Water Conservancy Project Construction Supervision Quality Control Information Management System

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Abstract. The quality of water conservancy project is related to the investment benefit, social benefit, environmental benefit and the safety of people's life and property. It directly affects the development of national economy and social stability. It is the key to the success or failure of project construction. In the construction supervision of water conservancy project, the project quality control is the core content of its work. It is not only the most important basis and standard to reflect the quality of supervision service, but also the basic requirement of the owner for supervision. Aiming at the construction of local water conservancy projects, this paper puts forward the necessity of developing the quality control information management system software of water conservancy project construction supervision. In the management of engineering construction quality evaluation, the fuzzy decision-making technology is applied to the comprehensive evaluation of engineering quality. Combined with the supervision practice, the evaluation grade is analyzed, and the four-level evaluation standard is established. Starting from the quality evaluation of the bottom unit project, the comprehensive evaluation of the engineering project is completed layer by layer through subdivisional works, divisional works and unit works.

Keywords: Hydraulic engineering · mis · supervisor · Quality Control

1 Introduction

Construction project supervision refers to a professional service activity in which an engineering supervision enterprise with corresponding qualifications accepts the entrustment of the construction unit, undertakes its project management work, and monitors the construction behavior of the contractor on behalf of the construction unit. In 1984, China first introduced the supervision mode in Lubuge Hydropower Station [1]. In 1990, the Ministry of water resources began to carry out construction supervision in the construction of water conservancy projects. By 1996, the construction supervision system was officially implemented in the water conservancy industry. Over the past 20 years, water conservancy project construction supervision has developed from scratch and gradually expanded. It has played an important role in water conservancy project construction quality, progress and investment control [2]. At the same time, it has promoted the reform of

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water conservancy project construction management system, improved the management level of water conservancy project construction, and made remarkable achievements. In the process of implementing the project construction supervision system, the state and the Ministry of water resources have constantly revised and improved the laws, regulations, specifications and technical standards related to the construction supervision of water conservancy projects to meet the actual needs of water conservancy project construction [3]. At present, the construction supervision system has become a basic system that must be followed in the construction of water conservancy projects.

Project quality control is the core content of supervision work and the most important basis and standard to reflect the quality of supervision service; At the same time, it is also the basic requirement of the owner for supervision. The construction of engineering project involves many units such as design, construction, owner and supervisor. In the construction and implementation of the project, it is necessary to coordinate the relationship between all parties. In addition, the construction process of the project is affected by the natural environment such as geology, topography, meteorology and hydrology, the staffing and technical level of the construction unit, the capacity of construction machinery and equipment, construction organization and management, construction technology, technical measures and operation methods [4]. These factors not only directly affect the construction quality of the project, but also determine that the quality management of water conservancy project has the characteristics of large amount of information, high technical difficulty and strong comprehensiveness. The traditional project quality management information processing and quality evaluation mainly rely on the manual operation of supervisors, with heavy workload, long calculation cycle, poor reliability of results, non-standard use of quality evaluation form, and manual transmission of relevant data of project quality management among various units, which affects the timeliness, accuracy and comprehensiveness of information, which seriously affects the work of supervision engineers. Based on the above reasons, using advanced computer technology and system fuzzy decision-making technology, it is very necessary to research and develop the water conservancy project supervision quality control information management system.

2 Related Work

2.1 Contents of Supervision Quality Control in Project Construction Stage

The whole process of supervision quality control in the project construction stage can be divided into three links: pre control, in-process control and post control. The pre control supervision mainly includes: the quality control of the preparation work of the construction contractor, that is, the review of construction personnel, construction materials (raw materials, semi-finished products, components and accessories), construction machinery, construction methods and measures, environmental conditions necessary for construction, etc.; Do a good job in the prior quality assurance work that the supervision unit should do, such as being familiar with and mastering the technical basis of quality control, establishing and improving the quality monitoring system of the supervision department, making monitoring preparations, organizing the review of design drawings and issuing supervision engineer drawings, etc. [5]. In process control, use effective

quality control methods, strictly inspect and inspect the process handover according to reasonable procedures, be responsible for the handling of quality accidents, and exercise the right of quality supervision. Post control, mainly responsible for reviewing the completion data, evaluating the quality status and level of the project, reviewing the quality inspection report and relevant technical documents provided by the construction contractor, sorting out the technical documents related to the quality of the project, cataloging and establishing archives; Organize relevant departments to make evaluation and conclusion on the project construction; Organize linkage test run, etc.

