

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

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Abstract: With the rapid development of urbanization, it also expands the scale of construction engineering and increasingly intensified competition in the construction market. The management level of building technology is an important factor affecting the quality of construction engineering, which has an in-depth impact on the economic benefits and market image of construction enterprises. This paper studies the significance of enhancing building engineering construction technology management, puts forward the general aspects in building engineering construction technology management including organization design and planning, as well as technical control during construction process. On such basis, it presents measures to improve construction technology management mode in building engineering and serves as an effective reference for the sound development of the construction industry.

1. Introduction

The construction industry is a backbone of socio-economical development, consequently the construction scale and quantity is on increasing trend and building structure becomes more complex. Construction technology management, although the construction industry has made great progress in construction engineering and building technologies, but still there are many problems with it; for new situation under new circumstances requirement of the market demands and technological development trend this article focuses on examining current challenges functioned by education centers. By ensuring a proper management level for construction technology, we can rationally optimize resource allocation, better stimulate technological innovation and even deeply ensure the high quality development of building engineering. Thus, a detailed study on methods to enhance construction technology management in building engineering is of great practical significance.

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

2.1 Ensures Project Quality and Safety

Reasonable and scientific construction technology management can lead to standardized conduct in construction process. Construction personnel can refer to the construction plan and technical disclosures of each construction phase with precision, which helps them understand the technical methods of these phases in detail, avoiding some improper operations that may lead to poor quality during the construction process ^[1]. Construction technology management effectively focus on quality inspection of raw materials and components, controlling the standardization of materials on site from the source, means to have a solid foundation for building engineering construction with high-quality. In addition, through effective construction technology management measures to carry out risk assessment and hidden danger investigation, we can fully reserve the early detection of risk situation, targeted to develop prevention and control measures. In order to ensure that construction personnel can timely learn the real-time dynamics of the construction site, nip potential safety hazards in the bud, and then effectively guarantee the overall quality and safety level of building engineering projects, regular activities such as safety training and technical disclosure organized by

construction enterprises will be conducted.

2.2 Optimizes Resource Allocation

Construction automation allows for proper resource allocation as building engineering construction technology management. Precise construction technology management can plan human, material and financial resources according to the actual demands of engineering projects, which will speed up the pace of construction. As construction companies organize construction workers of different trades and skill levels to work in the field, it prevents idleness issues and greatly boosts labor productivity. Construction technology management can also calculate the time and quantity used by different construction materials accurately to plan procurement based on the practical needs of the engineering project to guarantee sufficient material supply for each building phase so that due materials will not stock in, meanwhile, the capital occupation is avoided. According to the good guidance and management of reasonable construction technology, it takes refined control on each node of fund application in the process, ensures that funds are invested in important fields and key links, improves the overall efficiency of fund use, and ultimately achieves comprehensive optimization of resource allocation.

2.3 Facilitates Technological Innovation

Construction Technology Management (CTM) creates a positive climate for innovation in building engineering. Organized management allows construction personnel to understand the buildings that better meet project construction objectives and technical specifications, avoiding inefficient resource waste due to poor communication or chaotic procedures. With the careful working environment, construction personnel will input more energy and time in to exploring technology, which aggravate their desire of participating innovation actively and offers strong guarantee for technology innovation. At the same time, rational construction technology management methods can build a reasonable technical data collection and analysis system, gathering abundant project data and scientific resource support for technological innovation. Construction enterprises can quickly discover possible technical problems and development trends, based on big data analysis technology and artificial intelligence technology, giving clear direction to later technological R&D application, improving the success rate of technological innovation. In addition, with the high standardization construction technology management process, the R and D & application cycle of new technologies and processes in building engineering projects will be greatly shortened. Managers are able to integrate instruments of multiple resources so that problems during a transformation stage can be solved quickly and the result of innovation can be turned into actual productivity in the construction enterprise within a short period.

2.4 Strengthens Risk Prevention and Control Capability

Improvement of risk prevention and control capability about building engineering project with accurate and efficient management of construction technology. Construction enterprises can reasonably identify more potential risk points (such as design defects or construction process conflicts) by learning from the meticulous review based on construction drawings and plans, really realizing early detection and prevention of risks. At the same time, strict construction technology management measures can use new technologies to standardize the entire construction process, establish a perfect construction risk emergency system and develop corresponding contingency plans for potential risks. Regular drills are implemented because these methods enable immediate response in case of emergencies and effective handling measures when emergencies occur, minimizing economic losses. In addition, strict construction technology management strategies can implement appropriate information systems to achieve real-time monitoring of construction risks, further enhancing the ability to prevent and control construction risk problems of building engineering projects and ensuring safe construction with high quality.

