Research on Risk Identification, Assessment, and Control Strategies in Construction Project Management

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Abstract: Modern construction projects are often large-scale with numerous construction phases. To effectively ensure project quality and benefits during project management, it is crucial to conduct thorough risk identification. By assessing and controlling risks, the controllability of the entire construction process can be enhanced, which is key to ensuring the smooth implementation of the project. Therefore, it is necessary to identify specific risks involved in construction projects and develop targeted project management plans to effectively recognize and control various risks in engineering construction. Based on this, this paper starts with an analysis of the characteristics of construction project management in the new era and conducts targeted research on risk identification, assessment, and control strategies in project management.

1. Introduction

From the current development of China's construction industry, it has become one of the most important components of the country's socio-economic structure. The continuous expansion of modern construction project scales has made the processes involved in construction and management more complex, significantly increasing the difficulty of project lifecycle management. During the specific implementation of construction project management, risk control in construction should be prioritized. Targeted risk identification and assessment can be used to determine real-world issues faced during engineering construction, thereby addressing various challenges and ensuring the overall quality of the project. Currently, construction projects often encounter a series of issues, such as complex risk identification processes, poor communication among responsible departments, and low accuracy of risk assessment results, which make risk identification and control in project management more challenging. Therefore, it is necessary to conduct in-depth research on risk identification, assessment, and control strategies in construction project management.

2. Analysis of the Characteristics of Construction Project Management in the New Era

In the current new era, China's socio-economic development is accelerating, and the economic scale of the construction industry is also growing. To provide sustainable development momentum for China's construction enterprises and the industry, it is essential to recognize the newly formed landscape of construction project management and impose stringent requirements and higher standards on various aspects of engineering management, approaching from multiple management dimensions. Currently, the characteristics of construction project management in the new era are mainly reflected in the following aspects:

Firstly, there is increasing investment in promoting green transformation of projects driven by the "dual carbon" strategy. Against the backdrop of increasingly severe ecological and environmental issues, China's construction sector has recognized its significant responsibilities during its operational development and has begun to regard promoting green transformation in construction as a major industry trend. Currently, targeted green construction management plans have been established for the entire process, forming a construction technology system with green and energy-saving attributes. Simultaneously, targeted suppression measures have been

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implemented for noise pollution, dust pollution, and light pollution encountered during on-site construction. It is evident that the gradual improvement of the green and environmentally friendly mindset has made the ecological concept in construction project construction increasingly prominent and significantly reduced carbon emissions throughout the project lifecycle.

Secondly, there is a higher emphasis on lifecycle management of engineering construction. From the current implementation of modern construction project management, the management capabilities throughout the project lifecycle continue to upgrade. However, due to increasing internal competition pressure in the construction industry, many enterprises face severe capital chain pressure during their operational development. It is precisely because of the intensified capital chain pressure that enterprises have begun to actively innovate traditional project management models when conducting engineering management, starting from multiple aspects such as construction progress control, cost control, and risk prevention. At the same time, they emphasize the importance of promoting communication among departments and enhancing team coordination capabilities. Only in this way can construction enterprises maintain a stable position in the current fierce industry competition and achieve win-win cooperation among multiple participants and responsible parties.

3. Risk Identification in Construction Project Management

3.1 Cost Budget Risk

From the current implementation of modern construction project management, cost budget risk management is one of the most important components when it comes to risk management, mainly because project costs directly affect the final construction benefits. Therefore, it is necessary to strictly control cost budgets at multiple stages, including project decision-making, design, and on-site construction, considering various potential cost budget risks. In current construction project management, although the cost budgeting phase is regarded as important, effective control over various risks in this phase has not been achieved, and management loopholes still exist, directly affecting project economic benefits [1]. For example, quantity surveying is an important part of cost budgeting in modern construction projects. However, when conducting formal quantity surveying work, there may be discrepancies between the measured data and the actual project conditions, resulting in poorly targeted fund allocation plans that fail to accurately account for specific project quantities. It is precisely because of the above situation that the likelihood of budget overruns significantly increases during subsequent construction of construction projects.

3.2 Green Construction Risk

Although the concept of green and environmentally friendly construction has been widely applied in current construction projects, overall, due to the real-world impacts of various factors, such as inadequate green construction management plans, national policy requirements, an imperfect technical system, and the need to improve the professional qualities of relevant construction technicians, green construction operations face certain risks. Specifically, China has begun to vigorously implement strategic policies related to "carbon peaking" and "carbon neutrality," effectively innovating the previous construction project concepts and specific management plans. However, for many current construction projects, although pollution prevention and control measures for the surrounding ecological environment during construction have been placed on the agenda when implementing national strategic policies and green construction standards, targeted green construction management methods for construction projects have also been specially introduced [2]. Overall, many construction enterprises still have relatively weak environmental awareness, and energy-saving and environmental protection measures are not effectively implemented. As a result, although the concept of green construction has been introduced in project construction, multiple links and indicators of the project have not met the national green construction standards. It is precisely because of the above situation that the green and ecological development of many construction enterprises remains superficial and does not

facilitate the acquisition of sustainable and stable development momentum for the enterprises [3].

