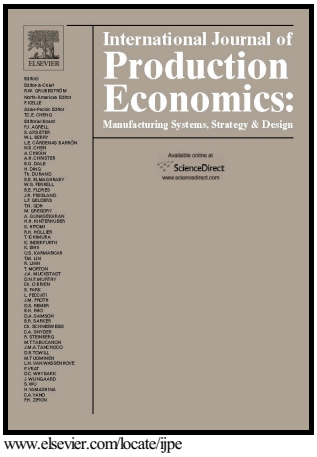

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Abstract

While sharing storage and transportation units is common for many product types, cold items usually have different temperature requirements and as a result, not all items can share a holding/transportation unit. Consequently, the type of products and their compatibility with other products needs to be considered in the inventory model. In this paper, we propose multi-product inventory models for cold items. The models determine the inventory levels that minimize either the cost or carbon-equivalent emissions. We model the compatibility of items as a constraint in the inventory model. To solve the model, we first find an appropriate "family of products" that can share a storage/transportation unit. Then, for each family of products we develop an approximate solution method to determine the order quantity of each product within a family. Numerical experiments demonstrate the solution procedure, and provide managerial insights into cold item inventory policies.

Key words: Multi-Product, Lot Sizing Models, Sustainability, Cold Supply Chain, Unit Capacity