

Triangular Hesitant Fuzzy TOPSIS Approach in Investment Projects Management

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Abstract : The presented study develops a decision support methodology for multi-criteria group decision-making problem. The proposed methodology is based on the TOPSIS (Technique for Order Performance by Similarity to Ideal Solution) approach in the hesitant fuzzy environment. The main idea of decision-making problem is a selection of one best alternative or several ranking alternatives among a set of feasible alternatives. Typically, the process of decision-making is based on an evaluation of certain criteria. In many MCDM problems (such as medical diagnosis, project management, business and financial management, etc.), the process of decision-making involves experts' assessments. These assessments frequently are expressed in fuzzy numbers, confidence intervals, intuitionistic fuzzy values, hesitant fuzzy elements and so on. However, a more realistic approach is using linguistic expert assessments (linguistic variables). In the proposed methodology both the values and weights of the criteria take the form of linguistic variables, given by all decision makers. Then, these assessments are expressed in triangular fuzzy numbers. Consequently, proposed approach is based on triangular hesitant fuzzy TOPSIS decision-making model. Following the TOPSIS algorithm, first, the fuzzy positive ideal solution (FPIS) and the fuzzy negative-ideal solution (FNIS) are defined. Then the ranking of alternatives is performed in accordance with the proximity of their distances to the both FPIS and FNIS. Based on proposed approach the software package has been developed, which was used to rank investment projects in the real investment decision-making problem. The application and testing of the software were carried out based on the data provided by the 'Bank of Georgia'.

Keywords : fuzzy TOPSIS approach, investment project, linguistic variable, multi-criteria decision making, triangular hesitant fuzzy set

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