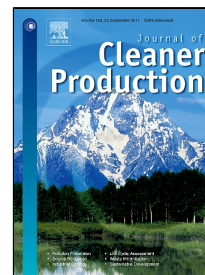


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A Novel Interval Type-2 Fuzzy Evaluation Model based Group Decision Analysis for Green Supplier Selection Problems: A Case Study of Battery Industry

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Abstract

Selecting the most suitable supplier regarding to the environmental competencies is one of the main issues for companies and organizations. To address the issue, the group decision-making methodologies are well known approaches which could help decision makers (DMs) for evaluating the green supplier selection problems. In this study, a new model based on group decision-making approach is introduced under novel compromise ranking method and interval type-2 fuzzy sets (IT2FSs) for the green supplier selection problems. In the proposed approach, the assessment criteria are provided by DMs based on linguistic terms which are converted to interval type-2 fuzzy elements. In this respect, decision makers' weights are computed based on an extended interval type-2 fuzzy TOPSIS method considering the priority experts' opinions about the relative significance of criteria, and also a new ranking index is presented respecting to interval type-2 fuzzy Hamming distance measure to ranking potential alternatives. Hence, a real case study is considered to indicate the applicability of the proposed approach. In addition, results from the proposed approach are compared with the existing method in literature in order to illustrate the validation of proposed model. Furthermore, a sensitivity analysis is prepared to identify and determine the effects of different DMs' weights on ranking results. Results show that the proposed approach is an effective and practical decision tool for green supplier selection problems in fuzzy environment.

Keywords: Interval type-2 fuzzy set, Group decision analysis, Fuzzy TOPSIS, Green supplier selection problem.

1. Introduction

In today's competitive environment, organizations should be conformed their processes and operations to satisfy the customers' demands and survive in the competitive market (Ho, Xu, and Dey, 2010). On the other hand, customers are looking for lower product cost with higher quality, and on time delivery (Dulmin and Mininno, 2003; Nazari-Shirkouhi and Keramati, 2017; Nazari-Shirkouhi et al., 2013; Sarkis et al., 2007). So, the supplier selection is one of the main factors which will be affected customers satisfaction and the operations of the final products. It also can be named as the most important strategic decision in the supply chain (Ho et al., 2010). Organizations are forced to focus on environmental competencies because of important environmental issues such as global warming, increasing public awareness, and pressure from

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