3. Main Content of Construction Technology Management in Building Engineering

3.1 Construction Organization Design and Planning Management

The core processes of construction technology management in building engineering are construction organization design and planning management. Construction organization design provides overall planning advantage. In the compilation stage, considering the scale of building engineering and construction conditions, reasonably dividing the construction process, determining different procedures and connection methods for each stage of construction, so as to ensure that construction can be carried out in an orderly manner ^[2]. Construction planning management manages the dynamic regulation of resources and construction schedule. Reasonably allocates manpower, materials and mechanical equipment according to construction organization plan, achieves the overall control of engineering quality and project progress, improves the comprehensive benefits of building engineering project.

3.2 Technical Control During the Construction Process

The technical control of construction process in engineering building mainly embodied in strictly control the processes, clarifying the implementation steps and specific methods of each sub-item project according to the construction drawing. Technical disclosure is an essential component of construction technology process control. Technical personnel conduct technical disclosure to the construction team before each construction process, content ranges from quality standards and safety precautions. Improve the technical control in the construction process to ensure that the final technical solution has rationality and feasibility.

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

4.1 Establish a Standardized Technology Management System

The fundamental means to promote the scientific management of construction technology of building engineering is to build a standardized technical management system. Construction enterprises should be based on the formulation of construction technology management system throughout the whole lifecycle stage of engineering project, clarify the requirements for each construction phase technical and quality standards, operational normative requirements from project planning survey, construction quality inspection. The system should be modified according to the iteration of industry technology and the change of laws and regulations, so that it can always keep up with the project construction situation. At the same time, construction enterprises should frequently arrange construction personnel to participate in construction technology training and guidance, conduct theoretical understanding of quality standards and safety norms, actively organize some training activities such as expert lectures and field observations, help construction personnel to improve their practical level. Thus, construction enterprises should implement strict evaluation mechanisms during the training period and rely on the results of on-the-job assessment to determine whether their professional competence is up to standard so this can act as an incentive for employees. As construction enterprises can obtain the advantages of information technology, it is essential to establish an informatized platform for the management of construction technology, achieving digitalization and real-time sharing of materials on the platform, relevant data such as drawings and plans are stored here, which well lays a foundation for future retrieval by site personnel. Also big data analysis technology can be used for monitoring technical data in construction to identify potential risks and send warnings in time. Construction enterprises should enhance the supervision and evaluation of technology management of construction, establish independent teams for supervision and evaluation, regularly evaluate the technical management status in the field of construction, judge whether quality inspection is qualified or whether technical disclosure meets the requirements standards, so that standardized technology management system can be implemented in engineering construction field.

4.2 Promote the Application of Intelligent Technologies

This study indicates that construction technology management in building engineering should actively guide the application of various intelligent technologies. The construction enterprise shall build the digital management platform of the enterprise, and BIM is at the core level of the digital management system; relying on 3D modeling, data integration and dynamic simulation function to achieve construction progress simulation and dynamic resource allocation during the production process. Using BIM+GIS technology provides a powerful ability to manage and control visual information throughout the lifecycle of the project, reducing design changes and construction rework rates ^[3]. On the front side, construction enterprises should make use of IoT perception systems to construct smart construction sites, set intelligent sensors in critical equipment like tower cranes and deep foundations to collect real-time stress, displacement, and settlement data (transmitted to cloud analysis platforms through 5G networks), risk early warning management as well as emergency decision support provided by AI algorithms. In addition, construction enterprises should make full use of AI technology to optimize construction plan and notice risk early warning, utilize computer vision for automatic identification and prediction of safety hazards, as well as promote AI-based quality inspection and evaluation of engineering quality so that the behavior in management can change from passive response to active intervention. Intelligent technology is applied, and has to form a continuous iterative evaluation and optimization mechanism, constantly through the application feedback calibration of technical route, eventually enhanced management to strive for the new form of intelligence, Full speed improvement on engineering construction efficiency and lean level.