2.2 Research on the Application of Information Management System in Domestic Engineering Projects

In 1988, the Ministry of Construction issued the notice on carrying out construction supervision to implement the construction supervision system in China's construction field. In 1997, the state fully implemented the construction project supervision system. Since the implementation of the construction project supervision system, the construction project supervision system has played an important role in the project construction. Project construction management mainly controls the three objectives of project progress, investment amount and project quality. Among these three control objectives, quality control is the first [6]. As the core of project control, it determines the success or failure of project construction. Quality control runs through the whole process of the project, and the quality should be strictly controlled from planning, survey, design, construction and operation management after completion.

The quality control in the construction stage is particularly important. The construction stage is the process of finally turning the design blueprint into reality. The construction entity quality of the project is reflected in each process of the construction process. The quality control in the construction stage includes the whole process system quality control from the quality control of raw materials to the completion acceptance of the project. In order to improve the quality control and management level of engineering construction project construction, many software companies begin to study project management software [7]. At present, there are many kinds of project management software that have been developed. Because the construction quality management software involves a large number of construction standards and specifications, and there are differences in application regions and environments, many Chinese software companies have developed a number of engineering project quality management systems by combining foreign technologies and ideas with China's domestic management reality.

A set of calculation software with high reliability, high security and high expansibility is jointly developed by Henan water conservancy and hydropower project construction quality monitoring and supervision station and Henan Nochi Software Co., Ltd. The software is based on Windows operating system and Microsoft Net as the development platform, it adopts three-tier architecture and web service technology to carry out remote database transmission and quality control inspection through the Internet. It is a distributed and intelligent network information platform, covering the main processes of water conservancy and hydropower project quality management and 200 project quality evaluation forms. The system includes the correlation calculation of all forms, which

greatly improves the work efficiency of staff, and also helps the management department standardize the specific filling in of forms [8]. The system carries out standardized management of quality management system control, project division, quality evaluation, project acceptance and other work through strict control of each process.

3 Quality Control in Advance in the Construction Stage of Project Supervision

3.1 Quality Control of Materials and Engineering Equipment Required for the Project

Raw materials, semi-finished products, components and fittings and permanent equipment required by the project will form an integral part of the permanent project in the future. Therefore, their quality will directly affect the quality of future engineering products, so the quality control is a very important link.

For the quality control of materials and engineering equipment, the whole process and overall control shall be carried out, that is, systematic supervision and control shall be carried out from the aspects of procurement, processing and manufacturing, transportation, mobilization, storage and use.

(1) Check whether the contractor has ordered and purchased materials and equipment according to the requirements of quality standards and project schedule. Before determining the order, the Contractor shall submit the quality report, supply capacity, price and test data of the supplier to the supervising engineer for review. The order can be placed only when the Supervising Engineer considers that it can meet the construction requirements of the project [9]. In case of lack of reliable data or doubts about materials, it is necessary to jointly investigate the production process, quality control and testing means, management mode, etc. of the supplier's factory, and order only after confirming that there are no problems.
(2) Check whether the storage and storage methods of materials and equipment after arrival are carried out in accordance with their performance, characteristics and operation and storage instructions, so as to ensure that materials and equipment will not deteriorate or change performance due to improper storage.
(3) Check whether the construction materials and equipment enter the site according to the requirements of the project construction schedule.
(4) The Contractor shall not change the supplier without authorization. If any change is necessary, it shall be reported to the supervising engineer for approval in advance.
(5) Various raw materials used for concrete and mortar shall be constructed according to the mix proportion approved by the supervising engineer after being confirmed and approved by the project supervisor. The mix proportion shall be designed by the supervision engineer's representative and the technical personnel of the construction unit together, and various data of multi scheme trial mixing, sample making and mixing shall be measured. The Contractor shall write a comprehensive report and submit it to the supervision project supervisor for selection and approval.

3.2 Construction Process Quality Control Method

(1) Establish project quality inspection system

The supervision organization shall establish various quality inspection systems in accordance with relevant laws, regulations, technical specifications and other provisions and in combination with the actual situation of the project. It is a mandatory and binding document that the supervisor and the contractor must abide by, such as the commencement application system; Quality inspection and evaluation system for process, unit, divisional and unit works; Quality acceptance and inspection system for concealed and key parts; Quality defect inspection and handling system; Quality accident investigation and handling system, etc.

