages the process of equipment purchase, installation, operation, maintenance and scrapping, and connect the equipment coding with operation and maintenance to get the specific data of the equipment operation, and monitor and analyze its operation status and operation change trend in real time. The second module is project implementation management, which mainly includes project initiation, including all types of project incorporation

into the system audit, to achieve follow-up adjustment and recording; project plan formulation, adjustment, supplementation, etc.; contract management, including contract creation, review, approval, disclosure, execution, and supplementary functions; construction management, mainly budget, settlement management, on-site management, and completion acceptance management during project implementation; evaluation management, real-time monitoring and evaluation of project progress, quality, cost, safety, etc. The third module is post work platform management, which realizes employees' online office and post management standardization. The fourth module is the financial management module, which realizes the standardization of expense application and reimbursement. The intelligent management of engineering projects based on the Internet and the Internet of Things technology, real-time sharing and updating of engineering management information, data and data, greatly standardizes and simplifies the workflow, and there is a great correlation between system modules to facilitate data, information search, statistics, analysis, etc., to achieve the standardization, standardization and convenience of on-site management process of engineering projects<sup>[8]</sup>.

#### 5. Conclusion

The project management mode of the environmental protection industry generally adopts the BOT and EPC modes. There are still some problems in the process of project management implementation: lack of a sound project management system, insufficient application of project management information, and unclear decentralization in project management, on this basis, this paper proposes corresponding solutions: perfect the project management system, clarify the allocation of project management authority, and strengthen the construction of engineering project management information. It is also proposed that the future development trend of project engineering management is to design a project standardization management system based on the two modes of BOT and EPC, to realize the intelligent management of engineering projects, to make the project site management process more standardized and standardized, and greatly improve the progress and efficiency of project management.

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