

Original Research Article

Analysis of engineering management and application of computer electronic information technology*Jin quan Zhang**Hilong Group (shanghai) Information Technology Co., Ltd., Shanghai, 201107, China*

Abstract: With the rapid development of information technology, computer electronic information technology has permeated all aspects of engineering management, significantly improving its efficiency and quality. This paper begins with the research background, analyzing the current application status and development trends of computer electronic information technology in engineering management. Through a combination of literature review and case studies, it explores in detail the practical applications of key technologies such as big data, cloud computing, the Internet of Things (IoT), and artificial intelligence (AI) in engineering management, focusing on their effectiveness and advantages in project planning, resource allocation, schedule management, quality control, and risk early warning. Research indicates that computer electronic information technology can effectively reduce engineering management costs, enhance project execution efficiency, optimize resource allocation, and improve risk monitoring capabilities. The paper further discusses challenges in its application, including difficulties in technology integration, data security risks, and talent shortages, proposing countermeasures such as increasing investment in R&D, strengthening information security systems, and implementing professional training programs. The findings suggest that fully leveraging computer electronic information technology not only enhances the scientific precision of engineering management but also injects new momentum into cross-disciplinary collaboration and smart engineering construction, providing significant reference value and practical guidance for the innovative development of modern engineering management systems.

Keywords: Computer electronic information technology; Engineering management; Big data; Artificial intelligence; Risk monitoring

Introduction

We are in an era driven by information technology, where computer electronic information technology has not only transformed our daily lives but also profoundly influenced the field of engineering management. It encompasses areas such as big data, cloud computing, IoT, and AI, providing efficient tools and methods for engineering management. However, the integration of these technologies also introduces new challenges, such as ensuring data security while effectively applying them to improve project execution efficiency, optimize resource allocation, and reduce costs. Additionally, addressing talent shortages and achieving seamless technology integration in the face of relentless technological advancements pose significant challenges for engineering management. Exploring the application of computer electronic information technology in engineering management, analyzing its challenges and solutions, has become a critical topic in the field. Through this study, we aim to offer valuable insights and inspiration for engineering management practitioners.

1. The transformation of engineering management by information technology**1.1. The role and significance of information technology in engineering management**

Information technology serves as a core driver in the transformation of modern engineering management.

The integration of computer electronic information technology has shifted traditional linear management models to dynamic, intelligent systems, achieving informatization, automation, and collaborative management. During the project planning phase, IT equips managers with the ability to analyze market demands, resource allocation, and budgets accurately, enhancing decision-making precision. Real-time data processing and monitoring systems optimize resource allocation and execution efficiency during project implementation. Intelligent risk early warning and control mechanisms enable managers to identify potential issues and devise solutions, ensuring project stability and minimizing losses. Furthermore, IT promotes transparency and collaboration in engineering management by facilitating information sharing and communication across departments and disciplines, fostering a more cohesive management framework.

1.2. The evolution of computer electronic information technology in engineering management

The application of computer electronic information technology in engineering management has evolved from basic data processing to modern intelligent systems. Initially, computers were used for simple tasks like document management and statistical analysis. With advancements, database systems significantly improved information retrieval and analysis capabilities. In the 21st century, networking technologies enabled the widespread adoption of management information systems, enhancing project communication and collaboration. The emergence of big data, cloud computing, IoT, and AI has further propelled engineering management toward intelligence, supporting the entire project lifecycle and improving accuracy and efficiency.

1.3. Technology-driven transformation of engineering management models

Rapid technological progress has reshaped engineering management models. Traditional approaches, reliant on manual experience and static data, suffered from inefficiency and inflexibility. With computer electronic information technology, engineering management has transitioned to dynamic, intelligent systems. Real-time data analysis and smart tools enable automated and precise resource management, enhancing monitoring accuracy and enabling remote collaboration and communication. These innovations have redefined organizational structures and operational mechanisms, paving the way for modern engineering management.

