

Reliable and flexible supplier selection problem: a genetic algorithm inspired simulation approach

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Abstract

Strategic decision making in a supply chain commences with a proper sourcing plan. Disruptions in the supply side will certainly inflict cascading effects throughout the chain. To minimise this vulnerability, the procurement system should be incorporated with strategic risk mitigation capabilities like reliability and flexibility. However, the financial implications for improving risk management capabilities and the absence of a suitable decision support system to handle the inherent computational complexities restrained enterprises from upgrading their systems. The present research intends to meet this requirement by proposing a novel multi-objective mathematical model to prepare a procurement plan that optimises reliability and flexibility together with different cost components. Since the proposed model contains nonlinear constraints and mixed-integer variables, we present a simulation-based optimisation methodology inspired by genetic algorithm to solve the model. An illustrative problem is solved, and the managerial implications are discussed to exhibit the scope of the proposed model.

Keywords: supplier selection, order allocation, multi-objective, reliability, flexibility, simulation

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