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Perishable Inventory Management with Dynamic Pricing Using Time-Temperature Indicators Linked to Automatic Detecting Devices*

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Abstract

We consider the problem of inventory management of perishable products, typical examples of which include food, beverage, and pharmaceuticals. Retailers increasingly use RFID-supported time-temperature-indicator-based automatic devices (TTI-based ADs) to keep track of the age and quality of perishable items in stock and to reduce the risk of selling damaged products to customers. They also apply dynamic pricing to entice consumers to purchase items that approach their expiry dates. The problem is to maximize the retailer's profit while taking customer satisfaction into account. We first formulate the problem as a deterministic non-linear mixed integer program and apply a local search algorithm to approximately solve the problem. We then conduct sensitivity analysis based on extensive simulation experiments to evaluate the impacts of adopting TTI-based ADs and other factors on the solution under different scenarios.

Keywords: perishable products; inventory management; dynamic pricing policy; RFID and TTI technology applications; customer sensitivity to product freshness

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