Analysis of Quality Supervision and Safety Management Measures in Construction Engineering

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Keywords: Construction engineering; Quality supervision; Safety management; Measures

Abstract: Quality supervision and safety management in construction engineering are critical to ensuring the smooth implementation of projects, guaranteeing engineering quality, and safeguarding personnel safety. This paper provides an in-depth analysis of the importance of quality supervision and safety management in construction engineering, identifies existing problems in these areas, and proposes targeted measures to strengthen quality supervision—including improving the supervision system, enhancing the competence of supervision personnel, and strengthening whole-process supervision—as well as measures to enhance safety management. The implementation of these measures aims to improve the quality standards and safety management efficiency of construction projects, thereby promoting the healthy and sustainable development of the construction industry.

1. Introduction

As a vital component of the national economy, construction engineering directly affects the safety of people's lives and property, as well as social stability. With the rapid development of the construction industry, the scale of construction projects continues to expand, and technologies become increasingly complex, placing higher demands on quality supervision and safety management. However, numerous problems still exist in quality supervision and safety management, leading to frequent quality and safety incidents that cause significant losses to society. Therefore, strengthening quality supervision and safety management in construction engineering and exploring effective management methods are of great practical significance.

2. Importance of Quality Supervision and Safety Management in Construction Engineering

2.1 Ensuring Engineering Quality: Building a Solid Foundation for Long-Term Projects

Engineering quality is the core of construction projects, directly impacting the functionality of buildings and the safety of people's lives and property[1]. Quality supervision in construction engineering involves strict control throughout the entire process, from project planning and design to construction and completion verification. During construction, supervision personnel conduct rigorous inspections of building materials, components, and equipment in accordance with relevant standards and specifications, preventing substandard products from entering the construction site. Key indicators such as steel strength and cement grade are accurately tested to ensure compliance with design requirements. Real-time supervision of construction techniques and operational processes prevents improper practices that could lead to quality hazards. Details such as the compactness of concrete vibration and the fullness of mortar joints in brickwork affect the overall quality of the building. Through quality supervision, issues can be identified and corrected in a timely manner, preventing the occurrence of substandard projects and ensuring the delivery of high-quality construction outcomes.

2.2 Ensuring Personnel Safety: Upholding the Principle of Life First

  DOI: 10.25236/icacel.2025.194

The construction industry is high-risk, with potential hazards such as falls from heights, object impacts, electric shocks, and collapses[2]. Safety management is critical in construction engineering. By establishing comprehensive safety management systems and operational procedures, clarifying safety responsibilities for each position, and standardizing the behavior of construction personnel, accidents can be reduced. Construction personnel are required to properly wear and use personal protective equipment such as safety helmets, safety belts, and safety nets. Safety education and training enhance the safety awareness and emergency response capabilities of workers. Regular activities such as safety lectures and emergency drills familiarize workers with safety procedures and self-rescue methods. Safety management personnel conduct daily inspections and specialized checks of construction sites to identify and eliminate hazards promptly, strictly addressing violations to create a safe and orderly construction environment.

2.3 Promoting the Healthy Development of the Construction Industry and Social Progress

Effective quality supervision and safety management are significant for the healthy development of the construction industry. High-quality projects and safe construction environments enhance the reputation and image of construction enterprises, increasing their market competitiveness[3]. In a competitive market, enterprises that prioritize quality and safety are more likely to gain recognition and trust from clients, securing more project bids. Those that neglect these aspects risk being eliminated from the market. Standardized quality supervision and safety management drive technological innovation and management improvements in the construction industry. To meet quality and safety requirements, enterprises continuously adopt new technologies, processes, and materials, improving construction efficiency and quality. A well-regulated industry attracts more talented individuals to the construction sector, injecting new vitality into its sustainable development and promoting overall economic and social progress.

3. Issues in Quality Supervision and Safety Management in Construction Engineering

3.1 Quality Supervision Issues

3.1.1 Incomplete Supervision System

The quality supervision system in construction engineering still has loopholes and deficiencies. The setup of supervision institutions is unreasonable in some regions, with insufficient supervision resources to meet the demands of large-scale projects. Supervision procedures and standards lack uniformity, leading to local protectionism and ineffective supervision, which undermines the fairness and efficiency of quality supervision[4].