4. Research on Risk Assessment and Control Strategies in Construction Project Management

4.1 Selection of Risk Assessment Methods

Due to the increasing complexity of construction techniques and the expanding scale of modern construction projects, the risk factors faced during construction also exhibit diversified trends. To effectively assess construction risks, targeted risk assessment methods should be selected to facilitate subsequent risk control work. Specifically, current risk assessment methods in construction project management mainly include three categories: qualitative assessment (including the Delphi method and expert scoring method, which can be applied to risk assessment scenarios with insufficient data. These methods mainly rely on the experience of experts and industry insiders for assessment. However, this assessment method has certain defects, such as strong subjectivity in the assessment results, which may lead to discrepancies between the final results and the actual project conditions), quantitative assessment (mainly referring to the fuzzy comprehensive evaluation method. For this assessment method, it involves quantifying various risk factors and probabilities involved in engineering construction by constructing mathematical models. The advantage of this assessment method is that it ensures the objectivity of the assessment results, but it often relies heavily on data quality and requires high-quality preliminary research as a prerequisite), and dynamic assessment (mainly referring to the use of advanced technologies such as artificial intelligence and AI for dynamic risk prediction throughout the engineering construction process. Its advantage is that it can issue warnings or make automatic adjustments through real-time data analysis. At the same time, the assessment operation is simple and can be used in various complex environments. However, its disadvantage is also obvious, namely the high initial cost investment) [4]. Appropriate risk assessment methods should be selected based on the specific conditions of construction projects.

4.2 Risk Control Strategies

4.2.1 Establish a Regular Staff Training Mechanism and a Dynamic Evaluation System

To ensure the comprehensive effectiveness of risk control work in construction project management, construction enterprises need to firmly establish a risk management awareness, achieve effective management throughout the entire construction process, and set up targeted prevention and control mechanisms for various potential risk hazards that may arise during the construction process. To achieve the above work objectives, it is necessary to increase training efforts regarding the risk awareness and risk prevention and control capabilities of relevant personnel. Therefore, enterprises need to establish a regular training mechanism. During the training process, they should specifically enhance the risk prediction and prevention and control capabilities of relevant technicians and management personnel, enabling them to accurately identify potential risks in specific work links at the first instance when performing their duties and then set up targeted response plans [5]. A more rigorous risk prediction and prevention and control system can be formed by regularly conducting lectures, publicity, and education activities within the enterprise, enabling each staff member to take on risk prevention and control functions more proactively when performing their duties and effectively controlling the possibility of various risks, such as funding risks and progress risks, during the construction process [6]. In addition, construction enterprises should also establish a dynamic evaluation system, mainly referring to the irregular evaluation of the professional skills of relevant technicians and management personnel. The evaluation should be based on a combination of theoretical and practical abilities and stage-by-stage work achievements to select backbone personnel with solid foundations and outstanding performance in their positions and provide them with more opportunities for professional title evaluation and promotion. During the evaluation process, attention should be paid to combining digital tools with specific evaluation methods and using intelligent monitoring systems to supervise the specific work status of staff in their duties to determine the risk points in

their daily work [7].

4.2.2 Prioritize Fund Supervision and Establish a Multi-dimensional Supervision Network

Fund supervision is an important direction for risk control in current construction project management. The fund supervision situation directly affects the overall cost consumption of the project, requiring construction enterprises to establish and improve fund supervision systems, with a particular emphasis on preventing the improper use of funds. On the premise of safeguarding the relevant rights and interests of workers, fund allocation should be reasonably arranged to improve the work efficiency throughout the project lifecycle, especially by focusing on the management of the full lifecycle use of materials and equipment. From the initial procurement link to the subsequent warehousing and allocation link and finally to the on-site construction management link, material and equipment management should be regarded as a top priority to avoid situations such as unreasonable material and equipment configuration, excessive procurement or rental, and increased project costs. This can also form a targeted closed-loop management plan. Specifically, a hierarchical accountability system can be established to separately classify various fund risk issues that arise during engineering construction, clarify responsible departments and individuals, and thereby enhance the standardization of fund utilization [8]. A pre-planned investigation procedure should also be set up, namely, to hold specific responsible departments and individuals legally accountable and publicize the rules and handling progress to achieve a high-pressure deterrent effect. In addition, to effectively control fund risks, a multi-dimensional fund supervision network should also be established. For example, special management offices, direct petition platforms, and special audit channels can be set up, and a reward and reporting mechanism can also be established to achieve multi-dimensional supervision of fund risks throughout the construction process and prevent situations such as fund embezzlement, over-claiming, and corruption and bribery among relevant personnel [9].

5. Conclusion

In summary, risk identification is crucial in construction project management. After identifying specific risk factors in engineering management, targeted risk assessment and control plans should be formulated. Specifically, work can be carried out from several aspects, such as establishing a regular staff training mechanism, setting up a dynamic evaluation system, highlighting the importance of fund risk supervision, and establishing a multi-dimensional supervision network, to make the fund utilization in construction project construction more reasonable, which is also key to ensuring project benefits and the subsequent stable development of construction enterprises. In the future, construction enterprises should further innovate their technical plans for risk identification, assessment, and control and actively apply advanced technologies such as artificial intelligence and big data to improve their risk control and prevention capabilities.

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