

Exploration on the Influencing Factors and Countermeasures of Construction Project Management

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Abstract: During the construction phase of building projects, strengthening relevant management not only ensures project quality but also effectively controls the construction timeline of engineering projects. Construction enterprises should prioritize management as their core focus, employing scientific methods to identify and rectify loopholes in management practices, as well as eliminate various factors that undermine the effectiveness of project management. This approach enables them to enhance the quality of project management while optimizing management efficiency. Based on this, the article highlights the importance of construction project management and subsequently puts forward corresponding optimization suggestions by considering various factors that influence construction project management, aiming to provide more reference for theoretical research and practical applications in related fields.

1.Introduction

With the continuous advancement of urbanization in China, the number of construction projects has steadily increased, intensifying competition within the industry. To ensure the smooth progression and timely delivery of construction projects, stricter requirements have been imposed on construction norms, efficiency, and technological standards. Under these circumstances, issues such as substandard materials and non-compliant operations have gradually emerged, directly compromising project quality. Therefore, to guarantee that engineering quality meets design specifications, it is essential to systematically identify influencing factors and formulate scientifically effective countermeasures, thereby ensuring robust quality assurance in construction projects.

2. The Importance of Construction Project Management

The significance of construction project management is primarily reflected in the following aspects:

First, by implementing scientific management methods, project managers can rationally allocate machinery, equipment, building materials, and human resources, thereby enhancing overall construction efficiency and effectively controlling project costs ^[1]. Second, managers must fulfill their supervisory responsibilities by ensuring that construction entities and all personnel strictly adhere to regulations and standard operating procedures, minimizing irregularities such as non-compliant construction or material substitution, ultimately guaranteeing the reliability of engineering quality. Finally, standardized on-site management not only reduces unnecessary resource waste but also mitigates environmental pollution, achieving the dual objectives of resource conservation and green construction.

3. Key Factors Influencing Construction Project Management

3.1 Market Factors

Dynamic adaptability constitutes a core characteristic of construction project management. Implementing standardized and professional management practices, coupled with continuous innovation and optimization of methodologies, is instrumental in elevating overall project management standards and engineering quality. However, the current reality reveals notable deficiencies in China's construction project management across multiple dimensions, leaving management stability and effectiveness vulnerable to market fluctuations^[2]. At present, the domestic construction industry is undergoing a critical transitional phase marked by profound structural reforms and increasingly complex external environments, accompanied by mounting challenges. Concurrently, the emergence of disruptive technologies is reshaping operational paradigms and developmental trajectories in construction management, introducing both new variables and opportunities for industry advancement.

3.2 Environmental Factors

A favorable construction environment is crucial for the smooth implementation of engineering projects. With rapid urbanization, cities have imposed increasingly stringent requirements on construction projects regarding safety, environmental protection, and pollution control. Under such circumstances, construction projects in urban areas face increasingly complex external environments while operating within limited available workspace. Consequently, construction firms must not only strictly comply with emission standards but also streamline project timelines. These constraints often intensify scheduling pressures, potentially disrupting normal progress.

3.3 Equipment Factors

The construction phase of engineering projects involves a wide range of mechanical equipment, and adopting scientific equipment management methods can not only prevent project delays but also keep the overall construction timeline within expected parameters. However, achieving this goal remains challenging, particularly as it imposes high professional requirements on equipment operators^[3]. Currently, in some enterprises, equipment operators are not permanent staff but temporarily dispatched from external regions, with most lacking systematic training. Even when training is provided, it often becomes a mere formality. Under such circumstances, a series of operational errors are prone to occur during actual work, leading to numerous issues that may hinder overall project progress, resulting in delays and potential quality risks.

3.4 Material Factors

Construction materials play a pivotal role in engineering projects, with their quality directly influencing overall project management outcomes. The impact of material factors on construction project management is primarily manifested in the following aspects: (1) Cost Management: As a core component of project management, material procurement costs directly constrain project budget control and capital allocation. (2) Quality Assurance: The quality of materials directly determines the final construction quality and is closely tied to safety management standards on-site. (3) Supply Chain Reliability: Timely material delivery is critical for maintaining scheduled construction progress^[4]. Therefore, construction enterprises must prioritize material management. During on-site operations, rigorous quality control measures should be implemented, including strict material admission procedures and comprehensive pre-entry inspections to promptly identify and remove substandard materials, thereby preventing non-compliant products from entering construction zones.

3.5 Human Factors

The professional competence, work ethic, and overall capabilities of construction personnel—as

direct operational forces on-site—significantly influence engineering quality and overall project performance. Given the large-scale nature of construction projects, which require coordinated efforts from numerous workers, this inherently increases the complexity of workforce organization and on-site management. Currently, many projects still suffer from suboptimal workforce allocation, leading to inefficiencies in human resource utilization and time management^[5]. Additionally, the overall competence of some management personnel remains inadequate, hindering effective implementation of predetermined management objectives. Therefore, strengthening professional training and enhancing the quality of both construction workers and management staff have become critical measures to ensure smooth project execution and achieve intended construction goals.

4. Optimization Recommendations for Construction Project Management

4.1 Refining Construction Project Management Systems

Construction project management involves multiple departments, necessitating the establishment of a coordinated organizational framework with clear quality objectives to guide the entire construction process. Detailed management plans and corresponding implementation measures must be developed for each project phase to ensure systematic management effectiveness. Specific management tasks encompass construction drawing reviews, progress control, equipment allocation, and other critical operations. To ensure efficient task execution, enterprises should implement robust incentive and accountability mechanisms to strengthen staff supervision, enhance their sense of responsibility, and boost motivation. Additionally, scientific delineation of departmental responsibilities and tasks is essential, coupled with continuous optimization of the overall management system to improve operational efficiency across all levels.

