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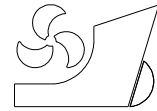*Faiz Bin Mohd Turan*

AN IMPROVED METHODOLOGY FOR MULTI-CRITERIA EVALUATIONS IN THE SHIPPING INDUSTRY

Summary

This paper presents a reliable, easy and more objective approach for ranking and determining preference in a multi-criteria decision-making problem within the shipping industry. Through the integration of the improved score function, fuzzy Shannon's entropy method and the interval-valued intuitionistic fuzzy M-TOPSIS method, for ranking and for representing the aggregated effect of positive and negative evaluations in the performance ratings of the alternatives based on interval-valued intuitionistic fuzzy set (IVIFS) data. The integration of the improved score function, fuzzy Shannon's entropy method and the interval-valued intuitionistic fuzzy M-TOPSIS method in this paper has provided a whole new approach for solving multi-criteria decision-making problems. The improved score function which is applied to the calculation of the separation measures of each alternative from the positive and negative ideal solutions. Reflect and model the fuzziness and hesitation of the decision-maker subjective assessment, while the fuzzy Shannon's entropy method is been used for calculating the criteria weight. The proposed method has successfully been applied to rank and determined the most appropriate shipping partner for a shipping company located in Malaysia, and for a modified hypothetical example which is based on the selection of a preferred Ship as a reference for a new design. The model has been compared with existing model and we can conclude, it provides a better alternative method for ranking and for the determination of preference in a multi-criteria decision-making problem.

Key words: Interval-Valued Intuitionistic Fuzzy M-TOPSIS model, Fuzzy Shannon's Entropy method, Multi-Criteria Decision-Making, Shipping Company

1. Introduction

In multi-criteria decision-making (MCDM) problems, such as in design selection, equipment selection, supplier selection and in the evaluation of business strategic performance, it is necessary to consider many factors/criteria simultaneously before selecting or ranking the alternatives. The Decision-Makers (DMs), desirable alternative(s) are chosen by providing preference information in the form of, exact numerical value, interval value [1] or with linguistic variables [2]. However, such preference information's are often characterized by ambiguity due to vagueness and uncertainty [1], [3]. This ambiguity caused