Exploration of Engineering Supervision Quality Control Under Uncertain Model

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Abstract: Effective supervision quality control during the construction project implementation is an important measure to ensure the overall construction quality of the project. The effective implementation of the supervision work can greatly improve the overall construction effect of the construction project, can guarantee the construction quality of the project, and at the same time can strictly control the construction cost, construction safety and construction progress. Therefore, the quality control of engineering projects has a crucial role in the construction process of construction projects. This requires an analysis based on the importance of supervision quality control work and the current research status. At the same time, the key points of supervision quality control during the construction process of construction are put forward, so as to give full play to the positive role of supervision quality control work in construction projects and enhance construction projects' construction level.

1. Introduction
The construction project involves more content, and the scale of the construction project is getting larger and larger. In order to ensure the orderliness and standardization of the construction process of building projects, it is necessary to carry out effective engineering supervision quality control work. In the quality management of construction engineering supervision, the orderliness and effectiveness of quality control, progress control, and investment control must be guaranteed in strict accordance with China's relevant regulations. Only in this way can the outstanding role of the quality control work in construction engineering supervision be ensured, and the overall construction quality of construction engineering can be improved.

2. Uncertain Factors in Engineering Supervision
In project management, the owner entrusts engineering supervision to carry out process control during the construction phase. During the management process, target tasks are set and implemented in accordance with the requirements of the supervision. Using the mathematical theoretical analysis method of uncertainty factors, set the agent's effort vector: a1, a2 .... an, which determines the observable information vector X = X1 ..... XN, quality control of construction supervision The mean value of the obedience in the process is the variance, and the distribution is set to Y = Y1 ..... Yn, X = a + Y, and the effort variable of the agent is set to the elasticity coefficient. The construction process and related construction can be ensured by paying attention to the supervision the scheme and the construction design code are in accordance with each other. By adjusting the incentive intensity coefficient, the agent's effort function can be changed to play a guiding role. The client's expected value is equal to the expected return.

According to the analysis of the conditions of the Cabinet for Incentive Purchase Restriction, the
agent's effort level for the task adopts the conditions of incentives and constraints to achieve the maximum value under the condition that the equivalent return is the largest:

\[ f(\beta_1, \beta_2, \ldots, \beta_n) = c + \rho^2 a - \frac{1}{2} ba^T [C_i] a - \frac{1}{2} \rho \beta^T \Sigma \beta \]

The above formula shows that the selection of the incentive coefficient is determined by \( a \), and the agent constraint mechanism \( B \) is substituted into the model, which is transformed into a mathematical model with fuzzy opportunity constraints:

\[
\begin{align*}
\max & \quad \{ a^T a_i \cdots a^T a_n - c - \frac{1}{\rho} a^T \Sigma^{-1} a \} \\
\text{s.t.} & \quad C_r (c + \frac{1}{2} a^T \Sigma^{-1} a - \frac{1}{2} ba^T [C_i] a \geq a) \geq a \]
\end{align*}
\]

The fuzzy guidance model for engineering supervision incentive guidance was solved and transformed into a deterministic planning model [1].

3. Status and Goals of Construction Engineering Supervision Quality Control

3.1 Status of Construction Engineering Supervision Quality Control

China's construction engineering supervision quality control work started relatively late, so there are some problems in the current supervision and control work, which will have a certain impact on the efficiency and quality of supervision quality control work. The main problems in the current quality control process of construction engineering supervision are reflected in the following aspects: First, China has not formulated relevant laws and regulations based on the supervision quality control work of construction engineering projects, and has not issued a comprehensive and comprehensive building supervision and regulation system. This will lead to a lack of strict and effective institutional guarantee for supervision quality control work, affecting the standardization and standardization of supervision control work. Secondly, when carrying out the quality control of construction engineering supervision, many enterprises do not attach importance to the effective application of this work. In the concrete construction process, problems such as cutting corners and evading taxes are easy to occur. Coupled with China's incomplete related laws and regulations, the supervision department cannot effectively supervise the supervision enterprises and construction enterprises according to the legal system, which leads to the supervision quality control work being superficial. Finally, because there is no perfect national level supervision quality control the legal and regulatory system, coupled with the inability of many companies to properly understand the significance of supervision in construction projects. As a result, many enterprises have not formulated scientific and reasonable supervision quality control standards according to their actual development situation, making the quality supervision of construction projects in the construction stage more chaotic and unable to guarantee the overall quality of engineering projects [2].