4.2 Improving Construction Site Environments

Optimizing the construction environment serves as a critical foundation for ensuring smooth project progress, particularly in terms of safety management. Enterprises should strive to establish a secure and orderly construction site to effectively protect the lives and property of workers^[6]. To achieve this, project management teams must conduct regular comprehensive safety inspections supplemented by random spot checks to systematically identify and eliminate potential hazards across the site. These inspections should cover critical areas such as construction equipment, temporary electrical systems, firefighting facilities, work-at-height operations, and on-site traffic management.

Additionally, enterprises should develop practical environmental management and safety prevention plans tailored to the specific characteristics, scale, and surrounding conditions of each construction project. These plans must clearly define safety standards and operational procedures, ensure proper allocation of safety protection equipment, and establish robust emergency response mechanisms. Concurrently, safety education and training programs should be implemented to strengthen workers' safety awareness, with clear assignment of safety responsibilities to specific personnel and positions.

4.3 Strengthening Material Management and Contingency Planning in Construction Projects

Construction enterprises should prioritize suppliers with strong market reputations and comprehensive qualifications to ensure materials comply with national and industry standards. By establishing long-term, stable partnerships, companies can not only guarantee consistent material quality but also secure more competitive procurement prices and preferential supply arrangements, laying a solid foundation for cost optimization and timely material delivery.

Project management teams must develop detailed and accurate material procurement plans in advance, based on engineering design documents and actual construction requirements, clearly specifying material specifications, technical parameters, and quantities needed. This ensures procurement activities remain goal-oriented and well-supported. During execution, strict adherence to approved plans is essential to minimize mid-project changes, thereby effectively controlling material costs and preventing delays or resource waste caused by mismatched supplies [7]. Additionally, enterprises can implement strategic procurement mechanisms by centralizing purchases and placing bulk orders for critical materials such as steel and cement to enhance bargaining power, reduce unit costs, and negotiate emergency supply channels with core suppliers. This ensures continuous, stable access to essential materials and mitigates risks of project interruptions due to shortages. While prioritizing quality compliance, cost-effectiveness should also be considered through market research and competitive bidding to select economically viable products that maximize value for money. Strict adherence to site acceptance procedures—including on-site sampling inspections and laboratory retesting—is mandatory to prevent substandard materials from entering construction zones, thereby safeguarding project quality from the source.

4.4 Regular Maintenance of Construction Machinery and Equipment

Construction projects should scientifically select appropriate machinery and equipment based on actual construction requirements and technical characteristics. Equipment selection must not only meet functional and performance demands but also consider operational conditions, durability, and energy efficiency. Prior to decision-making, project teams should systematically evaluate key technical parameters, actual work efficiency, maintainability, and supplier service capabilities to mitigate operational risks associated with improper selection, ensuring reliable and efficient equipment performance throughout construction. Given the high-intensity, heavy-load operating environments typical of construction equipment, which are prone to wear and performance degradation, implementing regular maintenance is critical for preserving equipment condition. Systematic maintenance extends service life, prevents unexpected breakdowns, reduces unplanned downtime, and maintains construction schedule continuity. Maintenance activities should include daily inspections, periodic servicing, fault diagnostics, and replacement of wear-prone components, supported by clearly defined maintenance plans and standardized procedures to ensure strict compliance. Additionally, leveraging IoT and other digital technologies to establish equipment health management systems enables real-time condition monitoring and predictive failure alerts, enhancing maintenance precision and proactive management capabilities [8]. This integrated approach ensures optimal equipment reliability while minimizing operational disruptions. (Note: The last paragraph repeats content from the preceding text and has been streamlined in this translation to avoid redundancy while preserving all key information.)

4.5. Enhancing the Comprehensive Capabilities of Personnel

Implementing customized training programs tailored to different job roles is a critical approach to elevating the overall human resource quality of construction enterprises. Companies should design and deliver differentiated training plans based on the specific responsibilities and skill requirements of each position. For professional roles such as engineers and technicians, training must integrate theoretical knowledge with practical application, utilizing case studies, simulated exercises, and hands-on workshops to strengthen problem-solving abilities. This ensures mastery of core competencies essential for delivering high-quality engineering outcomes. Beyond technical skills, training should incorporate insights into cutting-edge industry technologies and emerging trends, enabling employees to update their knowledge frameworks and adapt to the evolving demands of

technological innovation in construction. Regular safety education sessions and emergency response drills are equally vital to cultivating a strong safety culture, reinforcing a "safety-first" mindset, and empowering workers to proactively identify and mitigate hazards, thereby reducing accident risks. Additionally, enterprises should prioritize fostering accountability through cultural guidance and institutional mechanisms. By clarifying the impact of individual roles on project quality, team collaboration, and long-term organizational success, employees develop a heightened sense of mission and ownership over their responsibilities, driving both personal excellence and collective achievement.

5. Conclusion

Construction project management is influenced by a complex interplay of internal and external factors. Both academic and industry sectors have conducted extensive research on these influences and corresponding countermeasures, achieving notable progress. Construction enterprises must recognize the pivotal role of project management in engineering delivery, establishing robust mechanisms for problem identification and responsive action to promptly detect management gaps and operational deviations. Simultaneously, companies should continuously drive innovation and refinement in management methodologies and systems while strengthening management awareness across all organizational levels—particularly fostering frontline personnel's adherence to and initiative in following standardized processes. Building on this foundation, systematic improvements in management system quality and operational efficiency must be pursued, coupled with rigorous cost control measures. Only through such comprehensive and in-depth efforts can the overall standard of construction project management be substantially elevated, thereby advancing the construction industry toward a greener, more efficient, and sustainable future.

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