Identifying Interconnectivities between Modular Construction Decision-Making Factors Using Clustering and Network Analysis

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ABSTRACT

Understanding the complex and unique requirements of modular construction methods have become crucial given the ongoing increase in popularity of such construction methods. In fact, studying the various modular construction factors and their interconnections to attain successful project performance is perceived to help practitioners choose the modularization strategies that are more suitable for their specific context. To this end, there is a need to better understand the interconnectivities among the various modular construction decision-making factors. As such, the paper aims to enhance the knowledge of the interactions and interdependencies among the various modular construction decision-making factors. To achieve that, the authors identified 50 decision-making factors affecting the use of modular construction in the industry based on an extensive analysis of the literature. Second, a reference matrix reflecting the co-occurrence of the decision-factors in the literature is constructed. Third, spectral clustering algorithms are used to aggregate the decision-factors based on their interconnectivities. Fourth, social network analysis is used to determine the key interconnectivities and combinations of decision-factors in each cluster. The findings show that the 50 identified decision-factors can be categorized into four clusters where each cluster reflects particular interconnected aspects. This paper provides professionals with a proactive approach that enables them to identify interaction and dependencies between the different modular construction aspects. Ultimately, the outcomes of this paper shall enhance a better understanding of the unique and complex requirements of modular construction projects.