Management Content and Optimization Strategy Analysis for Power Construction Enterprises

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Abstract: With the rapid development of China's power industry, power construction enterprises are facing an increasingly competitive market environment. This paper systematically analyzes the main aspects of management in power construction enterprises, including project cost management, quality management, safety management, schedule management, and human resource management. In response to the key challenges currently faced in enterprise operations, such as lax cost control, inadequate quality supervision, numerous safety hazards, and low levels of informatization, corresponding optimization strategies are proposed. Research findings indicate that implementing refined cost control, establishing a comprehensive quality supervision system, strengthening safety risk pre-control mechanisms, and promoting informatization and intelligent construction can effectively enhance the management level and market competitiveness of power construction enterprises. This study provides theoretical insights and practical guidance for power construction enterprises to achieve sustainable development.

Keywords: Power Construction Enterprises; Business Management; Cost Control; Quality Management; Safety Risks; Informatization Construction; Optimization Strategies

1. Introduction

In recent years, with the deepening implementation of China's "dual carbon" strategy and the accelerated construction of a new power system, the power construction industry has encountered unprecedented development opportunities while simultaneously facing severe challenges such as intensifying market competition, rising cost pressures, and prominent safety and quality risks. Traditional extensive management models have become increasingly inadequate in meeting the demands of high-quality industry development, particularly in complex projects like ultra-high voltage transmission systems and new energy grid infrastructure, where issues such as low management efficiency and insufficient digitalization are becoming more apparent[1]. Against this backdrop, optimizing the operational management models of power construction enterprises and enhancing refined control capabilities throughout project lifecycles have emerged as focal points for both academia and industry. This study systematically examines key management challenges through case studies of representative domestic power construction enterprises, incorporating quantitative analysis and field research, and proposes targeted optimization strategies to provide theoretical support and practical references for industry transformation and upgrading.

2. Current Management Status Analysis of Power Construction Enterprises

At present, the management mode of electric power construction enterprises is still in the stage of transforming from traditional experience-based management to modern management. Driven by the rapid development of the industry and the changes in market demand, most enterprises have realized the necessity of management innovation. However, there are still many practical constraints in the specific implementation. From the perspective of cost control, enterprises have generally established a budget management system, but their ability to dynamically monitor the whole process of the project is insufficient, especially in dealing with external factors such as fluctuations in material prices and rising labor costs. The measures taken are relatively passive, which often leads to the actual construction cost exceeding the budget. Some enterprises have tried to introduce the ERP system for cost accounting, but due to the reasons such as non - real - time data collection and non - restructuring of business processes, the application effect of the system is often greatly reduced.

In terms of quality and safety management, although the industry has formed a relatively complete set of system norms, there is still a lot of

room for improvement in the implementation level[2]. Quality inspection mainly relies on manual inspection and post - event acceptance, and lacks a mechanism for tracing the quality data of the whole process. The intelligence level of safety management is not high, and the risk warning ability for high - risk scenarios such as high - altitude operations and live - line operations is limited. It is worth noting that in recent years, the promotion of new processes such as prefabricated construction and modular construction has objectively put forward higher requirements for quality and safety management. However, the talent reserves and technical support of enterprises have not yet been fully matched.

As a key means of improving management efficiency, the promotion of information construction shows a clear polarization. Large central state - owned enterprises and industry leading enterprises have gradually built digital platforms covering the whole process of project management, and have realized basic functions such as visual construction progress and traceable quality data. However, a large number of small and medium-sized construction enterprises are still in the primary stage of office automation, and their application of new technologies such as BIM and the Internet of Things is still in the pilot exploration stage. This digital divide not only restricts the overall efficiency improvement of the industry, but also to some extent intensifies the imbalance of market competition. In addition, the phenomenon of data islands between various business systems is common, making it difficult for the management level to obtain accurate decision - making support information in time.

From the perspective of human resources, the electric power construction industry is facing the dilemma of structural shortage of skilled talents. On the one hand, the supply of compound talents with digital management capabilities is insufficient. On the other hand, the aging trend of front - line construction personnel is obvious, and the employment willingness of young labor force continues to decline. This talent gap has led to the practical resistance to the promotion and application of new technologies and equipment, and has also objectively increased the training cost and management difficulty of enterprises. At the same time, there is no effective talent flow and sharing mechanism in the industry, which further amplifies the contradiction between talent supply and demand.

Overall, the management upgrading of electric power construction enterprises is at a critical window period. Although some leading enterprises have begun the substantive exploration of digital transformation, the industry as a whole still faces multiple challenges such as incomplete transformation of ideas, superficial application of technology and insufficient talent support. The growing pains in this transformation period not only reflect the inadaptability between traditional management modes and new development requirements, but also predict that the industry is about to usher in a deep - seated change and restructuring.

3. Diagnosis of Key Issues in Power Construction Enterprises

The power construction industry is facing systemic management bottlenecks that increasingly constrain high-quality development. Regarding project control, a significant disconnect exists between cost accounting and budget execution, with effective dynamic cost monitoring mechanisms yet to be established[3]. This frequently leads to uncontrolled cost overruns during project implementation. Concurrently, outdated progress management methods fail to meet practical needs, while inadequate response mechanisms for unexpected disruptions exacerbate schedule delay risks. Such extensive project management models are proving incompatible with the intensifying market competition.

