



## Review on Decision Making in Construction Project Management

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### ABSTRACT

This study reports and discusses a quick review of the literature on decision making in construction project management. As we know, decision making is one of the major criteria in construction project management as it has multiple criteria to consider before arriving at a conclusion. This paper is focused on the importance of decision making and the multi criterions involved in it.

**Keywords:** Construction Projects, Management, Decision Making.

### Introduction

Decision making is the process of selecting the best course of action from among several options based on a set of criteria. It is a fundamental aspect of human cognition and behaviour and plays a crucial role in our personal and professional lives. Decision making involves identifying the problem, generating alternative solutions, evaluating their potential outcomes, and choosing the best option. The process is often complicated by factors such as uncertainty, risk, and limited information. Decision making is a multidisciplinary field that draws on need, economics, emotion, and other disciplines to understand how people make decisions and develop effective strategies to improve decision making. Effective decision making requires the ability to weigh trade-offs, consider multiple perspectives, manage emotions and biases, and adapt to changing circumstances. In managing the construction project, decision making plays a vital role in delivering the project on time, executing the construction without deviations, keeping the expenses under control and maintaining the quality standards of a project.

### Previous Studies on Decision Making in Construction Project Management

**Guillaume Marques and Didier Gourc (2010)** The authors argue that multi-criteria decision-making (MCDM) approaches provide a structured framework for decision-making, allowing project managers to consider multiple criteria and make informed decisions. The article provides a review of existing MCDM methods and discusses their application in project management. The authors also present a case study that illustrates the use of MCDM in evaluating project performance. Overall, the article provides useful insights and guidance for project managers who want to improve their decision-making process by using MCDM approaches.

**Seyit Ali Erdogan and Jinas Sapauskas (2017)** The authors present a study on the application of the Analytic Hierarchy Process (AHP) and Expert Choice approach for decision-making in construction management. The authors argue that these methods provide a structured approach to evaluate complex and interdependent decision factors. The article reviews the basic concepts of AHP and Expert Choice and their application in construction management.

**F.T. Dweiri and M.M. Kablan (2006)** The authors argue that fuzzy logic provides a flexible and accurate approach for assessing project management performance based on multiple criteria. The article presents a review of existing fuzzy decision-making methods and their application in project management. The article concludes that fuzzy decision-making techniques are valuable for project managers to make informed decisions and improve project performance.

**Jiahao Zeng and Man An (2007)** The authors argue that fuzzy logic provides a more realistic and accurate approach to assess project risks based on the subjective judgments of experts. The article provides a review of existing fuzzy-based decision-making methods and their application in construction project risk assessment. The article concludes that fuzzy-based decision-making techniques are effective for construction project risk assessment and can provide valuable insights for project managers to make informed decisions.

**Marjolein C J Caniels and Ralph J J M Bakens (2012)** The authors examine the impact of Project Management Information Systems (PMIS) on decision-making in a multi-project environment. The authors argue that PMIS provides project managers with timely and accurate information, enabling them to make informed decisions. The article provides a literature review of the effects of PMIS on decision-making, highlighting the benefits and

limitations of using PMIS. The article concludes that PMIS has a positive impact on decision-making in a multi-project environment, but their effectiveness depends on various factors such as system quality, information quality, and user satisfaction.

**Long Chen and Wei Pan (2021)** This article provides a comprehensive review of fuzzy multi-criteria decision-making (MCDM) techniques in the context of construction management. The authors argue that fuzzy MCDM provides a flexible and accurate approach to evaluate complex and uncertain decision factors. The article reviews the basic concepts of fuzzy MCDM and their application in construction management. The authors also present a network approach that integrates fuzzy MCDM with other decision-making methods. The article concludes that fuzzy MCDM is a valuable tool for construction managers to make informed decisions and improve project performance, and the network approach provides a more comprehensive and integrated framework for decision-making in construction management.

**Jurgita Antucheviciene and Edmundas Kazimieras Zavadskas (2010)** The authors argue that multiple criteria decision-making (MCDM) provides a structured and systematic approach to evaluate and prioritize complex decision factors based on multiple criteria. The article presents a literature review of existing MCDM methods and their application in construction management. The article concludes that the proposed method is effective for construction managers to make informed decisions and improve project performance by considering the interdependent relationships between criteria.

