

Data driven hybrid evolutionary analytical approach for multi objective location allocation decisions: Automotive green supply chain empirical evidence

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ABSTRACT

The strategic location of manufacturing plants and warehouses and the allocation of resources to the various stages of a supply chain using big data is of paramount importance in the era of internet of things. A multi-objective mathematical model is formulated in this paper to solve a location-allocation problem in a multi-echelon supply chain network to optimize three objectives simultaneously such as minimization of total supply chain cost (TSCC), maximization of fill rate and minimization of CO₂ emissions. Data driven hybrid evolutionary analytical approach is proposed by integrating Non-Dominated Sorting Genetic Algorithm-II (NSGA-II) to handle multiple objectives into Differential Evolution (DE) algorithm. Five variants of the hybrid algorithm are evaluated in addition to comparing the performance with the existing Multi-Objective Hybrid Particle Swarm Optimization (MOHPSO) algorithm. Extensive computational experiments confirm the superiority of the proposed Data driven hybrid evolutionary analytical approach over the existing MOHPSO algorithm. This study identifies a specific variant that is capable of producing the best solution in a higher order simulated instances and complex realistic scenario such as an automotive electronic parts supply chain in Malaysia.

KEYWORDS:

Location-allocation decision; Supply chain network; Multi-objective differential evolution; Big data