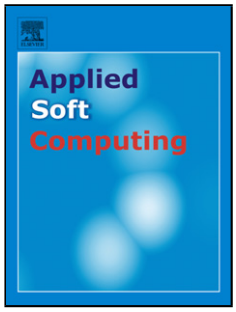

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An efficient hybrid genetic algorithm for multi-product competitive supply chain network design with price-dependent demand

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Highlights

- Proposing a MINLP model for multi-product competitive supply chain (SC) network
- Developing price-dependent demand function considering complementary and substitutable relationship between products, simultaneously
- Studying simultaneous strategic, tactical and operational planning in a Stackelberg game between SC's
- Using KKT conditions to convert proposed bi-level model to a single level
- Developing a hybrid meta-heuristic based on GA and FA to solve the problem

Abstract

According to the recent studies, competition between supply chains (SCs) will play a noticeable part of competition in the future's market. This study considers a SC vs. SC multi-product competition in the duopolistic markets. Pricing, location, transportation and production decisions are taken in a Stackelbrg game formulated as bi-level model. These supply chains (called leader and follower) are three-stage, multi-product, multi-source, and single-period SCs. Karush-Kuhn-Tucker (KKT) conditions are applied in order to transform the presented bi-level model into a single-level mixed integer nonlinear programming (MINLP). Due to computational complexity of the problem, an efficient Hybrid Genetic Algorithm (HGA) is proposed to solve the large size problems. In order to obtain more robust solutions, Taguchi method is applied to calibrate hybrid meta-heuristic parameters. The efficiency of the proposed HGA is investigated through the comparisons with optimal solutions and also with GA. Managerial insights are proposed alongside with the Sensitivity Analysis for important parameters.