

Evaluation of Digital's Role in Sustainable Built Environment

Theodore Wayne¹, Chang Saar Chai^{1*}, Shirly Siew Ling Wong², Fang Lee Lim³, Kai Chen Goh⁴ and Nur IzieAdiana Abidin⁵

¹Faculty of Engineering, Computing and Science, Swinburne University of Technology Sarawak Campus, 93350 Sarawak, Malaysia

²Faculty of Economics and Business, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia

³Department of Environmental Engineering, Faculty of Engineering and Green Technology, Universiti Tunku Abdul Rahman, 31900 Perak, Malaysia

⁴Faculty of Technology Management and Business, Universiti Tun Hussien Onn Malaysia, 86400 Johor, Malaysia

⁵Department of Structure and Materials, School of Civil Engineering, Faculty of Engineering, 81310 Johor, Malaysia

ABSTRACT

The construction industry has been evolving, embracing the delicate balance between the Fourth Industry Revolution and sustainable construction to create a sustainable and resilient built environment. Integrating digital tools and technologies in a renowned conventional construction industry is challenging, mainly due to the complex interaction between heterogeneous but heuristic construction processes, building systems, and workflows in achieving a common goal. This study took the initiative to review digital tool adoption and its role in the sustainable built environment by examining the impact of digital adoption in a sustainable built environment in terms of societal and industry impacts. A quantitative analysis is conducted, collecting 63 industry practitioners analysed through regression analysis. The result reveals that energy conservation is the most significant element in the sustainable built environment, which brought the greatest impact on both

society and industry in Malaysia. Based on the results, it is found that the digital adoption level in the Malaysian construction industry is still at a minimal level. Through the introduction of Industry4wrd, National 4IR and Construction 4.0 Strategic Plan (2021–2025), the importance of digital tools and technologies is slowly being acknowledged. The result of the study is significant to benchmark the current digital tools adoption in the Malaysian sustainable built environment. Moreover,

ARTICLE INFO

Article history:

Received: 27 January 2022

Accepted: 30 August 2022

Published: 31 March 2023

DOI: <https://doi.org/10.47836/pjst.31.3.13>

E-mail addresses:

101213621@students.swinburne.edu.my (Theodore Wayne)

cschai@swinburne.edu.my (Chang Saar Chai)

wslshirly@unimas.my (Shirly Siew Ling Wong)

limfl@utar.edu.my (Fang Lee Lim)

kaichen@uthm.edu.my (Kai Chen Goh)

izieadiana@utm.my (Nur IzieAdiana Abidin)

*Corresponding author

the contribution could be made in terms of better understanding and facilitating, where relevant, greater usage of digital tools in the construction industry to promote efficiency.

Keywords: Digital role, evaluation, quantitative research, sustainable built environment

INTRODUCTION

Visions for cities are more important than ever. It is expected that the migration trend will never stop any time soon, leading to an increase in population. More than half of the world's population lives in cities and urban areas, and this figure will likely increase to 70% by the year 2050 (Daniel, 2020). Thus, sustainable development practices help countries grow in ways that adapt to the challenges posed by climate change, which will help protect important natural resources for ours and future generations. Generally, the backbone of sustainable development is the interplay of three main pillars: economy, society, and environment. Daniel (2020) implied that the three main pillars enhancing the welfare of the entire society force us to reconsider the current urban practices to make sustainable city planning a dominant principle.

One of the key aspects is the necessity of sustainable development in the sphere of society's life to ensure that future generations' needs are not compromised. Establishing the Sustainable Development Goals (SDGs) plays a vital role in sustainability issues as the aim of the SDGs are to end poverty, protect the planet and ensure prosperity for all. Sustainability is a visionary objective that the construction industry and many individuals are gradually working towards. The construction sustainability objectives in the construction industry are always within the building design and construction materials. The shift to sustainability can be seen as a new paradigm where the sustainable objective lies in digital transformation.

Recently, the way humans live their lives and working environment has been transformed digitally. Digital technologies in any industrial process are directly concerned with the quality and productivity of the systems. Among the various fields within the industry, the construction industry has struggled the most with digital adoption and twining (Ahuja et al., 2009). The construction industry is difficult, with legacy processes that span architects, contractors, regulators, and building owners. Bridging different elements of every participant's field and their relationship is necessary for digital transformation (Ubarte & Kaplinski, 2016).

Most past studies in digital construction are focused on infrastructure development which can be seen in areas such as structural, material, and environmental disciplines and the use of design or planning software for the earlier stages of construction. By contrast, relatively little attention has been given to investigating the factors affecting these technologies' infiltration into the construction and project management lifecycle, even