(2) Formulate quality inspection procedures

After the completion of processes and unit works, the Contractor shall conduct self inspection on the construction quality according to the "three inspection system", make construction records, timely fill in the construction quality assessment form, and submit it to the supervisor and the on-site supervision engineer for review after passing the self-assessment. The quality level of processes and unit works shall be in accordance with DL/t5113 1-2005 standard for quality grade evaluation of unit works of water conservancy and hydropower capital construction projects (hereinafter referred to as the standard for evaluation of unit works) 136. For the quality acceptance of important works, important concealed works or key parts of the project, the construction unit shall first conduct self-assessment according to the quality acceptance standard. After passing the self-assessment, the owner, supervisor, designer and construction unit shall form a joint quality inspection team to check and verify the quality level. The quality evaluation of divisional works and unit works shall comply with the provisions of sl176-2007 code for construction quality inspection and evaluation of water conservancy and hydropower projects [10].

4 Water Conservancy Project Construction Supervision Quality Control Information Management System

4.1 System Functional Requirements Analysis

The problems existing in practice determine the functional requirements of the system, so the water conservancy project construction supervision quality control information management system should have the following functions:

(1) Information management function. For the quality data obtained from the test, the system shall have basic functions such as input, processing, query, statistics, analysis and output.

(2) Information sharing function. The project quality assessment involves five parties: the construction unit, the supervision unit, the construction unit, the design unit and the quality supervision organization. The quality information in the process of project construction should be transmitted and understood in time, and the database technology should be used to carry out systematic unified planning and design, so as to realize the timely exchange and sharing of quality information.

(3) Auxiliary decision-making function. The system shall have the functions of processing, statistics and analysis of the collected and entered data, which is conducive to giving correct decisions for project quality evaluation.

4.2 Overall System Function

According to the construction process quality control method, the structure diagram of water conservancy project construction supervision quality control information management system is established, as shown in Fig. 1.

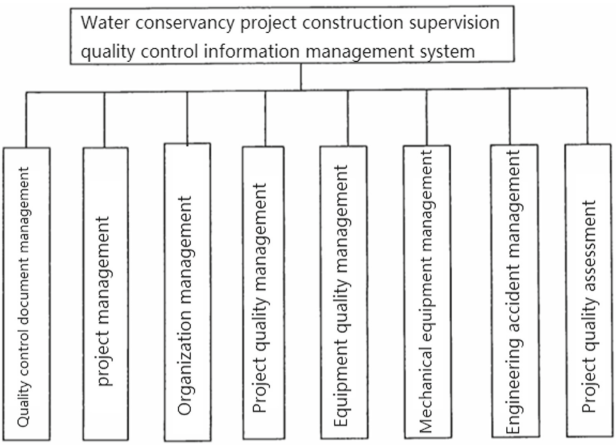

Fig. 1. Water conservancy project construction supervision quality control information management system

"Project division" is an important work completed by the construction unit (project legal person) with the participation of supervision, construction and design units. The project is divided into different levels according to the constituent units of the project. The first level of water conservancy project is divided into unit projects, which means that a water conservancy project is composed of several unit projects. The second level of water conservancy project is divided into divisional works, that is, a unit project is composed of several divisional works, and the third level of water conservancy project is divided into unit works, that is, a divisional project is composed of several unit works. In order to facilitate the quality supervision and evaluation in the construction process, each unit project, divisional project and unit project shall be numbered one by one. In order to determine the priority of each evaluation item in the quality inspection and evaluation, it is necessary to distinguish the main unit works, main divisional works, important concealed unit works and unit works at key parts. After the division of project composition is completed, it can be implemented only after it is confirmed by the corresponding engineering quality supervision organization. During the implementation of the project, if the project division needs to be adjusted, the project legal person shall re submit the adjusted project division to the project quality supervision organization for

confirmation. For the partial adjustment of the project division that does not affect the unit works, main divisional works, important concealed unit works and unit works at key parts, the project legal person shall organize the supervisor, the design unit and the construction unit to make their own adjustment. Therefore, the project division management module includes three functions: project division table entry, modification and query.

5 Conclusion

The quality control of water conservancy project construction supervision is the core content of supervision work, and the information in the construction stage is a very important basis for quality control. This paper focuses on the water conservancy project construction supervision quality control information management system. After discussing and analyzing the research and application status of engineering project management at home and abroad and the engineering construction supervision system, this paper puts forward the necessity of developing the water conservancy project construction supervision quality control information management system software. The fuzzy identification model and level eigenvalue are used to evaluate the quality of the unit project, and on this basis, the whole project is comprehensively evaluated layer by layer. This method evaluates the quality of the project. By quantifying the qualitative indicators, the evaluation results can better reflect the primary and secondary importance of the system evaluation objectives.

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