2. The empowerment of core technologies in engineering management

2.1. The application of big data in engineering planning and decision-making

Big data technology has become a cornerstone of modern engineering management. By analyzing vast datasets, managers can predict project demands and resource needs, enabling data-driven decision-making. Big data integrates complex project parameters and external factors into quantifiable metrics, improving planning accuracy. Historical data analysis identifies key performance indicators, refines execution strategies, and anticipates risks. Predictive analytics further enhance real-time responsiveness, ensuring adaptability in project management.

2.2. Cloud computing and resource allocation optimization

Cloud computing optimizes resource allocation by providing scalable computing power and storage. It enables real-time monitoring and flexible adjustments to meet fluctuating project demands, reducing costs and improving efficiency. Cloud platforms also foster collaborative environments, ensuring seamless information sharing and communication. Their predictive capabilities further enhance planning and risk management, solidifying cloud computing's role as a cornerstone of modern engineering management.

2.3. Innovations in quality control and risk early warning with AI and IoT

The integration of AI and IoT has revolutionized quality control and risk management in engineering. Sensor networks monitor project conditions in real time, while AI algorithms detect anomalies and predict risks, improving safety and reliability. These technologies streamline management processes, advancing the development of smart engineering.

3. Application outcomes and technological challenges

3.1. The impact of computer electronic information technology on project efficiency and quality

Computer electronic information technology has significantly enhanced project management efficiency and quality. Big data enables precise planning and decision-making, while cloud computing optimizes resource allocation. IoT facilitates real-time progress monitoring, and AI improves quality control through automated inspections. Together, these technologies streamline workflows, boost productivity, and elevate project outcomes.

3.2. Challenges in technology integration and data security

Compatibility issues between diverse technologies and platforms complicate integration. Data security is another critical concern, as the increasing volume of sensitive information raises risks of breaches and cyberattacks. Addressing these challenges requires robust strategies to ensure system stability and security.

3.3. The urgency of talent development

The growing reliance on advanced technologies demands professionals with expertise in both traditional project management and emerging IT fields. Bridging the talent gap necessitates enhanced training programs and collaboration between academia and industry to cultivate interdisciplinary skills.

4. Future prospects and recommendations

4.1. Strategic and policy recommendations for technology adoption

To promote the adoption of computer electronic information technology, strategic investments in R&D and innovation are essential. Governments and organizations should establish funding mechanisms and collaborative platforms to accelerate technology development. Policies must prioritize data security and privacy, while educational reforms should focus on cultivating a skilled workforce.

4.2. The Future of interdisciplinary collaboration and smart engineering systems

Future engineering management will thrive on interdisciplinary collaboration and smart systems. Open platforms and standardized data-sharing protocols will facilitate seamless communication across fields. Integrating ecological, social, and economic considerations into projects will ensure sustainable development. Cultivating versatile talent and fostering theory-practice integration will be key to realizing this vision.

5. Conclusion

This study comprehensively examines the application of computer electronic information technology in engineering management. By analyzing key technologies like big data, cloud computing, IoT, and AI, it highlights their benefits in planning, resource allocation, and risk management. Challenges such as integration complexity,

data security, and talent shortages are addressed with actionable solutions. However, limitations remain, including gaps in privacy protection and data ownership research. Future studies should explore these areas to unlock the full potential of technology in engineering management. As advancements continue, efficiency, quality, and innovation in the field will reach new heights.

References

- [1] Guo Sheng. Computer Electronic Information Technology in Engineering Management and Application. China Technology Investment, 2022(24):116-118.
- [2] Liu Dongshan. Analysis of Computer Electronic Information Technology in Engineering Management. City Pictorial, 2020(08):0510-0510.
- [3] Wan Xiaoming. Computer Electronic Information Technology and Engineering Management Analysis. Market Weekly·Theoretical Edition, 2020(42):0126-0126.
- [4] Wang Jingang. Research on Computer Electronic Information Technology and Engineering Management. Electronic Paradise, 2021(09):0021-0021.
- [5] Liu Junhua. Discussion on Computer Electronic Information Technology and Engineering Management. Avant-Garde, 2022(28):0136-0138.