Guest editorial

Innovation in megaprojects

Compared with traditional engineering projects, megaprojects have the following characteristics: (1) megaprojects involve a large number of industries and they are difficult to coordinate; (2) megaprojects integrate various engineering technologies, and their requirements are dynamic and uncertain and (3) the management of megaprojects is a complex system engineering, which shows specificity in decision-making and governance, organizational behavior analysis and design, project site management and social responsibility of stakeholders. Therefore, the traditional research methods have been unable to meet the practical needs of megaprojects. In order to steadily promote the implementation of megaprojects, ensure construction quality and consider social, economic and ecological impact, it is necessary to innovate technologies, management and methods of megaprojects.

The goal of this special issue is to explore research progress in megaprojects innovation in recent years, mainly including technology innovation, management innovation and method innovation, so as to effectively apply for all types of innovation activities in the actual engineering, and improve its quality, efficiency and impact of megaprojects.

In this special issue, we have nine papers, involving innovation of megaprojects in different stages (design, construction and operation).

Alex Gorod *et al.* improved the traditional "hierarchical" and "network-centric management" methods from the perspective of holonic, consider the uncertainty, and the consistency of standardization practice and industry standards, and then propose a systematic "holonic" method to manage large-scale projects in the construction industry. This method effectively improves the management efficiency and project success rate of complex construction projects.

Chen *et al.* conducted an in-depth study on how the ecosystem leaders establish and operate the innovation ecosystem of large-scale projects by using the inductive theory method, and propose a complete theoretical framework for the construction and operation of the innovation ecosystem, based on the structured interviews, informal dialogs and archives of the Hong Kong–Zhuhai–Macau Bridge. This is of great significance to show how ecosystem leaders participate in innovation activities at different stages of MIE management.

Liu *et al.* applied system dynamics to study the influencing factors, influencing process and driving mechanism of knowledge transfer among innovation agents in megaprojects. Through the construction of megaprojects knowledge transfer conceptual model, qualitative model, quantitative model and system simulation, the research purpose is achieved. The research results can produce practical value for the owners of megaprojects in cultivation, organization, coordination and management innovation.

Sang *et al.* studied the influence and mechanism of big data on project quality performance by constructing the two-level hierarchical linear model. Taking Chinese construction enterprises as samples, the research results show that the application of big data can effectively promote the development of engineering technology capability, and then significantly affect the performance of engineering projects. This is an important evidence for the application of big data technology in future projects.

Sam Fernando *et al.* collected the actual data of 131 construction projects in Australia, deeply study the complex dynamic change process of innovation promoters in construction projects, and propose a research framework to identify customers to promote innovation. Through comprehensive literature research, this study clarifies the promotion factors of

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customer-led innovation in construction projects; meanwhile, the results help construction practitioners to achieve higher project results through innovation.

Zeng *et al.* studied the engineering innovation from the perspective of architectural design, propose a conceptual model integrating the alternative structure and envelope structure of buildings in the design and development stage, and reflect the energy, emission and cost of buildings in the model. The proposed conceptual model can effectively help designers reduce the impact of buildings on the environment in the design stage, so as to improve the social responsibility of construction units; meanwhile, the model can also be used to support sustainable design.

Zhang *et al.* analyzed the internal relationship among the five factors through the construction of EFQM model, and takes 683 Chinese construction enterprises as samples to carry out empirical research by building structural equation model. This study improves the traditional EFQM model, develops a market-oriented EFQM excellence model suitable for developing countries and deeply analyzes the internal relationship between the five contributing factors in the presence of cultural differences.

Jiang *et al.* studied how to realize safety production in construction site from the perspective of building safety. It proposes a security management system based on cyber-physical system, including scene reconstruction design, data awareness, data communication and data processing modules. The safety management system can not only improve the quality and efficiency of construction but also be applied to the future practice of intelligent construction industry, which has important theoretical and application value.

Liu *et al.* investigated the exploitative learning process in the longest tunnel project on land in the Netherlands realized in a densely populated area. The empirical findings indicate that exploitative learning is promoted positively between the owner and the contractor and internally within the contractor. The most significant change that the exploitative learning process has led to is the change in mindset toward the collaboration.

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