Research on Effectively Improving the Management Level of Construction Technology in Building Engineering

Rui QU

Anhui Ruixiang Construction Engineering Co., Ltd., Hefei, Anhui, 230000, China

Keywords: Building Engineering; Construction Technology Management; Risk Prevention and Control; Technological Innovation

Abstract: The continuous advancement of urbanization has led to the expansion of construction engineering scale and increasingly fierce competition in the construction market. The management level of construction technology is a major factor determining the quality of building engineering, profoundly impacting the economic benefits and market image of construction enterprises. This paper analyzes the importance of improving the management level of construction technology in building engineering, presents common aspects of construction technology management in building engineering, including construction organization design and planning, and technical control during the construction process. Based on this, it proposes strategies for enhancing the management level of construction technology in building engineering, providing a strong reference for the sustainable and healthy development of the construction industry.

1. Introduction

The construction industry holds a core position in socio-economic development, with its construction scale and quantity showing an increasing trend, and building structures becoming more complex. Although construction technology in the field of building engineering has made significant progress, construction technology management still faces many problems, making it difficult to adapt to the market demands and technological development trends of the construction industry under new circumstances. Improving the management level of construction technology can rationally optimize resource allocation, promote technological innovation, and guarantee the high-quality development of building engineering. Therefore, in-depth exploration of paths to improve the management level of construction technology in building engineering has significant practical importance.

2. Importance of Improving the Management Level of Construction Technology in Building Engineering

2.1 Ensures Project Quality and Safety

Scientific and reasonable construction technology management ensures the standardization of construction processes. By referring to precise construction plans and technical disclosures, construction personnel can understand the technical methods of each construction phase in detail, avoiding construction quality issues caused by improper operations[1]. Construction technology management also emphasizes quality inspection of raw materials and components, ensuring the quality and standardization of materials on-site from the source, laying a solid foundation for high-quality building engineering construction. Furthermore, efficient construction technology management measures enable comprehensive risk assessment and hidden danger investigation, allowing for the early formulation of targeted risk prevention and control measures. Through regular safety training and technical disclosure activities organized by construction enterprises, the safety awareness of construction personnel is enhanced, enabling them to grasp the dynamics of the construction site in real time, nip potential safety hazards in the bud, and ensure the overall quality and safety level of the building engineering project.

  DOI: 10.25236/icacel.2025.181

2.2 Optimizes Resource Allocation

Construction technology management in building engineering plays a significant role in optimizing resource allocation. Precise construction technology management can plan human, material, and financial resources according to the actual needs of the engineering project, thereby accelerating the pace of construction. Construction enterprises arrange construction personnel of different trades and skill levels to work on-site, avoiding idleness issues and significantly improving labor efficiency. Construction technology management can also accurately calculate the usage time and quantity of various construction materials, formulate procurement plans that meet the needs of the engineering project, ensure sufficient material supply for each construction phase, and prevent material inventory backlog and excessive capital occupation. With the support of reasonable and effective construction technology management, construction enterprises can exercise refined control over the construction process, reasonably arrange various fund usage nodes, ensure funds are invested in important areas and key links, improve the overall efficiency of fund use, and truly achieve comprehensive optimization of resource allocation.

2.3 Facilitates Technological Innovation

Implementing construction technology management in building engineering can create a favorable innovation atmosphere. Orderly management helps construction personnel clarify project construction goals and technical requirements, avoiding resource waste caused by poor communication or chaotic processes. In an orderly working environment, construction personnel will invest more energy and time into technological exploration, stimulating their enthusiasm for participation in innovation and providing strong support for technological innovation. Simultaneously, reasonable construction technology management strategies can establish a sound system for collecting and analyzing technical data, accumulate rich project data, and provide reliable resource support for technological innovation. Supported by big data analysis and artificial intelligence technologies, construction enterprises can promptly identify potential technical problems and development trends, providing clear direction for subsequent technology research and development (R&D) and application, and improving the success rate of technological innovation. Furthermore, with the support of standardized construction technology management processes, the R&D and application cycle of new technologies and processes in building engineering projects will be significantly shortened. Managers can coordinate multiple resources and promptly address various problems encountered during the transformation phase, ensuring that innovation achievements can be quickly implemented in a short time and transformed into actual productivity for the construction enterprise.

2.4 Strengthens Risk Prevention and Control Capability

Precise and effective construction technology management can strengthen the risk prevention and control capability of building engineering projects. Based on meticulous review of construction drawings and plans, construction enterprises can identify potential risk points such as design defects or construction process conflicts, truly achieving early detection and prevention of risks. Meanwhile, strict construction technology management measures can standardize the entire construction process, establish a sound construction risk emergency mechanism, develop contingency plans for potential risks, conduct regular drills, and enable immediate response and effective handling measures when risks occur, minimizing economic losses. Additionally, strict construction technology management strategies can utilize information systems for real-time monitoring of construction risks, further enhancing the risk prevention and control capability of building engineering projects and ensuring construction safety and project quality.

