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Supplier Selection and Order Allocation Using a Stochastic Multi-Objective Programming Model and Genetic Algorithm

Authors : Rouhallah Bagheri, Morteza Mahmoudi, Hadi Moheb-Alizadeh

Abstract : In this paper, we develop a supplier selection and order allocation multi-objective model in stochastic environment in which purchasing cost, percentage of delivered items with delay and percentage of rejected items provided by each supplier are supposed to be stochastic parameters following any arbitrary probability distribution. To do so, we use dependent chance programming (DCP) that maximizes probability of the event that total purchasing cost, total delivered items with delay and total rejected items are less than or equal to pre-determined values given by decision maker. After transforming the above mentioned stochastic multi-objective programming problem into a stochastic single objective problem using minimum deviation method, we apply a genetic algorithm to get the later single objective problem solved. The employed genetic algorithm performs a simulation process in order to calculate the stochastic objective function as its fitness function. At the end, we explore the impact of stochastic parameters on the given solution via a sensitivity analysis exploiting coefficient of variation. The results show that as stochastic parameters have greater coefficients of variation, the value of objective function in the stochastic single objective programming problem is worsened.

Keywords : dependent chance programming, genetic algorithm, minimum deviation method, order allocation, supplier selection

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