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An Integrated Forward/Reverse Logistics Network Optimization Model for Multi-Stage Capacitated Supply Chain

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ABSTRACT

In this study, the integrated forward/reverse logistics network is investigated, and a capacitated multi-stage logistics network design is proposed by formulating a generalized logistics network problem into a bi-objective mixed-integer programming model (MIP). The purpose is to minimize the total costs and maximize the responsiveness of the closed- loop supply chain network simultaneously. Moreover branch and bound algorithm is applied to find a global optimum for this model which provides the decisions related to the facility location problem, optimum quantity of shipped product, and facility capacity. Finally, a numerical example is conducted in order to show the power of the proposed MIP model to avoid the sub-optimality caused by separate design of the forward and reverse logistics networks. It has been shown that such an approach can significantly help the managers to make decisions about the problems associated with integrated logistics network design.

KEYWORDS

Integrated Forward/Reverse Logistics Network, Closed-Loop Supply Chain Network, Mixed-Integer Linear Programming, Multi-Objective Optimization, Capacity and Location Decision

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