3. Main Content of Construction Technology Management in Building Engineering

3.1 Construction Organization Design and Planning Management

Construction organization design and planning management are the core processes of

construction technology management in building engineering. Construction organization design has the advantage of overall planning. During the compilation phase, it is necessary to consider the scale of the building engineering and construction conditions, reasonably divide the construction process, determine the procedures and connection methods for different construction stages, and guarantee the orderly development of construction[2]. Construction planning management focuses on the dynamic regulation of resources and construction progress. Construction enterprises will reasonably arrange resources such as manpower, materials, and mechanical equipment according to the construction organization plan, achieve comprehensive control of engineering quality and project progress, and improve the comprehensive benefits of the building engineering project.

3.2 Technical Control During the Construction Process

Technical control during the construction process of building engineering is mainly reflected in the strict control of processes, clarifying the implementation steps and specific methods of each sub-item project according to the construction drawings. Technical disclosure is the basic link of process control in construction technology. Before the start of each construction process, technical personnel need to conduct technical disclosure to the construction team, covering content such as quality standards and safety precautions. Strengthening technical control during the construction process ensures the rationality and feasibility of the final technical solution.

4. Effective Strategies for Improving the Management Level of Construction Technology in Building Engineering

4.1 Establish a Standardized Technology Management System

The key to improving the management level of construction technology in building engineering is to establish a standardized technology management system. Construction enterprises should formulate construction technology management systems covering the entire lifecycle of the engineering project, clarify the technical requirements and quality standards for each construction phase, and develop operational normative requirements from project planning survey to construction quality inspection. The system should be adjusted according to updates in industry technology and regulations, ensuring it always conforms to the project construction situation. Simultaneously, construction enterprises should regularly organize construction personnel to participate in construction technology training, impart theoretical knowledge such as quality standards and safety norms, and actively carry out training activities like expert lectures and field observations to help construction personnel improve their technical skills. Construction enterprises should establish strict assessment mechanisms during training, linking assessment results with the performance of construction personnel, motivating employees to proactively enhance their professional competence. Construction enterprises should leverage the advantages of information technology to establish an informatized platform for construction technology management, achieving digital management and real-time sharing of materials within the platform, storing data such as construction drawings and plans, and creating favorable conditions for later reference by construction personnel. Big data analysis technology can also be used to monitor technical data during construction, promptly identify potential risks, and issue warnings. Construction enterprises should strengthen supervision and assessment of construction technology management, establish separate supervision and assessment teams, regularly evaluate the technical management situation on the construction site, judge whether quality inspections are qualified and whether technical disclosures are adequate, ensuring the standardized technology management system can be implemented in the field of building engineering projects.

4.2 Promote the Application of Intelligent Technologies

Construction technology management in building engineering should actively promote the application of intelligent technologies. Construction enterprises should build digital management platforms with BIM technology at the core, achieving construction progress simulation and

dynamic resource allocation through 3D modeling, data integration, and dynamic simulation functions. Utilizing BIM+GIS technology enables visual information management and control throughout the project lifecycle, reducing the rate of design changes and construction rework[3]. Construction enterprises should deploy IoT perception systems to build smart construction sites, install intelligent sensors in key parts such as tower cranes and deep foundations to collect data on stress, displacement, and settlement in real time, transmit it to cloud analysis platforms via 5G networks, and achieve risk early warning and emergency decision support combined with AI algorithms. Furthermore, construction enterprises should vigorously promote AI-based construction plan optimization and risk early warning, adopt computer vision for automatic identification of safety hazards and AI-based quality inspection and evaluation of engineering quality, transforming management behavior from passive response to active intervention. The application of intelligent technologies requires establishing a continuous iterative evaluation and optimization mechanism, constantly calibrating the technical route through application feedback, ultimately forming a new form of intelligence-empowered management, and comprehensively improving the efficiency and lean level of engineering construction.

