

Application of Construction Management Control in Architectural Engineering Management

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Abstract: This paper focuses on the application of construction management control in architectural engineering management. It first elaborates on the significance of construction management control in architectural engineering management, followed by a detailed analysis of its specific applications at various stages of architectural engineering projects, including the construction preparation stage, the construction process stage, and the completion acceptance stage. Finally, it explores the challenges faced by construction management control and proposes corresponding solutions, such as strengthening personnel training and improving management mechanisms, with the aim of providing valuable references for architectural engineering management.

1. Introduction

Construction project management is a complex and systematic endeavor, with construction management control serving as one of its core components. The effective implementation of construction management control is directly related to key indicators such as the quality, cost, and schedule of construction projects, playing a crucial role in enhancing the overall benefits and competitiveness of construction projects. With the rapid development of the construction industry and increasingly fierce market competition, strengthening construction management control has become an inevitable choice for construction project managers.

2. The Significance of Construction Management Control in Construction Project Management

2.1 Ensuring Project Quality

Project quality is the cornerstone of construction projects, directly relating to the building's functionality and safety. Construction management control employs a series of scientific approaches and stringent procedures to comprehensively supervise the construction process. From the procurement and inspection of raw materials to the operational rules of each construction procedure, and then to the quality acceptance of finished products, every link adheres to strict standards and processes. Regular quality inspections and spot checks are conducted to promptly identify and resolve quality issues during construction, preventing the accumulation and escalation of quality hazards, thereby laying a solid foundation for the quality of construction projects ^[1].

2.2 Controlling Project Costs

Controlling construction project costs is directly related to the project's economic benefits. Construction management control effectively plans and monitors project costs. During the preliminary project stage, reasonable budgeting is relied upon to provide detailed estimates of various expenses, serving as a basis for cost control. During the construction phase, managers continuously monitor material usage, labor scheduling, and equipment rental to prevent resource waste and additional expenses. Strictly screening and managing suppliers aim to achieve more favorable material prices and payment terms, further reducing procurement costs and keeping

project costs within budget, thereby enhancing the project's economic profitability.

2.3 Ensuring Project Schedule

Project schedule is an important objective in construction project management, directly affecting the project's delivery time and investment returns. Construction management control formulates a comprehensive construction schedule, clearly defining work tasks and time nodes for each stage and allocating the plan to individual construction teams and personnel. During the construction phase, managers continuously review the progress execution status, promptly identify factors affecting the schedule, and take appropriate measures for adjustment. Through effective communication, coordination and cooperation with all participating parties are strengthened to promptly address issues arising during construction, preventing schedule delays due to poor communication.

3. The Practical Application of Construction Management Control in Each Stage of Construction Projects

3.1 Construction Preparation Stage

3.1.1 Technical Preparation

During the construction preparation stage, construction management control first needs to conduct technical preparations. This involves familiarizing oneself with construction-related drawings, organizing design disclosures and drawing reviews, clarifying construction techniques and quality requirements, formulating construction organization designs and specialized construction plans, comprehensively planning and coordinating the construction process, and implementing technical disclosures to convey construction techniques and quality requirements to every construction worker ^[2].

3.1.2 Resource Preparation

Resource preparation is a critical aspect of the construction preparation stage. Construction management control must ensure that human, material, and financial resources required for construction are in place on time. In terms of human resources, the number of construction workers and job positions should be appropriately arranged according to the project scale and construction schedule requirements. Regarding material resources, the procurement, transportation, and storage of materials, components, and equipment should be well-managed to ensure that the quality of materials and equipment meets relevant requirements. In terms of financial resources, project funds should be reasonably allocated to ensure their proper utilization.

3.1.3 Site Preparation

Site preparation work is the foundation for ensuring smooth construction. Construction management control should reasonably plan and arrange the construction site, which includes cleaning the construction site, setting up temporary supporting facilities such as office areas, living spaces, and material storage areas, establishing construction roads and drainage systems to ensure smooth traffic and drainage on the construction site, and conducting surveying and setting-out operations to verify the location and elevation of buildings.

3.2 Construction Process Stage

3.2.1 Quality Control

During the construction process, quality control is the core task of construction management control. Construction management control should establish a strict quality inspection system to conduct quality inspections and acceptance for each procedure. For key procedures and concealed works, special attention should be given to inspection and monitoring to ensure that project quality meets design requirements and relevant standards. The quality control of raw materials and components should be strengthened, with strict inspections of incoming materials and components to prevent substandard materials and components from entering the construction site ^[3].

