# Progress and Review of Information Technology in the Field of Fine Engineering Management

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**Abstract.** With the continuous development of technology and the increasing progress of society, construction project management is confronted with more and more challenges and opportunities. In order to improve the management efficiency and quality of engineering projects, researchers continue to explore and apply various information technology to realize the refinement, intelligence and whole process of engineering management. This paper summarizes the research status of information technology in the field of fine engineering management at home and abroad, analyzes the advantages and challenges of information technology, looks forward to the development trend and prospect of information technology, and puts forward some research directions and problems worthy of attention. This paper aims to provide reference and inspiration for the theory and practice of construction management.

**Keywords:** Information technology, Fine engineering management, Construction project management; Summarize

## 1 Introduction

Construction project management refers to the effective organization, coordination, control and supervision of each stage and link of the construction project to ensure the smooth completion of the project and achieve the predetermined objectives and requirements. Construction project management

involves many links, such as engineering design, construction, operation and maintenance, safety, quality, cost, schedule, contract, risk, etc. It is a complex system project. [1-4] With the increasing scale and technology of construction projects, the difficulty and complexity of construction project management are also increasing. Traditional management methods and means have been difficult to adapt to the needs of modern construction projects, and new technologies and concepts need to be introduced to improve the level and effect of construction project management. [5-8]

Information technology refers to the use of computer, network, communication, sensing and other technologies, information acquisition, processing, transmission, storage, display and application of effective management and control, in order to achieve information digitization, networking, intelligence and integration. Information technology is


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an important feature and development direction of today's society, which has had a profound impact and change on various fields and industries. [9] In the field of construction engineering management, the application of information technology has become increasingly extensive and in-depth, providing powerful technical support and tools for construction engineering management, making the level of information management of construction engineering constantly improve, and laying the foundation for the refinement, intelligence and whole process of construction engineering management. [10-16]

## 2 Advantages and challenges of information technology application

The application of information technology in the field of fine engineering management has brought many advantages, but also faces some challenges. The application of information technology in precision engineering management brings numerous advantages while also posing certain challenges. The application of information technology in precision engineering management can be summarized in the following three aspects: First, Enhancing Engineering Management Efficiency and Quality: Information technology enables rapid acquisition, processing, and transmission of engineering information, reducing information lag and distortion while improving accuracy and completeness. Through information technology, engineering managers can monitor real-time project status and changes, enabling timely decision-making and adjustments. This improves responsiveness and flexibility in project management. Additionally, information technology enhances visualization and collaboration among project managers, improving communication and coordination, thereby elevating the quality and effectiveness of engineering management. Second, Driving Innovation and Optimization in Engineering Management: Information technology provides extensive data and analytical tools to support innovation and optimization in engineering management. By leveraging models and algorithms, engineering managers can simulate and analyze various aspects of projects, identify potential issues and improvement opportunities, and propose optimized solutions. This drives innovation and optimization in project management. Furthermore, information technology offers reference frameworks and benchmarks, promoting learning and development in engineering management, thereby enhancing overall capabilities and standards. Third, Reducing Engineering Management Costs and Risks: Information technology enables effective control and reduction of project costs and risks, conserving resources and funds while ensuring project safety and stability. Through predictive and evaluative tools, engineering managers can establish reasonable budgets and control measures, preventing cost overruns and waste. This ensures cost rationality and optimization. Additionally, information technology facilitates risk identification and mitigation, enabling the development of effective preventive and emergency response plans, thereby minimizing risks and enhancing project safety and reliability.

