

# Construction Project Management and Construction Quality Control Strategy

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**Abstract:** With the gradual acceleration of the urbanization process, the construction industry has been developing rapidly. As the key link to ensure the quality and safety of the project, construction management and construction quality control are of great significance to enhance the competitiveness of construction enterprises and realize sustainable development. In this paper, the effective strategy of construction management and the effective strategy of construction quality control will be discussed in depth, aiming at providing useful management and quality control strategies for construction enterprises.

**Keywords:** Construction engineering management; Construction quality control; Strategy; Quality control point

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## 1. Introduction

Construction project management is an important means to ensure the smooth progress of engineering projects and improve engineering quality and safety. With the continuous development of the construction industry, the scale and complexity of construction projects are gradually increasing, which puts forward higher requirements for construction project management. Furthermore, construction quality control, as a key factor in ensuring the quality of construction projects, is of great significance in achieving the objectives of engineering projects. Therefore, it is of great practical significance and theoretical value to discuss construction management and construction quality control strategy.

## 2. Effective strategies for construction project management

### 2.1. Preliminary planning and design management

Project feasibility study is an important basis for project decision-making, and it ensures the smooth implementation of the project and the realization of expected benefits through a comprehensive evaluation of the technical, economic, and social aspects of the project <sup>[1]</sup>. Enterprises should use scientific methods and means, from the technical, economic, social, humanistic, ecological, and other aspects of the project to carry out a comprehensive feasibility study analysis and economic evaluation. The “three controls, two management and

one coordination” of feasibility study and construction period should be incorporated into the core content of project management simultaneously to ensure that the project does not produce negative effects and obtains the best economic and social benefits <sup>[2]</sup>. The review and modification of the design scheme is the key link to ensuring design quality and improving the design level. The competent construction department should strengthen the monitoring of the optimization of the design work, formulate the evaluation standards and specific implementation rules for the optimization of the design scheme, and increase the staffing and review of professional and technical personnel. To conduct a comprehensive review of the design results at each stage, both to review the technical feasibility, but also to review the economic rationality, and strengthen the management of the design market, strictly through the qualification management, personnel registration, design bidding, drawing review, and other links to regulate the design market, and strive to reduce unlicensed design and design beyond the level.

## **2.2. Management of construction preparation phase**

Collect and check design and construction drawings, project contracts, construction schemes, technical specifications, laws and regulations, and other documents. After careful inspection and analysis, determine the basis for the preparation of the construction organization design, fully consider the characteristics of the project and the actual situation, and ensure the scientific rationality of the program. The contents of preparation include a construction organization design book, construction flow chart, construction organization diagram, construction safety technical measures, etc., and each link and detail is carefully considered and planned <sup>[3]</sup>. Ensure that the quality of materials and equipment meets the design, technical specifications and standards, shall not purchase fake and shoddy products, and obtain legal property rights certificates and product quality certificates according to law. According to the characteristics and needs of the construction, materials, and equipment are reviewed and deployed to ensure that the supply of materials and equipment in the construction process is sufficient to avoid affecting the construction progress. Reasonable staffing and optimized organizational structure can ensure the coordinated operation of the construction team, equipped with the appropriate number of professional and technical personnel, conduct corresponding training according to the professional and technical requirements of the construction team, improve the technical quality and operational ability of the construction team, ensure the effective implementation of safety measures during the construction process, and reduce the occurrence of construction accidents. Cultivate the team consciousness and cooperation ability of the construction team, improve the communication and cooperation ability, and strengthen the team cohesion.

## **2.3. Construction process management**

Clarify safety responsibilities at all levels and ensure that every worker understands and fulfills their safety responsibilities <sup>[4]</sup>. Establish a safety production leadership organization headed by the project manager, responsible for organizing and carrying out safety management activities. Conduct entrance education and safety training for new workers to ensure they understand and comply with safety regulations. Organize regular safety inspections and drills to improve workers’ safety awareness and ability to respond to emergencies. Monitor construction progress in real-time with daily, weekly, and monthly progress reports. Modern information technology means, such as Building Information Modeling (BIM), are used to simulate and predict construction progress <sup>[5]</sup>. When there is a deviation between the actual progress and the planned progress, the reasons should be analyzed in time and measures should be taken to adjust, increase resource investment, optimize the construction plan, etc., to ensure the timely completion of the project. Clear quality standards and quality requirements, and develop a detailed quality management plan, which should include quality control points, inspection batches, and acceptance standards. Side supervision of key processes and key parts is conducted

