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Risk Analysis in Off-Site Construction Manufacturing in Small to Medium-Sized Projects

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Abstract : The objective of off-site construction manufacturing is to utilise the workforce and machinery in a controlled environment without external interference for higher productivity and quality. The usage of prefabricated components can save up to 14% of the total energy consumption in comparison with the equivalent number of cast-in-place ones. Despite the benefits of prefabrication construction, its current project practices encompass technical and managerial issues. Building design, precast components' production, logistics, and prefabrication installation processes are still mostly discontinued and fragmented. Furthermore, collaboration among prefabrication manufacturers, transportation parties, and on-site assemblers rely on real-time information such as the status of precast components, delivery progress, and the location of components. From the technical point of view, in this industry, geometric variability is still prevalent, which can be caused during the transportation or production of components. These issues indicate that there are still many aspects of prefabricated construction that can be developed using disruptive technologies. Practical real-time risk analysis can be used to address these issues as well as the management of safety, quality, and construction environment issues. On the other hand, the lack of research about risk assessment and the absence of standards and tools hinder risk management modeling in prefabricated construction. It is essential to note that no risk management standard has been established explicitly for prefabricated construction projects, and most software packages do not provide tailor-made functions for this type of projects.

Keywords : project risk management, risk analysis, risk modelling, prefabricated construction projects
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