3.1.2 Uneven Competence of Supervision Personnel

Quality supervision requires personnel with professional knowledge and extensive experience. However, the competence of supervision personnel varies widely. Some lack systematic professional training and are insufficiently familiar with new technologies, processes, and materials, making it difficult to accurately assess engineering quality issues. Others lack a sense of responsibility, leading to perfunctory work that affects the effectiveness of quality supervision[5].

3.1.3 Outdated Supervision Methods

With advancements in construction technology, quality requirements for construction projects are increasing. Traditional supervision methods, such as visual inspections and simple measurements, are no longer adequate. Some supervision institutions still rely on these outdated methods, lacking advanced detection equipment and technological means to identify deep-seated quality defects. Poor

informatization levels also hinder the timely and accurate transmission and processing of supervision information, reducing the efficiency of supervision work.

3.2 Safety Management Issues

3.2.1 Poor Implementation of Safety Management Systems

Although national and local governments have issued a series of safety management regulations for construction engineering, their implementation is often inadequate. Some construction enterprises have loopholes in their safety management systems, and safety responsibilities are not fully practicable. Problems identified during safety inspections are often addressed slowly or incompletely. Some construction sites lack sufficient safety management personnel, rendering safety management ineffective[6].

3.2.2 Lack of Safety Awareness Among Construction Personnel

Many construction workers have low educational levels and lack safety awareness, necessary safety knowledge, and self-protection skills. Violations of safety service regulations, such as not wearing protective equipment and engaging in risky operations, are common. Some construction enterprises prioritize economic benefits over safety education and training, preventing workers from improving their safety awareness and operational skills.

3.2.3 Insufficient Safety Investment

Safety investment is essential for ensuring safety in construction engineering. However, some construction units cut costs by reducing safety investments, resulting in simple and crude safety protect facilities, a lack of necessary safety warning signs and protective equipment, and insufficient investment in safety technology research and application. This makes it difficult to adopt advanced safety technologies and management methods to improve on-site safety levels.

4. Measures to Enhance Quality Supervision and Safety Management in Construction Engineering

4.1 Measures to Strengthen Quality Supervision

4.1.1 Improve the Supervision System

Based on the scale and distribution of construction projects, quality supervision institutions should be properly established to ensure coverage of all projects. The standardization of supervision institutions should be strengthened, with clear responsibilities and authorities. Supervision systems and procedures should be established and improved to enhance the scientific and normative levels of supervision work[7]. Nationally unified supervision procedures and standards should be developed to eliminate local protectionism and ineffective supervision. Training on supervision procedures and standards should be provided to ensure proper implementation. Supervision assessment mechanisms should be improved to regularly evaluate the work of supervision institutions and personnel, encouraging active fulfillment of responsibilities.

4.1.2 Enhance the Competence of Supervision Personnel

Regular professional training should be organized for supervision personnel to keep them updated on new technologies, processes, and materials. Training content should include construction engineering quality standards, specifications, and testing technologies, with a focus on practical operational skills. Professional ethics education should be strengthened to foster a sense of responsibility and mission. Activities such as integrity education and warning education should be conducted to guide supervision personnel in establishing correct values and power perspectives,

preventing illegal behaviors such as favoritism and fraud.

4.1.3 Strengthen Whole-Process Supervision

Before construction begins, construction drawings should be thoroughly reviewed to ensure compliance with relevant standards and specifications. The qualifications of construction units, personnel credentials, and construction organization designs should be strictly examine and verify to ensure be in the process of construction capability and management horizontal. The quality of building materials, components, and equipment should be inspected to prevent substandard products from entering the construction site. During construction, dynamic quality control should be enhanced through regular inspections and timely correction of issues[8]. Key processes and concealed work should be closely supervised to ensure compliance with design requirements. Construction process records and file management should be strengthened to provide a basis for quality retrospect. During project completion and check and accept, standards and specifications should be strictly followed to conduct comprehensive inspections, ensuring structural safety and functionality. Issues identified during check and accept should be promptly addressed, with projects delivered only after rectification is qualified.

