

TOPSIS for solving multi-objective multi-product supplier selection problem under price breaks

ABSTRACT

Supplier selection is a multi-criteria decision-making problem (MCDM) that is affected by quantitative and qualitative (conflicting) factors. For supplier selection problem, if suppliers offer quantity discounts and buyer wants to buy multiple products as well, this problem becomes more complicated. To solve the problem, an integration of technique for order preference by similarity to ideal solution (TOPSIS) and multi-product multi-objective mixed integer linear programming (MOMILP) is used to consider both tangible and intangible factors in choosing the best suppliers and define the optimum quantities among the selected suppliers. The problem includes the three objective functions: to maximize the total value of purchasing (TVP), and to minimize the total defect rate and total cost, while satisfying demand requirement and capacity constraints. In this paper, to solve the multi-objective model, TOPSIS and later a single objective function are proposed which can consider the relative importance of the three goals.

Keyword: Supplier selection; MCDM; Multi-product; Quantity discount; TOPSIS; MOMILP