3.2 Goals of Construction Engineering Supervision Quality Control

In the process of quality supervision of construction engineering projects, strict quality control during the construction phase is mainly based on the specific entrusted requirements of the project legal person, using the staff of the supervision organization to conduct comprehensive supervision and supervision of the construction project from the construction preparation stage to the completion of the construction management. Only by ensuring that the quality of the construction project is consistent with the relevant requirements of the project legal person, can the economic benefits of the enterprise be guaranteed. When carrying out the supervision quality control of engineering projects, scientific and reasonable supervision goals must be formulated according to the specific conditions of the project, so as to provide accurate and reliable guidance for subsequent supervision work, and ensure the rationality and scientificity of supervision goals and supervision work. Only in an orderly and smooth manner, otherwise it may affect the efficiency and quality of supervision work.
4. Principles of Construction Project Engineering Supervision

4.1 Value Safety and Quality First
When we carry out engineering supervision in construction projects, the principles of safety and quality must be strictly followed. First of all, safety first is to prevent unexpected safety accidents during the construction process of the construction project, which poses a threat to construction workers and other management personnel. When carrying out construction project supervision based on the principle of safety first, it is necessary to strengthen publicity and education and increase the awareness of safety responsibility of construction workers and managers. Attention is paid to strict inspection of each link in the construction process, and timely inspection of hidden safety hazards to ensure safety during construction. Second, quality first is the basic principle that enterprises must adhere to during construction. It is necessary to strengthen the education and training of staff, so that staff can establish the concept of quality first, and then they can complete operations strictly in accordance with relevant specifications and standards during the construction process to ensure that the construction efficiency and quality of the project meet the actual requirements of the project [3].

4.2 Insist on Drawing Guidance
In the current implementation process of construction projects, the professional content involved is relatively extensive, and the construction difficulty is greatly increased. In order to ensure the orderliness and standardization of the construction process, during the construction preparation stage, the supervisors must carry out construction technical data and comprehensively analyze the investigation to ensure the scientificity and rationality of the construction design scheme. During the construction process, engineering supervisors must strictly carry out engineering supervision according to the guidance of construction design drawings to ensure that each supervision and management work can be successfully completed, and at the same time, they must severely crack down on unauthorized modification of design drawings and related data.

4.3 Value Prior Control
In the current development process of the construction industry, the scale of construction engineering projects is getting larger and larger, and the investment intensity is also getting bigger, and the risks that exist are also increasing accordingly. If sufficient preparations are not made in the early stage of construction, it will lead to failure to effectively guide the later construction process, it is easy to make some loopholes and hidden dangers in the later stage of the project. Besides, it may increase the capital investment in the later stage, and it will seriously affect the construction quality. Therefore, before the construction project is implemented, the construction plan needs to be effectively reviewed. During the review process, a scientific and reasonable construction plan needs to be selected according to the specific construction conditions, project budget and construction environment. This requires the supervision quality control work of pre-control. During the pre-control process, the supervision organization must strictly analyze the difficulties and key contents of the construction drawings. At the same time, it is necessary to carry out comprehensive technical investigations to professional supervision engineers to ensure the overall construction quality of the project. At the same time, the supervision staff must strengthen their vigilance, ensure the adaptability of the construction conditions, construction environment, and construction materials to the construction design drawings, and strictly implement every link in the construction process in accordance with China's relevant regulations. Audit and supervision to prevent potential safety hazards and quality problems during the construction process. In this way, the hidden safety hazards of the construction can be solved from the root cause, and the construction quality of the project can be guaranteed.

5. Key Points of Quality Control for Construction Project Engineering Supervision

5.1 Key Points of Quality Control for Pre-Construction Engineering
In the process of supervision quality control of engineering projects, paying attention to the early quality control work is the main step to ensure that the subsequent construction works smoothly, and it will have a crucial impact on the overall construction quality of the construction project. When carrying out the supervision quality control of the pre-construction preparation work, it is necessary to proceed from the following aspects to ensure the effectiveness of the quality control work.

First, strict and comprehensive review of construction drawings is required. When conducting a meeting review of construction design drawings, it is necessary to follow the relevant meeting review procedures to ensure the standardization of the meeting review work and the quality of the meeting review results. When reviewing the construction design drawings, professional designers, supervisors and technicians must be hired for joint review to ensure the accuracy and reliability of the review work.

Second, the construction design drawings of the project must be clearly marked. In the process of marking the design drawings of construction projects, it is necessary to clearly mark the building structure, water supply and drainage pipes, heating and ventilation systems, and equipment installation according to the specific content of the design drawings and the actual conditions of the project. At the same time, it is necessary to design the supporting firefighting drawings, review opinions and drawings review minutes, so as to provide accurate and reliable reference and guidance for the construction of subsequent construction projects [4].

