

Cost Control Strategies and Risk Management for Green Building Projects under Digital Transformation

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Abstract: This paper discusses the importance, problems and optimisation countermeasures of green building projects in the context of digital transformation. Firstly, it analyses the impact of digital transformation on the construction industry and explains the value of the green building concept in terms of environmental friendliness, economic benefits and social recognition and policy support. Secondly, it points out the problems faced during the integration of digital transformation and green building. Finally, it proposes optimisation countermeasures such as strengthening technology integration and standardisation, implementing refined cost control strategies, and constructing a comprehensive risk management system, aiming to provide theoretical references and practical guidance for the digital transformation of green building projects.

Keywords: Digital Transformation; Green Building; Technological Innovation; Cost Control

Introductory

With the severe challenges of global climate change and the deepening of the concept of sustainable development, green building, as an important development direction of the construction industry, is increasingly attracting widespread attention from all walks of life. Meanwhile digital transformation, as an important driving force of the new round of technological revolution and industrial change, is profoundly changing the face of the construction industry. Combining digital transformation with green building can not only enhance the intelligent level of construction projects, but also effectively promote resource conservation and environmental protection, and promote the development of the construction industry in the direction of low carbon and environmental protection. It is of great practical significance to study the importance, problems and optimisation countermeasures of green building projects under digital transformation.

1. Importance of green building projects under digital transformation

1.1 Impact of digital transformation on the construction industry

The impact of digital transformation on green building projects is far-reaching, and the core lies in technological innovation. Through the integration of technologies such as big data, cloud computing and the Internet of Things (IoT), building projects can achieve information integration and intelligent decision-making throughout the life cycle, optimise the design, construction and operation and maintenance processes, shorten the project cycle and improve management efficiency^[1]. In addition, digital transformation promotes the development of green buildings, and accurate resource allocation and energy management significantly reduces energy consumption and emissions, accelerating the construction industry's progress towards low-carbon, environmental protection and sustainability.

1.2 Embodiment of the value of the green building concept

The value of the green building concept is reflected in several dimensions, especially environmental friendliness. Through energy-saving technologies, optimal design and environmentally friendly materials, green buildings effectively save energy, reduce emissions, protect the ecology and reduce pressure on the environment. In addition, measures such as green roofs and permeable paving improve the urban microclimate and enhance the quality of life for residents. Economically, green buildings reduce energy consumption and operating costs, bringing long-term returns and proving their investment value. At the same time, with the public's heightened awareness of environmental protection and the government's supportive policies, green buildings have become an important expression of corporate social responsibility and brand image.

1.3 Synergies between digital transformation and green buildings

Digital transformation synergises with green building to promote sustainable development in the construction industry.^[2] Digital transformation provides efficient and accurate design and implementation tools, combining big data, cloud computing and IoT technologies to achieve programme optimisation, intelligent monitoring and data analysis, and improve project performance and efficiency. Digital tools help cost control, predict costs, optimise resources, reduce waste and improve economic efficiency. At the same time, the digital platform enhances risk management, monitors data in real time, accurately identifies risks, and ensures smooth project implementation and delivery.

2. Problems with green building projects under digital transformation

2.1 Technology and data integration challenges

In digital transformation, green building projects face technical and data integration challenges: firstly, standards are not uniform, leading to impediments to data circulation and sharing, and differences in data formats and interfaces between systems affect information transfer and utilisation. Second, data security and privacy protection issues are prominent, and large amounts of data collection and processing increase security risks, especially in cloud computing and IoT applications. Thirdly, technology maturity and cost issues limit the promotion of advanced technologies in projects, and despite their great potential, high costs and the immaturity of some of the technologies impede widespread application.