3.2.2 Schedule Control

Schedule control is an important objective of construction management control. Construction management control should appropriately arrange the construction schedule according to the construction organization design and schedule plan. During the construction process, regular inspections and analyses of the project schedule should be conducted to promptly identify issues affecting the project schedule and take corresponding measures for adjustment, such as increasing construction workers and equipment, optimizing the current construction plan, and coordinating relationships among various parties to ensure the project is completed on time.

3.2.3 Cost Control

Cost control is one of the key links in construction management control. Construction management control should establish a cost management system to comprehensively control and account for project costs. During actual construction, material consumption and labor costs should be strictly controlled, and the use of construction machinery should be reasonably arranged to reduce construction expenses. Management measures for project changes and claims should be strengthened, with timely handling of project change and claim procedures to increase project revenue ^[4].

3.2.4 Safety Management

Safety management is an important aspect of construction management control. Construction management control should establish a comprehensive safety management system and focus on safety management at the construction site. This involves conducting safety training and education for construction workers to enhance their safety awareness and self-protection awareness, setting up safety warning signs, providing necessary safety protection equipment and materials such as safety helmets, safety belts, and safety nets, conducting regular safety inspections to promptly identify and eliminate safety hazards, and preventing safety accidents.

3.3 Completion Acceptance Stage

3.3.1 Organizing Completion Documents

During the completion acceptance stage, construction management should arrange relevant personnel to organize completion documents, which include construction drawings, construction records, quality inspection reports, material certificates, etc. These documents are crucial evidence for project completion acceptance. Construction management control should ensure that the completion documents are complete and accurate to prepare for the final project completion acceptance ^[5].

3.3.2 Organizing Completion Acceptance

Construction management control should organize project completion acceptance in accordance with relevant regulations and procedures. Relevant personnel from the construction unit, design unit, and supervision unit should be invited to participate in the completion acceptance to conduct a comprehensive inspection and evaluation of project quality. For issues identified during the acceptance, prompt rectification should be carried out to ensure that the project meets acceptance requirements.

3.3.3 Handling Project Settlement

Project settlement is one of the final links in construction management control. Construction management control should handle project settlement procedures in accordance with the construction contract and relevant regulations. When handling project settlement, the project quantity and project cost should be accurately calculated to ensure the rationality and accuracy of project settlement.

4. Problems Faced by Construction Management Control and Solutions

4.1 Problems Faced by Construction Management Control

4.1.1 Uneven Personnel Quality

Construction projects involve numerous positions, ranging from front-line construction workers to project management team members, with significant differences in personnel quality. Some front-line construction workers have not received systematic professional skill training and are not proficient in construction techniques and operational specifications, which may lead to non-compliant operations affecting project quality and construction safety ^[6]. Some project managers possess certain theoretical knowledge but lack practical management experience. When facing complex construction situations, they may find it difficult to make scientific and reasonable decisions, resulting in low management efficiency. There are also differences in work attitudes and a sense of responsibility among personnel, with some lacking professional dedication and being perfunctory in their work, causing significant troubles for construction management.

4.1.2 Incomplete Management Mechanism

A complete management mechanism is an important support for construction management control. However, at present, many construction projects have incomplete management mechanisms with loopholes. The lack of clear job responsibilities and work processes leads to mutual shirking of responsibilities in work, resulting in decreased work efficiency. The supervision and assessment mechanism is flawed, with insufficient effective evaluation and supervision of personnel work performance, making it difficult to fully mobilize personnel's enthusiasm. The communication and coordination mechanism is not smooth, with delayed and inaccurate information transmission among departments, leading to work errors and affecting the smooth progress of the project as a whole.

4.1.3 Limited Technical Level

With the continuous growth of the construction industry, new technologies, new processes, and new materials are constantly emerging, placing higher demands on the technical level of construction enterprises. Some construction units have insufficient technological innovation capabilities and are not proficient in applying new technologies and new processes. They still rely on traditional construction methods and techniques, resulting in decreased construction efficiency and difficulty in ensuring project quality. Enterprises invest insufficiently in technological research and development and lack professional technical personnel, making it impossible to timely master and apply advanced technologies in the industry and placing enterprises at a disadvantage in market competition.