4.1.4 Innovate Supervision Methods

Advanced detection equipment and technologies, such as non-destructive testing and infrared thermography, should be introduced to improve the accuracy and reliability of quality inspections. These technologies can identify deep-seated quality hazards, providing strong technical support for quality supervision. Digital means should be adopted to establish a quality supervision information management system, enabling real-time transmission and sharing of supervision information and improving efficiency. Big data analysis should be used to excavate deeply supervision data, providing scientific evidence for decision-making in quality supervision.

4.2 Measures to Strengthen Safety Management

4.2.1 Improve the Safety Management System

A comprehensive safety responsibility system should be established, clarifying the safety responsibilities of all parties involved, including construction units, supervision units, and others. work safety responsibility statement should be signed to assign safety responsibilities to specific departments and individuals. The implementation of safety responsibilities should be closely monitored, with accountability for units and individuals failing to fulfill their responsibilities. Based on the characteristics and actual conditions of construction projects, comprehensive safety management systems and operational procedures should be developed, including safety production education and training systems, safety inspection systems, and safety accident emergency plans. Construction units should strictly adhere to these systems and procedures to ensure safety.

4.2.2 Strengthen Safety Education and Training

Safety education and training should be provided to all personnel entering the construction site, including management, technical, and construction personnel. Training content should cover safety laws and regulations, safety service regulations, and safety accident cases to enhance safety awareness and self-protection skills. Regular emergency drills should be organized to improve the emergency response capabilities of construction personnel. Drills should cover common safety accidents such as fires, collapses, and electric shocks. Safety accident emergency plans should be reviewed and improved to ensure rapid and effective rescue operations in case of accidents.

4.2.3 Increase Safety Investment

Construction enterprises should increase investment in safety protect facilities, providing necessary safety warning signs, protective railings, safety nets, and other protective equipment. Temporary facilities on construction sites should be regularly inspected and maintained to ensure safety and reliability. Advanced safety technologies and management methods, such as intelligent safety monitoring and warning systems, should be actively promoted and applied. These technologies can improve the level of safety management on construction sites, enabling the timely identification and elimination of safety hazards.

5. Conclusion

In summary, quality supervision and safety management are the cornerstones of the healthy development of the construction industry, and they complement each other. Through a sound quality supervision system, quality issues during construction can be identified and corrected in a timely manner, ensuring that construction products meet design requirements and safety standards. Strict safety management measures provide a safe and reliable working environment for construction personnel, effectively reducing accident rates and safeguarding lives. Meanwhile, strengthening communication and collaboration among all parties involved will create a powerful synergy, enabling the delivery of more high quality, safe construction projects that meet society's demand for high-quality buildings, promote the sustained, stable, and high-quality development of the construction industry, and contribute to the creation of a better living environment.

References

[1] Yuan Lili. Analysis of Quality Supervision and Safety Management Measures in Residential Construction Engineering[J]. Engineering Quality, 2025, 43(7): 70-73, 78.

[2] Liu Qingyun. Analysis of Quality Supervision and Management Measures for Main Structures in Construction Engineering[J]. Development Guide to Building Materials, 2025, 23(12): 22-24.

[3] Wu Dong. Quality Supervision and Safety Management Measures in Residential Construction Engineering[J]. Chinese Housing, 2025, 18(1): 121-122.

[4] Yang Xueyan. Analysis of Quality Supervision and Safety Management Measures in Residential Construction Engineering[J]. Housing and Real Estate, 2024(20): 110-112.

[5] Chen Guoying. Analysis of Innovative Management Measures for Quality Supervision in Construction Engineering[J]. Urban Housing, 2020, 27(9): 186-187.

[6] Suo Wenhan. Analysis of Common Problems and Countermeasures in Quality and Safety Management of Construction Engineering[J]. Jushe, 2020(12): 192.

[7] Sun Cong. Analysis of Common Problems and Countermeasures in Quality and Safety Management of Construction Engineering[J]. Jushe, 2020(11): 188.

[8] Zhu Chuanjin. Analysis of Innovative Management Measures for Quality Supervision in Construction Engineering in the New Era[J]. Engineering andConstruction, 2020, 34(1): 173-174.