

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

As urbanization has progressed in China, the amount of buildings have increased and the construction industry has become more competitive. To support the smooth flow and timely delivery of the construction projects, construction norms, efficiency & technology standards have been made more stringent. In this situation, problems like using inferior raw materials and operating without the limit have sprung up bit by bit, which directly endanger the project quality. This means an effective measure for good construction quality assurance: the identification of influential factors systematically and the development of scientifically sound counter-acting measures to ensure that engineering quality meets design requirements.

2. The Importance of Construction Project Management

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

Through the use of scientific management approaches, project managers can rationally allocate constructions machine and equipment, building materials and human resources to improve overall construction efficiency and effectively controlling project costs ^[1]. Secondly, managers should fulfil their supervisory obligations and ensure that construction entities and all staff are produced in accordance with regulation and standard operating procedures to the greatest extent possible through avoiding irregularities such as non-compliant construction or material replacement so as to guarantee engineering quality is reliable. In the end, standardization of backend management can not only reduce the waste of resources but also greatly avoid environmental pollution, realizing the two goals of saving resources and green construction.

3. Key Factors Influencing Construction Project Management

3.1 Market Factors

Dynamic adaptability is a key feature in construction project management. Standardized and systematic management practices, continuous improvement of methodologies which could be the key to improving overall project management standards and the engineering quality. On the contrary,

the real situation indicates that China's construction project management is far from perfect from multiple dimensions, and its stability and efficiency are at risk in the rise and fall of market ^[2]. Currently, domestic construction industry is in the state of transitional period for structural reform and external environment is much more complicated with rising challenges. Simultaneously, the advent of disruptive technologies is altering operational modes and progress paths in construction management, offering both novel factors and windows of opportunity for industrial evolution.

3.2 Environmental Factors

An amiable construction environment is vital to executing engineering projects successfully. Because of rapid urbanization, cities have begun providing more and more strict regulations for construction projects regarding safety, environment protection and pollution control. In this context, construction projects set in urban areas are confronted with more complicated external conditions under very limited available workspace. As a result, construction businesses must adhere to emission standards more strictly while also shortening project timelines. These limitations make scheduling more demanding, causing an increased risk of derailing routine advancement.

3.3 Equipment Factors

Engineering projects can have a variety of mechanical equipment during the construction phase, and using scientific equipment management methods can not only avoid project delays, but also ensure that the overall construction period is within the expected control value. Nevertheless, reaching this objective is still difficult and also presents demanding demands for equipment drivers ^[3]. Currently, in some enterprises, the operators of equipment are not permanent workers, but rather sent from other regions for a period of time and most of them do not have systematic training. Sometimes even training is offered but it becomes just a formality. Under the above circumstances, a series of operational blindness are likely to occur in practical work; They often lead to many problems which will also make the whole project slower and risk quality.

3.4 Material Factors

Construction Materials: Construction materials are at its core for engineering projects, where high quality of material means better overall project management. The effects of material factors on construction project management mainly appear at: (1)Cost Management: Material procurement costs are an important part of project management which directly restricts the budget control and capital allocation of the project. (2) Reliability: The quality of materials is directly related to the final construction quality and is closely related to safety management standards on site. (3) Supply Chain Dependability; On-time arrival of materials is key to maintaining the planned pace of construction ^[4]. This is why material management becomes the most essential aspect of construction businesses. In the case of on-site operations, strict quality control methods should be implemented through material admission processes, going as far as implementing thorough and all-encompassing inspections before pantone stamping systems enter a construction zone in order to detect any low-quality materials for prompt removal.

3.5 Human Factors

Since construction personnel act as the operational forces directly on-site, professional competence and work ethic are of uttermost importance for engineering quality and overall project performance. Construction projects are inherently large scale endeavors involving operations by hundreds to thousands of workers in coordination with both an organizational level project control and on site management. Many projects are still under-allocated with human resources which ironically increases the cost of time management ^[5]. The incompetence of some management personnel is also a factor that prevents the overall implementation of predetermined management objectives. Hence, reinforcement of the professional training, improving human resources quality regarding skilled workers as well as managing staff becomes one of imperative means to facilitate smooth construction projects that help gain achieved construction purpose.

4. Optimization Recommendations for Construction Project Management

4.1 Refining Construction Project Management Systems

The construction project management involves several departments; therefore it requires a bigger organized entity structure to guide the entire process of construction with specific quality aims. Each phase of the project should develop detailed management plans and corresponding implementation measures to ensure systematic management efficacy. Management duties include construction drawing review, progress control, equipment distribution and other key operations. When companies create a system of incentives and accountability, they help strengthen employee supervision while increasing responsibility and motivation making them accomplish tasks in an efficient manner. Moreover, clearly defining the responsibilities and tasks of all departments scientifically as well as optimizing the overall management system constantly in order to make operational activities work smoothly at each and every level is a must.

4.2 Improving Construction Site Environments

The construction environment optimization plays a pivotal role in ensuring the complete construction projects proceed well, especially safety management. The objective of the enterprises is to create a safe and orderly construction site, so as to effectively protect the life and property safety of workers ^[6]. This requires management of projects that includes regular site wide extensive safety inspections completed by random spot checks to consistently document, and reduce hazards throughout the site. These inspections need to include vital aspects like construction plant/machinery, temporary electrical systems, fire-fighting system arrangements and work at height operations safety as well as site traffic management.

