Chapter 4
A Review of Critical Factors of Successfully Implementing IBS in China Based on Scopus Database

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ABSTRACT

This abstract presents a comprehensive literature review on the critical factors driving China's successful adoption of industrialized building systems (IBS). Aiming at improving project efficiency and quality, this paper drawing insights from global experiences by utilizing the sysmatic literature review (SLR) method based on 78 IBS-related papers from Scopus database. The study emphasizes the significance of cognitive incentives, regulations, education, technology, construction management, the performance of IBS, culture, and tradition in the IBS implementation process. Ultimately, this chapter provides guidance for effective IBS implementation, distilled from regulatory, workforce, technological, collaborative, and cultural dimensions.

INTRODUCTION

The definition of IBS (industrial building system) is slightly different in different countries, but all countries believe that IBS mainly include the following several aspects: the use of industrialized standardized design, industrialized mass production, assembly and on-site construction (Wang Run, 2023). It is the overall assembly of the main body of the project, computer-aided assembly, the main components of the building are produced in the factory, and reliable connections are used. This method can achieve high efficiency, environmental friendliness and energy saving throughout the building's life cycle(Wang Run, 2023).In recent years, IBS has been widely promoted and applied in China and other

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countries (Qiang Du et al., 2022), but it also faces some challenges and obstacles. Through the analysis of 78 papers on IBS by SLR, this article summarizes factors from cognitive incentives, policies, education, technology, construction management, performance, and cultural perspectives that influence the successful implementation of IBS. In addition, this article also discusses implementation strategies for each factor. It highlights the current research deficiencies and future directions at the end of the paper.

Current Status of China Construction Industry

With construction activity and growth in China, the housing market has also become active. The Chinese government focuses on developing infrastructure projects while promoting sustainable buildings and industrialized building systems (IBS) (Ying Rui Wang et al., 2020). In China, the construction industry provides many employment opportunities for society, leading to fierce competition within the industry.

According to data released by the National Bureau of Statistics of China, the GDP in 2022 reached 120,472.40 billion yuan, and the total output value of the domestic construction industry reached 30,793.538 billion yuan in 2022, of which the total output value of the construction industry accounted for about 25% of the GDP (National Bureau Statistics of China, 2022). However, with the rapid development of my country's construction industry, many disadvantages should be considered. For example, the waste and shortage of energy resources are prominent, environmental pollution and ecological damage are serious, and artificial rising costs drive construction costs to continue to rise(Jiahao Li, 2023). Construction Industry Institute research (CII) shows that 57% of non-value-added of work (inefficient work and waste) is in the construction industry, while at the same stage of development this proportion of manufacturing is 26%(Jiahao Li, 2023).

Moreover, China has been devoted to promoting infrastructures, like bridges, highways, light rail transit systems, etc. The implementation of the projects propels the construction industry to grow and also creates employment opportunities (Wang et al., 2020).

As a critical component of national development, the Chinese construction industry plays an essential role in the rapid and stable development of the economy.

Development History of IBS in China

The development stage of China's prefabricated buildings can be roughly divided into four stages: the initial stage, the development stage, the trough stage, and the further development stage(Jin Wu, 2022). In the early 1950s, the concept of prefabricated construction was first introduced to China. The technology at that time was mainly learned from the Soviet Union and Eastern Europe, and the housing construction model of standardization, and prefabricated construction was mainly promoted. From the 1960s to the early 1980s, prefabricated buildings experienced a period of stable development. At this time, the market demand for prefabricated buildings is single and the earthquake resistance requirements are not high. A large number of houses are suitable for construction in standardized methods(Jin Wu, 2022). Since the late 1980s, the construction market has had increasingly higher requirements for house design, seismic performance, and building scale. Unified construction methods can no longer meet these needs. At the same time, a series of quality problems have also appeared in a large number of prefabricated buildings. Since then, the development of prefabricated buildings has stagnated. From around year of 2008 to the present, the second industrial revolution has taken off, and foreign prefabricated construction technology has become very mature. With the loss of a large amount of cheap labor, labor costs are rising. At the