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Green Supplier selection for plastic industry using integrated model based on Pythagorean fuzzy AHP and fuzzy TOPSIS

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ABSTRACT

Purpose –Supply Chain Management (SCM) has emerged in recent years and is now increasing in popularity. It aims to reduce production costs, maximize earnings, improve customer relations, improve inventory management and increase customer satisfaction. Reducing total cost of procurement is one of the most important parameters in aligning the objectives of partners in a supply network.

Design/methodology/approach – This paper proposed Pythagorean Fuzzy Analytic Hierarchy Process (PFAHP) and Fuzzy Technique for Order Preference by Similarity to Ideal Solution (FTOPSIS) integrated model for green supplier selection for plastic industry. In the first phase of the study, the parameters to be used in selecting suppliers are determined. Then, by making pairwise comparisons, the weights of these parameters are determined with PFAHP method. Finally, the supplier that is most suitable for 3 suppliers is determined using the FTOPSIS method.

Findings – Among the criteria evaluated by 5 experts, the most important criteria, the parameters of the Inspection methods and management and organizations are determined as the most important parameters respectively. The supplier no. 3 has been identified as the most suitable supplier.

Discussion –The case study is performed under a fuzzy environment to reduce uncertainty and vagueness, and linguistic variables parameterized by interval-valued Pythagorean and triangular fuzzy numbers are used. Through the case study, 8 main and 45 sub-criteria supplier selection evaluation criteria used to assess 3 suppliers by FTOPSIS. However, our study has some disadvantages and possible further work is recommended. Other possible different fuzzy sets can be used in the projected method.

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