
An Integrated Location-Inventory-Routing Problem

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Abstract

A location-inventory-routing optimization problem characterized by an uncertain customer demand and supply lead-time is studied in this work. It considers a supply network which consists of a set of suppliers, multiple potential distribution centers and a set of demand zones. A daily reorder point (r, Q) inventory control policy is used at the distribution centers to be opened. From these distribution centers, delivery routes must be decided to ship the demand zones in time and to avoid backorders. A scenario-based approach is used to model the demand and lead-time uncertainty. Hence, a stochastic two-stage mathematical model maximizing the total expected supply network profit is obtained, which is solved using the sample average approximation method. Based on an illustrative case, we show the impact of inventory and routing costs on the strategic location-allocation decisions. However, it is found out that solving this problem is very difficult and time consuming. Therefore, a heuristic solution approach is under development to deal with realistic-size instances.

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