Fuzzy Multi-Criteria Decision-Making Framework for Risk Management in Construction Supply Chain

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Abstract : Risk management in the construction supply chain (CSC) is vital in construction project risks. CSC has various risks affecting product quality and project timeline, such as operational, social, financial, technical, design, and safety risks. These risks should be mitigated in project construction. So, this paper proposed a set of technologies to overcome risks in CSC, like artificial intelligence (AI), blockchain, data analytics, and IoT, to select the best one. So, the multi-criteria decision-making (MCDM) methodology is used to deal with various risks. The Multi-Attribute Utility Theory (MAUT) method is used to rank technologies. The weights of risks are obtained by the average method by using the decision matrix. The MCDM methodology is integrated with a fuzzy set to overcome uncertainty data. Experts used triangular fuzzy numbers to express their opinions instead of exact numbers. These allow the model to overcome inconsistent and vague data. The MCDM methodology was applied to 18 risks and 5 technologies. The results show that social risks have the highest weight. AI is the best technology for overcoming risks in CSC. AI can integrate with CSC from raw data to final products to deliver to the user.

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