4.1.4 Complex External Environment

Construction projects are often situated in a complex and changing external environment, influenced by various factors such as the natural environment, policies and regulations, and social relations. In terms of the natural environment, adverse weather conditions such as heavy rain, strong winds, and high temperatures can have a negative impact on the construction schedule and quality. Regarding policies and regulations, the continuous promulgation of new building regulations and standards by the national and local governments may result in construction enterprises facing penalties for non-compliance if they fail to promptly understand and adapt to these changes. From the perspective of social relations, construction projects may have conflicts and disputes with surrounding residents and government departments over issues such as noise pollution and traffic congestion. If not handled properly, these issues can affect the smooth implementation of the project.

4.2 Solutions

4.2.1 Strengthening Personnel Training

In response to the uneven quality of personnel, construction enterprises should further strengthen personnel training. For front-line construction workers, systematic professional skill training should

be conducted, covering aspects such as construction techniques, operational specifications, and safety knowledge, to improve their practical operational skills and safety awareness. Training can be carried out through methods such as organizing training courses, on-site guidance, and practical operation assessments to ensure that construction workers master relevant skills proficiently [7]. For project managers, management knowledge and skill training should be implemented, and employees should be encouraged to participate in industry training and exchange activities to learn advanced management techniques and experience. An incentive mechanism should be established to reward outstanding employees and mobilize their learning enthusiasm and work motivation.

4.2.2 Improving the Management Mechanism

A complete management mechanism is the key to improving the effectiveness of construction management control. A sound management system should be established to clarify the job responsibilities and work processes of each department, formulate detailed work standards and specifications, and provide a basis for various work tasks. A project progress, quality, and safety management system should be constructed to ensure that the project progresses smoothly according to the set objectives [8]. The supervision and assessment methods should be optimized, and a scientific and reasonable performance assessment system should be established. Regular assessments of personnel work performance should be conducted, and assessment results should be linked to employees' salaries, promotions, and rewards to effectively mobilize their enthusiasm. The supervision and inspection of project implementation should be strengthened to promptly identify and address issues and ensure project quality. The communication and coordination mechanism should be made smooth, and an effective information communication channel should be established to enhance information communication and sharing among departments. Regular project coordination meetings should be held to promptly resolve work-related issues and ensure tight work.

4.2.3 Enhancing Technical Level

Improving the technical level is the main way to enhance the construction management control capability. Construction enterprises should further increase investment in technological research and development, establish technological research and development centers, introduce and cultivate professional technical personnel, and carry out research and application of new technologies, new processes, and new materials. Cooperation with scientific research institutions and universities should be strengthened to jointly carry out technological research and development projects. By leveraging the resources and advantages of scientific research institutions, enterprises can enhance their technological innovation capabilities. Industry-leading new technologies, new processes, and prefabricated building technologies should be actively promoted and applied to improve construction efficiency and quality. Technical personnel should be regularly arranged to participate in technological training and exchange activities to timely understand and grasp the latest technological trends in the industry and continuously improve the enterprise's technical level.

4.2.4 Responding to Changes in the External Environment

For the complex external environment, construction enterprises should adopt effective response measures. In terms of the natural environment, communication with meteorological departments should be strengthened to timely grasp weather changes and implement preventive measures in advance. Before the arrival of adverse weather such as heavy rain and strong winds, outdoor operations should be suspended, and appropriate protection measures should be taken for construction equipment and materials on site. Regarding policies and regulations, a policy and regulation tracking system should be established to quickly grasp new policies and regulations promulgated by the national and local governments. Relevant personnel should be organized for learning and training to ensure that enterprise construction activities comply with current policies and regulations.

5. Conclusion

In conclusion, construction management control is a complex and systematic endeavor that faces numerous problems such as uneven personnel quality, incomplete management mechanisms, limited technical levels, and complex external environments. By strengthening personnel training, improving management mechanisms, enhancing technical levels, and responding to changes in the external environment, the level of construction management control can be effectively improved, ensuring that engineering projects progress smoothly according to predetermined objectives. Construction enterprises should fully recognize the importance of construction management control, continuously explore and innovate management methods and means to adapt to the development needs of the construction industry and enhance their market competitiveness and economic benefits.

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