Coordinating Replenishment Cycles in Three-Stage Inventory-Distribution Supply Chains

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Abstract—There have been many studies on two-stage supply models. Because supply chains are increasingly more complicated, this study considers the three-stage supply chain configurations which involve multiple companies at each stage and each company at the upstream stages can supply two or more customers. The coordination mechanisms for the members along the chain are achieved in the following two aspects: (i) each company takes general-integer (GI), stationary and nested inventory replenishment policies; (ii) two differential transportation costs are incorporated into the ordering and inventory costs. This paper analyzes the cost properties such that we can develop an efficient heuristic method to deal with the three-stage inventory-distribution problems (TSIDP). The relative outcomes between our proposed heuristic approach and LINGO® software indicate that the former outperforms the latter.

Keywords—Three-stage inventory/production/distribution supply chains, General-Integer policies, Heuristics.

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