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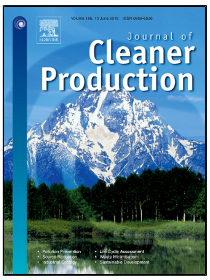

An integrated fuzzy MOORA method and FMEA technique for sustainable supplier selection considering quantity discounts and supplier's risk

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An integrated fuzzy MOORA method and FMEA technique for sustainable supplier selection considering quantity discounts and supplier's risk

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Abstract

Supplier selection is a complex process and plays a signification role in promoting the sustainable supply chain. In this study, a fuzzy multi-objective optimization model based on the ratio analysis (fuzzy MOORA) is applied to evaluate the supplier's overall performance. In reality, suppliers face risks like natural calamity or political variability. Hence, failure mode and effects analysis (FMEA) is implemented to evaluate the risks of a supplier. Moreover, a novel multi-objective mathematical model is developed to consider supplier's sustainability and order allocation simultaneously. The efficiency and applicability of the proposed approach is shown by a case study of the evaporative cooler in the home appliance industry. The current approach can be implemented in many manufacturing industries such as electrical, automotive and chemical. The results show that by employing the proposed model not only potent to increase total profit but also decrease the amount of risks which imposes on the sustainability.

Keywords: Sustainability, Supplier selection, Order allocation, FMEA, Quantity discount, Fuzzy MOORA.

1. Introduction

In the competitive business environment, companies seek to create competitive advantages by utilizing data management, knowledge management. Supply chain management has an important role in handling this issue. Moreover, in the field of the supply chain (SC), supplier selection is a strategic decision. Supplier selection is a process of taking the best suppliers with right price and quality at the right time and quantity (Ayhan and Kilic 2015). Researchers estimated that more than 60 percent of production costs relates to purchasing raw material from the suppliers (Krajewsld and Ritzman 1996). Supplier selection has great influence on the strategic and operational performance of an organization. Furthermore, good suppliers can reduce the production and inventory costs, improve the quality, flexibility and consequently satisfy customer expectations (Çebi and Otay 2016). Many aspects such as considering qualitative and quantitate criteria for various factors such as globalization of trade, government regulation, and changing customer preferences makes the supplier selection as a complex decision (De Boer et al., 2001).

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