

An integrated replenishment model under dynamic demand conditions

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Abstract

This research develops an integrated replenishment model considering supplier selection, procurement lot-sizing, quantity discounts and safety stocks under dynamic demand conditions. The objectives of the model are to minimize total costs, which include ordering cost, purchase cost, transportation cost, shortage cost and holding cost, and to maximize service level of the system over the planning horizon. First, a multi-objective programming (MOP) model is proposed in the paper. Next, the model is transformed into a mixed integer programming (MIP) model based on the ϵ -constraint method. Then, the genetic algorithm (GA) model is constructed to solve a large-scale optimization problem by finding a near-optimal solution. An example of a bike manufacturer is used to illustrate the practicality of the proposal model. The results demonstrate that the proposed model is an effective and accurate tool for the integrated replenishment and logistics management.

Keyword : Lot-sizing: Mixed integer programming: Multi-objective programming: Genetic algorithm (GA): Safety stock.