Enterprises must also establish more targeted environmental management and preventive safety plans, both in general and according to the construction characteristics of each project in terms of scale and surrounding conditions. Such plans should define minimum safety standards and operational procedures, appropriate use of safety protection equipment, and efficient emergency response mechanisms. At the same time, corresponding safety education and training programs should also be carried out to enhance the workers' awareness of safety, combined with clearly assigned personnel and post responsibilities for safe production.

4.3 Strengthening Material Management and Contingency Planning in Construction Projects

For the construction enterprises, when selecting suppliers, they should focus on the strength of supplier qualification and whether it meets national standards or industry standards in order to ensure that materials comply with standards. Through long-term stable supply partnerships, enterprises can not only ensure the quality of materials but also lock in competitive procurement prices and priority supply agreements, achieving cost reduction and timely material stability.

The project management team should make a material procurement plan in advance based on the engineering design and the technical target of actual construction, specifying the specifications, parameters and quantities of materials. This ensures procurement stays goal-based and well-supported. This means that execution should stick to approved plans as closely as possible, so that changes do not have to be made mid-project ^[7]. Enterprises can also exercise strategic procurement mechanisms by consolidating supplies through central purchasing and bulk orders of critical materials, like steel and cement, to strengthen bargaining power, reduce per-unit cost and shape emergency supply channels with lead suppliers. This guarantees a regular stream of vital supplies while avoiding potential project slowdown caused by supply shortages. Competition through market surveys and tendering must be made at the stage of selection to ensure economic products that optimize value for money while ensuring quality compliance. Ensuring that strict site acceptance procedures are available, including on-site sampling inspection and laboratory retesting where necessary, will stop sub-quality materials entering the construction area and prevent quality degradation from its point of origin.

4.4 Regular Maintenance of Construction Machinery and Equipment

Investigate the characteristics of the construction process, scientifically select machinery and equipment based on actual construction requirements and technical characteristics. Selection must satisfy functional and performance needs, as well as operational conditions, durability, and energy efficiency (and those attributes depend on each other). It is advisable that the project teams examine the key technical parameters, actual work efficiency, maintainability and supplier service capability in a regular manner ahead of decision-making to avoid operational risk due to improper selection and ensuring reliable equipment utilization efficiency over the construction phase. Considering that construction equipment operates in high-intensity, heavy-load environments and is subject to wear and performance degradation, periodic maintenance is very crucial for all kinds of machinery. Maintenance which is often systematic prolongs its service life, manages repairs and avoids unplanned downtimes that interrupt the continuity of a construction schedule. Maintenance work must incorporate daily checking, periodic servicing, diagnosis of faults and changing out damaged or worn parts via well-defined maintenance plans maintained by procedures that are expected to be observed with no exception. The use of IoT and other digital technologies to create equipment health management systems that allow for condition monitoring and predicting potential point failure alerts in real-time provides precise maintenance and proactive management [8]. This combined approach guarantees maximum equipment dependability with the most method for not interrupting operations.

4.5 Enhancing the Comprehensive Capabilities of Personnel

Catering specialized training according to various job roles is an integral way of enhancing the quality of human resources in construction organizations. Businesses need to build and provide the right training plans for each role, depending on what they require. Training that combines theory with application through the use of case studies, simulated exercises and hands-on workshops for professional roles, such as engineers and technicians is essential in strengthening problem-solving capabilities. Helps a student become adept in core competencies which are the fundamentals of ensuring delivery of best in class engineering outcomes. Additionally, training needs to go beyond the how to deliver insights on top industry technologies and trends that are emerging, so the employees can upgrade their knowledge framework and behavior according to latest industrial demand of technological innovation in construction. Regular safety training and emergency response drills are also as important in establishing a solid safety culture, promoting the "safety-first" mentality, and enabling workers to identify threats that present themselves within the working environment which protects their lives by minimizing accidents. Secondly, enterprises need to focus on building a culture of accountability and developing institutional mechanisms. In addition to taking individual responsibility for their tasks and answerability for projects, they also become conscious of the organizational logic linking roles to medium-term project quality and long-term firm success.

5. Conclusion

There are a lot of internal and external factors that influence construction project management. These influences and mitigation measures have been studied extensively in both academia and industry with considerable success. Construction enterprises must understand that project management is the cornerstone of engineering delivery, implementing reliable problem identification and responsive action mechanisms to detect management gaps and operational deviations as soon as possible. At the same time, enterprises should push for continuous innovation and improvement of management methods and systems while enhancing management awareness at all levels of the organization especially encouraging front-line personnel to implement standardized processes; On top of that, ongoing improvements to both the quality of management systems and operational efficiency need also to be pursued together with very stringent cost control. Effective overall systems of research and practice is only through these three levels of high-quality, long-term

collaboration among the many partners can we expect a fundamental step change in construction project management performance to benefit the wider industry and to image a greener, more efficient and sustainable future for this point where building on.

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