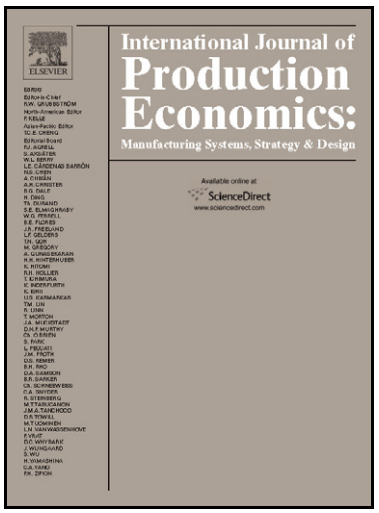

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Using truck-inventory-cost to obtain solutions to multi-period logistics models

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Abstract. The antithetic opposition between the cost of inventory and the fixed cost of transportation, which leads to multiple alternate near-optima, can be a primary contributor to the computational intractability of the mixed integer program for a two-echelon multi-period distribution system. To alleviate the computational intractability, we develop a heuristic procedure that determines the deployments of trucks to, and the consequent levels of inventory at, the second echelon thereby reducing the number of variables in the model. The reduced model is shown to identify near optimal solutions for the entire distribution system in negligible computation time.

Key Words: Logistics; Heuristics; Distribution; Integer programming

1. Introduction

The deployment of trucks to a demand point over time and their loading, which also determines inventory levels, is central to operational planning in a distribution system. Depending on the relative magnitudes of the cost of truck deployment and the cost of inventory, demand over time at a demand point is satisfied by shipments of product via trucks and/or by holding product in inventory. A truck may be any unit of transport that is used in an industry such as a trailer, container, or metric-ton. We consider the use of a mixed integer programming model to obtain shipment plans and inventory levels to meet demand at each demand point, in each time period, for a two-echelon multi-period distribution system. The model optimizes the total fixed cost of transporting product and the total cost of carrying inventory at both echelons. The inventory costs in the model take into account both the cost

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