2.2 Cost control challenges

In the context of digital transformation, green building projects face multiple challenges in terms of cost control. Firstly, large initial investment is an obvious challenge, with high-cost inputs such as green building materials and intelligent equipment significantly increasing the initial project budget and putting enormous pressure on cost control. While these inputs help to improve the environmental performance and intelligence of the building, they also require the project team to make more detailed considerations on budget allocation. Secondly, the complexity of benefit assessment further aggravates the difficulty of cost control. It is often difficult to directly quantify the long-term benefits of green buildings, such as energy saving and emission reduction, and improved living comfort, resulting in a lack of clear objectives and bases for the formulation of cost control strategies.

2.3 Inadequate risk management

Driven by digital transformation, green building projects have exposed many deficiencies in risk management. First, the incompleteness of risk identification is particularly prominent. With the deepening of digital transformation, new types of risks such as cybersecurity risks continue to emerge, but these risks are not fully integrated into the existing risk management system, resulting in the project team's blind spot in risk identification. Second, the lagging nature of the response mechanism also restricts the effectiveness of risk management. In the face of the rapidly changing market environment and technological challenges, the existing risk response mechanism often seems inadequate, and it is difficult to respond to emerging risks in a timely and effective manner^[3]. Obstacles to cross-departmental collaboration also exacerbate the difficulty of risk management, and poor communication and coordination in risk management within the project team and with external stakeholders leads to serious information silos, making it difficult to form a synergy to jointly address risk challenges.

3. Optimisation of green building projects under digital transformation

3.1 Strengthening technology integration and standardisation

Aiming at the challenges of green building projects under digital transformation in terms of technology integration and standardisation construction, this paper proposes the following optimisation countermeasures. First, the development of technical standards should be actively promoted, calling for broad participation within and outside the industry to jointly negotiate and develop unified data standards and interface specifications. This can not only promote the interconnection of information between different systems, improve the efficiency and accuracy of data processing, but also lay a solid foundation for the long-term development of green building projects. Secondly, strengthening data security protection is an indispensable link. In the process of digital transformation, data security is always an issue that the project team

must pay great attention to. Advanced encryption technology should be used and a strict data access control mechanism should be established to ensure that data security and privacy are fully guaranteed throughout the project life cycle. Finally, the promotion of technological innovation and application is the key to promoting the sustainable development of green building projects. Project teams should increase R&D investment, encourage technological innovation, and actively promote the application and popularisation of mature technologies. By lowering the cost threshold of technology use and improving the intelligent level of the project, the economic and social benefits of green building projects can be achieved.

3.2 Refined cost control strategies

In the context of digital transformation, green building projects need to implement refined cost control strategies. Firstly, establish a digital-based cost assessment model for the whole life cycle, comprehensively consider the cost factors of each stage, and achieve accurate prediction and control. Second, scientifically optimise the selection of green building materials and intelligent equipment, taking into account performance, price, environmental protection and other factors. Finally, the cost control programme is dynamically adjusted, closely monitoring the project progress and changes in the external environment, flexibly responding to risks and challenges, and ensuring that the project's economic benefits are maximized.

3.3 Establishment of a comprehensive risk management system

In order to effectively deal with the lack of risk management faced by green building projects under digital transformation, it is crucial to build a comprehensive risk management system. First, improving the risk identification and assessment mechanism. Using digital tools and technologies, potential risks are comprehensively and systematically identified, and scientific models are established to conduct quantitative analyses and provide support for response strategies. Second, formulate emergency response plans. With regard to identified risks, clear response measures, division of responsibilities and resource deployment are required to ensure a prompt and effective response. Third, strengthen cross-sectoral collaboration and communication. Establish an efficient information-sharing platform to achieve real-time transmission and sharing, promote synergy among all parties, and jointly respond to risks to ensure the smooth implementation and successful delivery of the project.

Conclude

This paper reveals the far-reaching impact of digital transformation on the construction industry and the development of green building through an in-depth analysis of the importance of green building projects under digital transformation, existing problems and optimisation countermeasures. In the future, with the deepening of digital transformation and the continuous innovation of green building technology, green building will play a more important role in promoting the coordinated development of economy, society and environment.

References

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