4.3 Build a Professional Construction Technology Management Team

However, building engineering construction technology management needs a solid basis with professional, effective, and efficient organizational structure of construction technology management team. Accordingly, construction enterprises should establish a systematic talent training system with project demand as guidance and actively carry out skills training work with universities and vocational colleges on the basis of the new knowledge in emerging fields such as BIM technology application, prefabricated construction and smart construction. The training model integrates theory and practice in order to train managers on standardized construction processes, as well as technical decision-making ability. Construction enterprises should build a flexible mechanism for talent selection, bypass the traditional seniority barrier, adopt two-dimensional assessment based on technical ability and management literacy, identify personnel with technical backbone through tackling key problems in major projects, improve cross-departmental job rotation systems such as chief engineers and technical experts to facilitate better integration between construction quality and safety with promotion of technology collaboration. Thirdly, construction enterprises need to set up performance evaluation system with core indicators such as scientific and technological innovation, quality control, schedule achievement and cost-saving on the basis of score and link assessment results with increase in salary/promotion/awards etc., boosting the initiative and creativity of the whole team. Elegant dual-career development paths that allow your technical personnel to deepen their professional reach or broaden the management space create stability and a sense of belonging across teams. Informatization avails itself for establishing technical problem databases, solution libraries and experience summary mechanisms. Relying on means such as mentoring, conducting project reviews, and cross-departmental collaboration to strengthen the comprehensive ability of technology management team in solving complex engineering problems, and providing strong talent support for efficient, high-quality and safe implementation of engineering projects.

4.4 Deepen Industry-University-Research Collaborative Technological Innovation

In construction technology management, regular communication mechanisms should be in place. It is best that construction enterprises actively establish regular exchange mechanisms with universities and research institutions, jointly carry out technical seminars and project matchmaking

meetings to break the information barrier. You are based on the publication of lists of technical problems encountered in practical projects by enterprises, so that universities and research institutions can further refine research directions, which forms a closed loop of "enterprises ask problems + academia/research solve them." The two sides can jointly build collaborative innovation platforms using key projects as carriers, and jointly establish a physical platform such as an engineering technology research center or a joint laboratory to achieve sharing of equipment, interoperability of data, and exchange of talents ^[4]. On the basis of this, construction enterprises should take the initiative to set up long-term stable strategic cooperative relations with universities and research institutes, jointly build technical R & D institutions or innovative consortiums to carry out key technology tackling key problems and achievement transformation. The enterprise is a technical tricky issue of real projects, the universities and research teams undertaking competitive and efficient docking of innovation chain to industrial chain. The whole process needs to optimize the sharing mechanism of intellectual property and benefit distribution mechanism, clarify the rights, responsibilities and benefits of all parties involved, establish pilot scale test bases and engineering application scenarios, accelerate the transformation and upgrading of scientific and technological achievements into productivity at a faster speed as well as promote comprehensively high-standard optimization refines to intelligent construction technology level with inexhaustible comprehensive power for driving high-quality development of construction industry.

4.5 Implement Whole-Process Technical Risk Management and Control

Construction technology management must create an ongoing process for risk identification throughout the project lifecycle. Through means of BIM technology and big data analysis in the stages of planning, design, construction, operation and maintenance, systematically identify possible risk points such as geological conditions, construction techniques and material performance to create a dynamic dangerous point list that can provide accurate prevention and control basis. Based on this, the construction enterprise should build a hierarchical control mechanism for technical risks, classify technical risks into three classifications according to their probability and impact level, improve the closed-loop management mechanism of odds risk full tracking of identified, records of treatment process and results, establish cases as a reference. In the event of sudden technical problems, construction enterprises should be prepared to establish a "rapid response mechanism", organize relevant professional and technical teams to conduct on-site assessment and adjust process formulation in time to avoid risk-causing chain reaction. In the complete phase, it is important to check the completeness of technical data and the degree between engineering entity and design to justify risk closure. Through the systematic and precise management and control of technical risks, it is possible to promote the synergetic optimization of project quality, safety and progress.

5. Conclusion

In summary, the management level of construction technology in building engineering projects will affect the competitive strength of construction enterprises, which is a key factor. But strengthening construction technology management is a long-term systematic project, which requires construction enterprises to do continuous exploration and practice, and constantly summarize experience lessons and optimize management methods. It is important for construction enterprises to establish the technology management system based on unified standards, actively promote the application of intelligent technologies, further construct professional construction technology management teams, deepen collaborative technological innovation between industry-university-research collaboration, and fully implement whole-process technical risk management and control so as to create more high-quality safe building products and promote urban development of economy.

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