## 3 The development trends and prospects of information technology applications

The application of information technology in precision engineering management has demonstrated significant potential and value, and it has also guided the development direction and future prospects of construction project management. There are three main development trends: First, Integration Trend: The integration of information technology involves effectively consolidating and coordinating different information technologies to achieve interconnectivity and collaborative functions, thereby enhancing the comprehensiveness and integration of information technology. For example, integrating BIM technology with GIS, ERP, and intelligent technologies can enable comprehensive and precise management and control of spatial, temporal, resource, cost, quality, and risk aspects of construction projects. Second, Intelligent Trend: intelligence The of information technology involves leveraging artificial intelligence, machine learning, and big data analytics to enhance the intelligence and automation of information technology, enabling self-learning and adaptive adjustments. This improves the flexibility and innovation of information technology. Intelligent information technology can achieve intelligent analysis and optimization of construction projects, thereby enhancing innovation and optimization in project management. For instance, using artificial intelligence and machine learning can enable in-depth mining and intelligent analysis of project data to identify potential issues and improvement opportunities, and propose optimized solutions and measures. Third, the widespread adoption of cloud-based applications. The cloud-based application of information technology involves using cloud computing, cloud storage, and cloud services to enhance the cloud-based and virtualized aspects of information technology, enabling remote access and sharing, and improving convenience and security. For example, using cloud computing and cloud can storage store project data and models in the cloud, enabling real-time updates and synchronization of project data and models, and facilitating remote access and sharing for project managers.

The application prospects of information technology in precision engineering management are extensive, mainly reflected in the following two aspects. On the one hand, it is the expansion of the application scope. The application scope of information technology will continue to expand to more types and fields of construction projects, covering all stages and aspects of construction projects, and meeting the various needs and requirements of construction projects. For example, information technology will be applied to more types of construction projects, such as prefabricated buildings, green buildings, smart buildings, etc., to achieve precision management of these new types of construction projects. On the other hand, it is the deepening of the application depth. The application depth of information technology will continue to deepen into more details and elements of construction projects, achieving more detailed and accurate information management and control of construction projects, and improving the quality and efficiency of construction projects. Information technology will also be applied to more elements of construction projects, such as quality, cost, progress, risk, etc., to achieve precise control and optimization of these elements of construction projects, and improve the precision level of project management.

# 4 Future Key Research Directions and Issues in the Application of Information Technology.

The application of information technology in precision engineering management has achieved certain outcomes and progress, yet there remain numerous research directions and issues warranting attention that require further exploration and resolution. The following are some primary research directions and issues:

## 4.1 The theory and methodology of precision management.

Precision management, a philosophy and model in construction project management that emphasizes meticulous attention to detail and precision, reflects a high - level, high - standard approach to construction project management. However, the theory and methodology of precision management remain underdeveloped and call for further research and refinement. Key issues to address include: how to define and quantify the concept and scope of precision management; how to set up and evaluate relevant metrics and standards; how to build and optimize processes and mechanisms; and how to measure and enhance the effectiveness and benefits of precision management.

## 4.2 The innovation and application of information technology.

Information technology serves as a crucial support and tool for precision engineering management, offering robust technical support and services. Nevertheless, there is still significant room and potential for the innovation and application of information technology, which requires ongoing exploration and development. For instance, key issues that need to be addressed include: How to develop and apply more advanced information technologies, such as artificial intelligence, the Internet of Things, and blockchain, to enhance the intelligence and security of information technology. How to effectively integrate and coordinate different information technologies to improve their comprehensiveness and integration. How to customize and optimize the application schemes and strategies of information technology according to different types and requirements of construction *projects*.

## 4.3 Project management standardization

Project management standardization involves establishing a unified set of project management norms and processes to ensure quality and efficiency, and to achieve the standardization and optimization of project management. It is a critical component and requirement of construction project management, as well as an essential guarantee and prerequisite for the effective application of information technology. However, the development and implementation of project management standardization face several challenges that require further research and refinement. Key issues to address include: How to formulate and update project management standards and norms to adapt to the development and changes in information technology. How to disseminate and implement

these standards and norms to ensure the compatibility and interoperability of information technology. How to monitor and evaluate the implementation and effectiveness of project management standards and norms. These are all issues that require further research and improvement.

## 5 Conclusion

This paper aims to offer a comprehensive and systematic review and analysis of the application and development of information technology in the field of precision engineering management, providing references and insights for related research and practices. It also recognizes that there are still many unknowns and deficiencies in this area, requiring further exploration and improvement. The paper anticipates more innovation and application of information technology in precision engineering management to make greater contributions to the development and progress of construction project management.

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