UNIVERSITI TEKNOLOGI MARA

ADOPTION OF ADVANCED TECHNOLOGY FOR CONSTRUCTION PRODUCTIVITY IMPROVEMENT

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ABSTRACT

The construction industry faces increasing pressure to improve productivity, quality, and efficiency while reducing costs and minimising risks. This study investigates the barriers to adopting advanced technologies in construction projects and proposes coping strategies to overcome these hurdles. Through a questionnaire survey of 57 respondents, this study identifies financial and economic barriers as the most significant obstacles, followed by technical and skill-related barriers and organisational and cultural barriers. The benefits of technology adoption include enhanced safety and risk management, cost reduction, improved profitability, and increased productivity. To mitigate these barriers, this study recommends implementing risk-sharing partnerships, government incentives, phased implementation, training and upskilling programs, pilot projects and demonstrations, and knowledge-sharing platforms. By integrating these coping strategies with advanced technologies such as BIM, AI, machine learning, IoT, drones/UAVs, and AR/VR, construction stakeholders can improve construction productivity, minimise delays and rework, and stay competitive.

Keywords: Construction productivity, advanced technologies, barriers to adoption, coping strategies, BIM, AI, machine learning, IoT, drones/UAVs, AR/VR.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

The construction industry is an economic driver of both developed and emerging nations. Construction drives job growth and improved productivity by creating solutions to address social, energy, and environmental challenges worldwide. In the 'Future of Construction' report dated September 2021, Oxford Economics stated that spending on construction accounted for 13% of the global GDP in 2020, and they expect this to reach over 13.5% in 2030. The construction sector in Malaysia employs 1.2 million people, accounting for 9.5 percent of the overall workforce. It contributes 4.6 percent directly to the national economy. It has a multiplier effect of 2.03 due to its connections to over 120 different industries, of which 90% of the firms comprise SMEs (Small and Medium Enterprises) (SMEs) in the speech of CIDB Chief Executive Datuk Ir. Ahmad 'Asri Abdul Hamid shares why it is time to adopt the new construction technologies (Shakirah, 2023).

Productivity measures output produced based on the inputs used in the production process and many types of metrics on productivity are produced (Forsythe, 2018). Total factor productivity (TFP) and partial factor productivity (PFP) are often used in the construction industry (Ofori et al., 2021). The construction industry is one of the most critical and significant sectors supporting a country's economic development. It contributes to the economy by about 8–10% on average in different countries, promotes growth, provides employment to the masses, and links the economy and other industries. Improving construction productivity (CP) enables us to save costs per capita and increase the firm's revenue. An increase in the revenues from improved CP provides an additional flow to the economy, as the construction industry links to all other sectors as a part of their business process. Their productivity growths determine the financial wealth of nations. The nations that experienced higher productivity growth translated into increases in the average wages of the workers, which contributed to the profits and tax revenue collection of the agencies (Dixit et al., 2019).

Despite various challenges the construction industry faces, poor CP remains among the most critical. Different studies provide several definitions for productivity. Generally, it is defined as the ratio of output to input. By adopting the leading standards