The operational effectiveness of quality and safety management systems reveals notable deficiencies. Although relevant regulations and standards are relatively comprehensive, execution gaps undermine their implementation. On-site quality inspections over-rely on manual experiential judgments without sufficient digital support, while safety hazard identification suffers from blind spots and inadequate preventive measures. The introduction of new techniques and equipment, while improving efficiency, simultaneously challenges traditional quality and safety protocols—without corresponding upgrades in management approaches.

Digital transformation encounters multifaceted obstacles. A disconnect persists between technology applications and actual business needs, with some enterprises prioritizing system deployment over practical utility, resulting in resource wastage. Incomplete and inaccurate data collection remains widespread, compromising evidence-based decision-making. Poor interoperability between business systems creates information silos that diminish overall management

efficacy. Additionally, frontline employees' limited acceptance and proficiency with new technologies further hinder digitalization outcomes.

Structural human resource contradictions are intensifying. The aging frontline workforce continues to grow, while declining interest among younger generations risks a talent vacuum in conventional construction roles. Simultaneously, the shortage of digitally literate, cross-disciplinary management talent cannot support corporate transformation demands. Training systems misalign with practical requirements, yielding suboptimal skill development, while inadequate incentive mechanisms fail to energize organizational vitality.

These deep-seated issues stem from both external environmental shifts and internal managerial shortcomings. External pressures—including heightened competition and rising costs—intertwine with internal weaknesses like extensive management practices and innovation deficits, collectively forming the primary barriers to enterprise advancement. Accurately diagnosing and systematically addressing these challenges will be pivotal to achieving high-quality development in power construction enterprises.

4. Optimization Strategy System for Electric Power Construction Enterprises

In response to the management bottlenecks currently faced by electric power construction enterprises, it is crucial to establish a systematic and multi - level optimization strategy system. At the project management level, a refined control mechanism for the entire life cycle should be constructed. By introducing a dynamic cost monitoring platform to achieve real - time linkage between budget and execution, and combining BIM technology to establish a three - dimensional progress model to implement intelligent early warning for key nodes. Meanwhile, the implementation of a project standardization management manual is recommended to modularize core elements such as construction techniques and acceptance standards, ensuring the replicability of experience across different projects. It is suggested to pilot the application of an artificial intelligence - based progress prediction system. By establishing a project duration risk assessment model based on historical data, it can provide data - driven support for decision - making.

In the field of quality and safety, it is necessary to build a tripartite safeguard system integrating "system + technology + culture". At the system level, the quality responsibility tracing mechanism should be perfected and a one - vote veto system for quality and safety should be implemented. At the technology level, intelligent monitoring equipment should be deployed, such as an IoT - based real - time monitoring system for steel structure stress, and combined with AI image recognition technology to automatically screen for safety hazards. At the cultural level, a "safety points system" should be promoted to link individual behavior with team performance. For special scenarios such as ultra - high - voltage construction, specialized quality control algorithms can be developed to continuously optimize process parameters through machine learning.

Digital transformation should adopt a "top - down design + step - by - step implementation" strategy. Priority should be given to building an enterprise - level data platform to connect the data flow of core systems such as bidding, procurement, and construction. Developing a mobile collaborative management app can enhance the on - site response speed. It is suggested to select pilot projects to deploy digital twin systems to achieve synchronized mapping between virtual and physical construction. Meanwhile, a digital innovation laboratory should be established to collaborate with universities in cultivating compound talents with both engineering experience and digital skills. For small and medium - sized projects, the promotion of lightweight SaaS management tools can lower the threshold for digital application.

Human resource optimization requires the construction of a full - chain mechanism for "attracting, cultivating, utilizing, and retaining" talents. Implement a "dual - channel" career development system to design differentiated promotion paths for technical backbones and management talents. Innovate university - enterprise cooperation models, such as setting up "order - based classes" to cultivate scarce talents in prefabricated construction. Promote a "project + training" combat - oriented model, using VR technology to simulate high - risk scenarios such as live - line operations for training purposes. The compensation system should establish a diversified incentive plan, set up a special reward fund for technological innovation, and implement a superimposed allowance system for remote projects. To address the aging issue, a "silver - haired expert database" can be established to achieve the inheritance of experience.

These strategies need to be supported by corresponding safeguard mechanisms: Establish a transformation committee led by senior executives

to formulate a three - year rolling implementation roadmap; allocate 3 - 5% of annual revenue as a special innovation fund; and establish a two - way feedback mechanism for the implementation of strategies. Through quarterly review meetings, dynamically adjust the plans. It is particularly important to maintain the synchronization between management improvement and technological upgrading to avoid the mismatch of "advanced hardware and lagging software". Ultimately, through systematic improvement, a core competitiveness that meets the construction needs of the new - type power system can be built.

5. Conclusion

This research provides an in-depth analysis of current operational management practices in power construction enterprises, identifying common industry challenges in cost control, quality supervision, safety management, and digital transformation. It proposes comprehensive optimization solutions from three dimensions: technological application, institutional innovation, and resource integration. Practical evidence demonstrates that adopting digital tools (such as BIM and IoT) for refined management, coupled with scientific evaluation mechanisms and shared resource platforms, can significantly enhance operational efficiency and risk prevention capabilities. Future research should further explore innovative approaches for green construction management under carbon neutrality goals and investigate the application potential of artificial intelligence in full lifecycle management of power projects, thereby continuously advancing the industry toward intelligent and low-carbon development.

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