to ensure effective quality control <sup>[6]</sup>. When quality problems are found, analyze the causes in time and take measures to deal with them, record and summarize the quality problems, and prevent similar problems from happening again. According to the actual situation of the project and contract requirements, make a detailed construction cost budget, which should include labor costs, materials costs, machinery costs, and other costs. Through the cost accounting system, real-time tracking and recording of various expenses, comparative analysis with the budget, timely detection of cost deviations, and taking measures to control. Reduce construction costs through material management, equipment maintenance, and human resource allocation. Introduce advanced cost management ideas and methods to improve cost control levels.

## **2.4. Late acceptance and delivery management**

In the later acceptance, we must first clarify the acceptance standards and procedures to ensure that each project content meets the design requirements and quality standards. In the acceptance process, strict quality inspection methods should be adopted to carefully inspect key parts and hidden projects to ensure that there are no hidden dangers. Establish a rectification and reinspection mechanism, and rectify and re-accept the problems found in time to ensure that the problems are completely solved. In terms of delivery management, it is necessary to formulate a detailed delivery plan, specify the time, place and method of delivery, etc., to ensure the orderly delivery process <sup>[7]</sup>. Strengthen communication and coordination with the owners, timely understand the needs and feedback of the owners, and ensure that the delivery results meet the expectations of the owners. In the delivery process, we should pay attention to details to ensure that engineering data, equipment, and facilities are complete and intact to provide convenience for the owner. To improve customer satisfaction, companies should also focus on the quality of service after delivery. For example, to provide owners with necessary operation training, equipment maintenance, and other services to ensure the continuous and stable operation of the project, establish a customer service feedback mechanism, timely understand customer satisfaction and demand, and provide reference and improvement direction for the enterprise's future engineering projects <sup>[8]</sup>. Late acceptance and delivery management is an indispensable part of construction project management. Only by developing effective management strategies and conscientiously implementing them, can we ensure project quality and customer satisfaction, and win a good reputation and credibility for the enterprise.

## **2.5. Information management strategy**

By integrating all kinds of information resources, a unified information management platform is established to realize centralized management, unified scheduling, and efficient use of information. Sensors, Radio-Frequency Identification (RFID), and other technical means are used to collect all kinds of data on the construction site in real-time, and data analysis software is used to process and analyze it, providing data support for management decision-making <sup>[9]</sup>. With the help of artificial intelligence technology, the progress, quality, cost, and other aspects of construction engineering are intelligently managed and controlled to improve management efficiency and accuracy. In the process of information management, we should pay attention to information security and take necessary security measures to ensure the integrity and confidentiality of information.

# **3. Effective strategies for construction quality control**

## **3.1. Material quality control**

Conduct a comprehensive assessment of suppliers, including their quality management system, production capacity, historical quality records, etc., to ensure the selection of reliable quality and reputable suppliers,

establish long-term stable cooperative relations with high-quality suppliers, ensure the stability of material supply and quality consistency, and carry out strict inspection and acceptance of each batch of materials entering the construction site. Ensure material meets design requirements and quality standards <sup>[10]</sup>. Physical property testing, chemical composition analysis, microbial testing, and other methods are used to conduct comprehensive and detailed testing of materials, requiring suppliers to provide material certification and identification to ensure the reliability and traceability of material sources. Classified storage according to the nature and use of materials, avoid mixing and misuse, and take appropriate moisture-proof and anti-corrosion measures for materials that are susceptible to moisture and corrosion to ensure that the quality of materials is not damaged. Follow the principle of first in, first out to ensure that the material is used within the validity period, timely identification and treatment: once found nonconforming products, immediately isolate and identify, prevent misuse, and notify the supplier for return and replacement processing. Record and analyze nonconforming products, find out the causes and take appropriate corrective measures to prevent similar problems from happening again <sup>[11]</sup>. Establish a quality information feedback mechanism, collect and process quality information from the construction site in time, provide a basis for improving material quality control, regularly review and improve material quality control work, constantly optimize quality control strategies and methods, and improve construction quality.