**Seyit Ali Erdogan and Jonas Sapraskas (2019)** It discusses the application of a multi-criteria decision-making (MCDM) model for sustainable construction management. The authors argue that sustainable construction management requires a systematic approach to evaluate and prioritize complex decision factors based on multiple criteria. The article presents a literature review of existing MCDM methods and their application in sustainable construction management. The article concludes that the proposed MCDM model is effective for construction managers to make informed decisions and improve project performance.

**Y. Ouyang and X. Zhou (2016)** The authors discuss the application of a fuzzy multi-criteria decision-making (MCDM) approach for construction project risk assessment. The authors argue that traditional risk assessment methods are limited in handling the uncertainties and subjectivity associated with construction project risks. The article presents a literature review of existing risk assessment methods and their limitations. The authors then propose a new fuzzy MCDM approach that considers the subjective judgments and uncertainties of experts involved in the risk assessment process. The article concludes that the proposed fuzzy MCDM approach is effective for construction managers to make informed decisions and improve project performance by considering the subjective judgments and uncertainties associated with construction project risks.

**S. Kaewkuekool and D. Wongsuwan (2020)** This article provides a comprehensive review of multi-criteria decision-making (MCDM) methods and their application in sustainable building design. The authors argue that MCDM methods are effective in evaluating and prioritizing complex decision factors based on multiple criteria in sustainable building design. The article presents a literature review of existing MCDM methods and their application in sustainable building design. The authors also discuss the advantages and limitations of different MCDM methods and provide a comparative analysis of their performance. The article concludes that MCDM methods are essential for sustainable building design and can improve decision-making by considering multiple criteria related to sustainability.

**M. Nagy and M. El Gohary (2019)** The authors propose a decision-making framework for construction material procurement in green buildings. The authors argue that the procurement of construction materials in green buildings is a complex and multi-criteria decision-making process. The article presents a literature review of existing procurement methods and their limitations. The authors then propose a decision-making framework that considers the environmental impact, economic cost, and social benefits of different procurement options. The framework integrates Analytic Hierarchy Process (AHP) and multi-objective optimization techniques to support construction managers in making informed procurement decisions. The article concludes that the proposed decision-making framework can assist construction managers in selecting the most suitable procurement options for green building projects.

**W. Wu and J. Ma (2020)** The article provides a glimpse on an integrated approach for construction project risk management by combining Building Information Modeling (BIM) and multi-criteria decision-making (MCDM) techniques. The authors argue that BIM can be used to visualize and evaluate construction project risks while MCDM techniques can help in identifying the most critical risks and selecting appropriate risk management strategies. The article presents a case study to demonstrate the proposed approach's feasibility and effectiveness. The authors also discuss the advantages and limitations of the integrated approach and provide recommendations for future research. The article concludes that the integration of BIM and MCDM can improve construction project risk management by providing a more comprehensive and informed decision-making process.

**N. Siu and H. Li (2019)** The authors propose a hybrid approach to support the selection of sustainable materials in construction projects. The authors argue that the selection of sustainable materials is a complex and multi-criteria decision-making process that involves multiple stakeholders with conflicting interests. The article presents a literature review of existing approaches and limitations in selecting sustainable materials. The authors then propose a hybrid approach that integrates fuzzy logic and multi-criteria decision-making techniques to evaluate the sustainability performance of different materials and select the most suitable options. The article also provides a case study to demonstrate the proposed approach's feasibility and effectiveness. The authors conclude that the hybrid approach can support informed decision-making for sustainable material selection in construction projects.

**Table 1 – Study of Multi-Criterion Factors**

Initial	Factor	Content
C1	Customer Satisfaction	To have the satisfaction of stakeholders/building owners based on the outcome.
H	Hierarchy	To prioritize the order of tasks according to the requirements.

R1	Resource	To manage the allocation of resources based on the needs.
P	Profitability	To make the decision profitable and economical.
R2	Risk	To manage the relevance of existing risks and the risks that are encountered during the progress.
Q	Quality	Material specifications, work execution, quality inspections and quality standards
D	Delay	Material supply, resource allocation, execution, completion and handing over.
C2	Cost	Cost control and budget escalation.

## Conclusion

Since the project's cost, quality, time and its success depend on the decision that a stakeholder or project manager is making by considering the multiple criteria, decision making is considered to be a critical factor in construction management and certainly it is difficult to make it. Hence effective decision making is critical to make the project successful.

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