

Effectiveness evaluation of Construction 4.0 technologies in improving built environment resilience

Construction
4.0 and built
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resilience

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Abstract

Purpose – Built environments are highly vulnerable to climatic disasters such as extreme floods, droughts and storms. Inaccurate decisions in adopting emerging construction technologies can result in missed opportunities to improve the resilience of built environments. Therefore, understanding the effectiveness of emerging construction technologies in improving built environment resilience can help in making better strategic decisions at the national and organizational levels. This study aims to evaluate the effectiveness of Construction 4.0 technologies in improving built environment resilience.

Design/methodology/approach – A list of Construction 4.0 technologies was adopted from a national strategic plan. Then, the data were collected using the fuzzy technique for order preference by similarity to ideal solution technique from selected built environment experts to determine the relative effectiveness of Construction 4.0 technologies in improving built environment resilience.

Findings – Six Construction 4.0 technologies are critical in improving built environment resilience (in rank order): building information modeling, autonomous construction, advanced building materials, big data and predictive analytics, internet of Things and prefabrication and modular construction. In addition, adopting Construction 4.0 technologies collectively is crucial, as moderate to strong connections exist among the technologies in improving built environment resilience.

Originality/value – To the best of the authors' knowledge, this is one of the first papers that evaluate the effectiveness of Construction 4.0 technologies in improving built environment resilience. Industry professionals, researchers and policymakers can use the study findings to make well-informed decisions on selecting Construction 4.0 technologies that improve built environment resilience to climatic disasters.

Keywords Decision-making, Fuzzy TOPSIS, Climatic disasters, Climate change

Paper type Research paper

1. Introduction

Built environments are significantly affected by climatic disasters (Ali *et al.*, 2020). Such disasters, including extreme floods, hurricanes, cyclones and heat waves, have detrimental effects on settlements, economies and communities (Salimi and Al-Ghamdi, 2020). The Red Cross reported that flood disasters in Iran affected over 2,000 cities, resulting in 78 fatalities, 1,136 injuries and



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