### **3.2. Construction process control**

According to the specific requirements and characteristics of the project, formulate detailed construction technology standards. These standards should cover the process, construction requirements, quality standards, etc., to ensure that every step of the construction process has clear guidance. Based on construction technology standards, the sequence and quality control points of each construction process are defined. Through the strict control of key processes and quality control points, assure the stability and controllability of the entire construction process. With the continuous progress of science and technology, new construction techniques and equipment continue to emerge. Hence, construction units should actively introduce advanced construction techniques and equipment to improve construction efficiency and quality. For example, the use of BIM technology for construction simulation and optimization can identify potential construction issues and formulate solutions beforehand <sup>[12]</sup>. Construction personnel is the key factor of construction process control, strengthen the training of construction personnel, and improve their professional skills and quality awareness, so that they can master the construction process standards and operating norms, to ensure the accuracy and standardization of the construction process. In the construction process, the whole process of monitoring is implemented to track and record all aspects of the construction process in real-time. This helps to find and correct problems in time, ensuring the accuracy and stability of the construction process. Conduct regular quality assessments on the implementation of construction technology, and make feedback and improvements according to the evaluation results. This is helpful to continuously improve the construction process standards and control strategies, and improve the stability and reliability of construction quality.

### **3.3. Construction quality inspection and acceptance**

At the initial stage of the project, a detailed construction quality inspection and acceptance plan shall be formulated according to the characteristics and requirements of the project, in which key information such as the frequency, content, method, standard, and responsible person of inspection and acceptance shall be clearly defined. Regular quality inspection of the construction site shall be carried out according to the plan, including inspection of the construction process, construction technology, and material use <sup>[13]</sup>. Carry out special quality inspections for key processes and hidden works to ensure the construction quality of these key links.

Quantitative analysis and evaluation of building materials and construction quality are carried out by using special testing equipment and instruments such as measuring instruments and material testing equipment. Random selection of building materials, components, or samples in the construction process is used for testing to ensure that the quality of materials meets the requirements. Sampling testing should cover all kinds of materials and construction links to improve the comprehensiveness and accuracy of testing <sup>[14]</sup>. Review the technical documents of the construction project, including construction drawings, design specifications, construction schemes, etc., to ensure that they are reasonable, accurate, and in line with standards. Ensure that the construction of the building is carried out following the contract requirements, including foundation works, structural works, decorative works, etc. Evaluate the performance of the building during use, such as seismic performance, thermal insulation performance, ventilation performance, etc., and compare with relevant standards to judge its eligibility. According to the acceptance results, the acceptance report is written to explain the quality of the building in detail, point out the existing problems and areas for improvement, and commend the qualified parts <sup>[15]</sup>. According to the inspection and acceptance results, the construction quality should be continuously improved in time, and the improvement should be reported to the relevant departments and personnel. Organize regular summary meetings of construction quality inspection and acceptance, share experience and lessons, and enhance the overall team's level of construction quality control.

### **3.4. Quality management system construction**

Define the quality objectives of the construction project and ensure that they are aligned with the overall organizational strategy. Formulate a clear quality policy, clarify the organization's commitment to quality and expectations, and establish quality awareness among all staff. Determine the organizational structure of the quality management department and clarify the responsibilities and authority of quality management personnel at all levels. Allocate human, material, and financial resources reasonably according to the requirements of the quality management system to ensure the effective implementation of quality activities. Develop a quality manual that defines the structure, processes, and procedures of the quality management system. Prepare procedure documents and work instructions to specify the specific operation methods of each quality management activity. Conduct quality management system training for all employees to ensure that they understand and comply with relevant requirements <sup>[16]</sup>. Conduct more in-depth professional training for key positions and quality management personnel to improve their quality management capabilities. The key process is strictly controlled to ensure the stability and reliability of construction quality. Continuously improve the effectiveness of the quality management system through data analysis, corrective action, and preventive action. Conduct regular internal audits to assess the conformity and effectiveness of the quality management system. The senior management shall conduct a comprehensive inspection and evaluation of the operation of the quality management system to ensure the continuous optimization of the system.

## **4. Closing remarks**

Construction project management and construction quality control are the key links to ensure the quality and safety of the project. The efficiency and level of construction management can be improved through effective management strategies, and the stability and reliability of construction quality can be ensured through fine quality control. In the future, with the continuous development of the construction industry, construction project management and construction quality control strategies will continue to improve and innovate, providing a strong guarantee for the development of the construction industry.

## Disclosure statement

The author declares no conflict of interest.

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