4.3 Build a Professional Construction Technology Management Team

Construction technology management in building engineering requires the support of a professional, efficient, and well-structured construction technology management team. Therefore, construction enterprises should build a systematic talent training system, guided by project needs, and collaborate with universities and vocational colleges to conduct skills training, focusing on knowledge updates in emerging fields such as BIM technology application, prefabricated construction, and smart construction. Through a training model combining theoretical teaching and on-site practical operation, ensure that managers master both standardized construction processes and technical decision-making abilities. Construction enterprises need to establish a dynamic talent selection mechanism, break down traditional seniority barriers, implement two-dimensional assessment based on technical ability and management literacy, identify technical backbone personnel during major project tackling key problems, and improve cross-departmental job rotation systems by establishing positions such as chief engineers and technical experts to promote the integration and collaboration of technology, quality, safety, and other roles. Additionally, construction enterprises should establish a performance evaluation system with core indicators such as technological innovation, quality control, schedule achievement, and cost savings, link assessment results with salary increases, promotions, and awards, stimulating team initiative and creativity. Design clear dual-career development paths so that technical personnel can grow in professional depth or management breadth, enhancing team stability and sense of belonging. Informatized platforms can also be used to establish technical problem databases, solution libraries, and experience summary mechanisms. Through methods like mentorship, project review, and cross-departmental collaboration, enhance the comprehensive ability of the technology management team to solve complex engineering problems, providing solid talent guarantee for the efficient, high-quality, and safe implementation of engineering projects.

4.4 Deepen Industry-University-Research Collaborative Technological Innovation

Construction technology management should establish regular communication mechanisms. Construction enterprises should proactively establish regular exchange systems with universities and research institutions, and jointly organize technical seminars and project matchmaking meetings to break down information barriers. Enterprises can regularly publish lists of technical challenges encountered in actual projects, based on which universities and research institutions can refine research directions, forming a closed-loop model of "enterprises posing problems, academia and research solving them." Both parties can jointly build collaborative innovation platforms, using key projects as carriers, and jointly establish physical platforms such as engineering technology research centers and joint laboratories to achieve equipment sharing, data interoperability, and talent exchange[4]. On this basis, construction enterprises should actively establish long-term stable strategic partnerships with universities and research institutes, jointly form technology R&D centers

or innovation consortia, carry out key technology tackling key problems and achievement transformation. Enterprises pose technical difficult problems from actual projects, which universities and research teams competitively undertake, accelerating the docking efficiency between the innovation chain and the industrial chain. The entire process requires perfecting intellectual property sharing and benefit distribution mechanisms, clarifying the rights, responsibilities, and benefits of all parties, establishing pilot-scale testing bases and engineering application scenarios, accelerating the maturation and application of scientific and technological achievements, comprehensively improving the standardization, refinement, and intelligence level of construction technology, and injecting continuous momentum into the high-quality development of the construction industry.

4.5 Implement Whole-Process Technical Risk Management and Control

Construction technology management should establish a dynamic risk identification system covering the entire project lifecycle. Utilize means such as BIM technology and big data analysis at various stages including planning, design, construction, and operation and maintenance to systematically identify potential risk points such as geological conditions, construction techniques, and material performance, forming a dynamically updated risk list to provide a basis for precise prevention and control. On this basis, construction enterprises should establish a hierarchical control mechanism, classify technical risks into different levels according to their likelihood and impact, improve the closed-loop management mechanism for technical risks, conduct full tracking of identified risks, record the handling process and results, and form a case library for reference by subsequent projects. Faced with sudden technical problems, construction enterprises need to establish a rapid response mechanism, organize technical teams for on-site assessment and process adjustment to prevent risk expansion. The completion phase should focus on checking the completeness of technical data and the degree of fit, between the engineering entity and the design, ensuring risk closure. Through systematic and refined management and control of technical risks, the synergistic optimization of project quality, safety, and progress can be achieved.

5. Conclusion

In summary, the management level of construction technology in building engineering projects is key to determining the competitive strength of construction enterprises. However, improving the management level of construction technology is a long-term and systematic project, requiring continuous exploration and practice by construction enterprises, and ongoing optimization of management methods based on summarizing experiences and lessons. Construction enterprises should establish standardized technology management systems, promote the application of intelligent technologies, build professional construction technology management teams, deepen industry-university-research collaborative technological innovation, and implement whole-process technical risk management and control, thereby creating more high-quality and safe building products and contributing to urban economic construction and development.

References

[1] Zhang Wei, Zhu Shengdong. Research on Effective Measures to Improve Construction Technology Management in Building Engineering[J]. Interior Design and Decoration World, 2024(1): 193-195.

[2] Kang Jiancheng. Briefly Discussing How to Effectively Improve the Management Level of Construction Technology in Building Engineering[J]. Architecture and Decoration, 2024(2): 48-50.

[3] Wei Weiguo. A Brief Analysis on How to Effectively Improve the Management Level of Construction Technology in Building Engineering[J]. Brick and Tile World, 2023(19): 121-123.

[4] Wei Fengxia. Strategic Analysis for Effectively Improving the Management Level of Construction Technology in Building Engineering[J]. Zhongzhou Construction, 2023(2): 61-62.