5.2 Key Points of Quality Control of Construction Project Supervision

Carrying out effective quality control during the construction phase of the main project of a project is the key content to ensure the construction quality of the entire project. The main project is the main part of the construction process. For this part, strict quality control of governance and supervision can greatly improve the overall construction level of the construction project. In the supervision quality control work, the supervisory management personnel must proceed from the following aspects: First, we need to strict inspection and inspection of the steel bar binding of the frame beams and column shear walls of the project to ensure that the quality of the steel bars is consistent with the requirements of the seismic nodes. At the same time, it is necessary to ensure that the safety and stability of the scaffold after installation are consistent with the design standards, and that the verticality and flatness of the formwork can meet the requirements of the project's construction specifications, so as to ensure the quality of concrete pouring construction. Second, it is necessary to strictly supervise the construction unit so that it can do a good job in the construction of model rooms. In the construction of electrical pipes, gas pipes, and flues, it is necessary to understand and master the basic situation of the model room, and then carry out large-scale construction to ensure that the owner's requirements can be met and large economic losses can be prevented. Thirdly, when strictly controlling the waterproof construction quality of the outer walls of the kitchen and bathroom, especially when the pipes of the bathroom and the kitchen are densely distributed, in order to ensure the quality of the pipeline laying, it is necessary to reserve pipeline access during the concrete construction process. However, in the actual construction process, there may be some factors that have an impact on the accuracy of the reserved position of the pipeline passage. This requires the construction personnel to accurately locate the pipeline path according to the pipeline laying requirements to prevent the reserved pipeline path from damaging the waterproof layer. After the completion of the implementation of the kitchen and toilet pipeline projects, a water storage test is required, and the subsequent construction can only be carried out after passing the inspection. Fourth, we must do a good job of controlling the floor drain level to prevent the floor drain level on the balcony from exceeding the level of the indoor structural layer, which will cause the backwater to flood. Fifth, in the process of supervision quality control, the construction unit must be strictly supervised, and the waterproof measures of the external wall must be emphasized. At the same time, the construction quality of the external wall must be strictly controlled. An L-shaped beam can be installed under the window to increase its stability and firmness.

5.3 Key Points of Roof Construction Supervision Quality Control

In the process of supervising the quality control of the roof construction phase, the supervision staff
must strictly check the slope of the roof to ensure that the slope of the roof is in compliance with the design index requirements. At the same time, it is necessary to strictly control the spacing of the partitions on the roof. In general, the spacing of the partitions on the roof is within 6 meters. In addition, the performance of the waterproof material of the roof and the construction quality of the waterproof material must be carefully checked, and the sampling inspection of the waterproof material must be done to ensure that the quality of the waterproof material meets the construction requirements of the roofing project. In the process of supervision quality control, we must pay attention to strict quality control of roof construction details, and ensure that the roof, stairwells, pipeline wells and other parts are in the form of arcs. This can effectively prevent the waterproof material from shrinking. Deformation. At the same time, it is necessary to ensure the waterproof quality of the ventilation pipe and the water outlet. The inner wall of the insulation board of the daughter wall must be painted with a waterproof layer to further prevent the moisture and rain from eroding the wall [5].

5.4 Key Points of Quality Control in Supervision During Completion and Acceptance
When carrying out supervision quality control during the completion and acceptance stage of a construction project, it is important to recognize the important role of the completion inspection work on the entire project. At the completion and acceptance stage, the supervisory staff must strictly supervise and manage the collective work of the general contractor. At the same time, they must strictly review the technical information of each subproject reported, and organize relevant departments to carry out effective acceptance of the project. When inspecting and accepting a single project, unit personnel must participate in the acceptance process, and at the same time cooperate with the acceptance process. If problems are found during the acceptance process, correct the existing problems in a timely manner. The rectification plan and rectification measures shall be carefully checked to ensure that the rectification plan is consistent with the design requirements of the project. At the same time, advance management of the rectification project shall be carried out to ensure the smooth acceptance of the project. In the process of quality control of the construction unit, it is necessary to attach importance to the supervision and management of the effect of site clearance work, ensure the effect of site clearance work, and improve the efficiency of supervision during the completion and acceptance stage.

6. Conclusion
In short, in order to ensure the quality of construction projects, effective supervision quality control must be carried out. In the supervision quality control work, we need to recognize the importance of the quality control of civil engineering construction supervision, and carry out effective quality control work in accordance with each stage of construction, and at the same time we need to pay attention to strict control of key points of construction. Only in this way can we ensure that the quality of the building construction meets the design requirements.

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