Evaluating the effectiveness of integrated benders decomposition algorithm and epsilon constraint method for multi-objective facility location problem under demand uncertainty

ABSTRACT

One of the most challenging issues in multi-objective problems is finding Pareto optimal points. This paper describes an algorithm based on Benders Decomposition Algorithm (BDA) which tries to find Pareto solutions. For this aim, a multi-objective facility location allocation model is proposed. In this case, an integrated BDA and epsilon constraint method are proposed and it is shown that how Pareto points in multi-objective facility location model can be found. Results are compared with the classic form of BDA and the weighted sum method for demand uncertainty and deterministic demands. To do this, Monte Carlo method with uniform function is used, then the stability of the proposed method towards demand uncertainty is shown. In order to evaluate the proposed algorithm, some performance metrics including the number of Pareto points, mean ideal points, and maximum spread are used, then the t-test analysis is done which points out that there is a significant difference between aforementioned algorithms.