

Chapter 7

Intelligent Engineering Construction Management: On-Site Construction Management

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ABSTRACT

Architecture is an important part of the city, and construction is an indispensable procedure of urban development. From the perspective of “smart construction sites,” this chapter describes the basic system architecture of intelligent information management system for engineering construction and introduces how to use information technology such as internet of things and artificial intelligence to improve the management capacity of engineering construction from the perspective of personnel management, quality management, safety management, equipment management, and environmental management. This chapter also analyzes the advantages and problems of intelligent construction sites in project management and gives specific measures and suggestions to realize smart construction sites.

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INTRODUCTION

Engineering construction is an essential procedure of urban development. Engineering construction is closely related to the society, traffic and environment. Therefore, project construction management has been an important part of smart city management. Intelligent engineering management combines information technology with engineering management to create a new people-oriented management mode by sensing technology, ubiquitous interconnection and artificial intelligence technology, so as to ensure engineering quality and safety and reduce the impact on urban and society and society. According to the site geometric characteristics, the construction site is divided into two shape: blocky shape and linear shape. Most of the construction projects are block-shaped, which are called on-site construction, such as stadiums, shopping malls, and residential areas, while transportation projects are mainly linear, which are called long-distance construction, such as highways, tunnels, and bridges. The surrounding environment of on-site construction is relatively stable. For long-distance construction, the surrounding environment continues to change as the project progresses. Therefore, the management characteristics of these two types of projects are different. This chapter will focus on on-site construction management in the smart city.

On-site construction management means the project construction area is concentrated in a certain location, so construction management is mainly carried out around the construction site. With the development of technology and social economy, the scale and complexity of engineering construction are getting larger and larger, leading to the issues of engineering quality. This results in the fact that safety supervision is becoming more and more prominent. Therefore, as a concept and application of construction management, “smart construction site” has emerged.

“Smart construction site” focuses on the construction site, combines the construction process with BIM Technology, Internet of things, cloud computing, big data, mobile, intelligent equipment to improve the construction management process and promote the management level through the rearrangement and adjustment of key elements such as personnel, machines, materials and funds. The management of “smart construction site” owns the characters of digitalization, refinement and intelligence, which makes the construction more safe, efficient and high qualified.

LITERATURE REVIEW

The research of on-site construction management is mainly divided into two aspects, one is the design and development of management platform architecture, the other is the realization of specific construction management functions.

In term of platform framework research, Feniosky et al. (2002) presents a collaborative management platform, including a knowledge repository, analysis resources, and multiple device access. that enables project participants share project. Chen et al. (2011) introduces a framework for the implementation of mobile computing on construction sites, and design a mobile computing systems to explored the interactions among mobile computing, construction personnel, construction information, and construction sites. Kim et al. (2013) proposes a on-site construction management platform using mobile computing technology, which focused on site monitoring, task management, and real-time information. Zeng et al. (2015) introduces a conceptual framework of real-time BIM framework for the on-site construction management, which are interacted by augmented reality (AR) and mobile computing technology. Zhang

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