Pricing and Order-Up-To Decisions for a Perishable Item with Price and Stock-Dependent Demand under LIFO Policy

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Abstract

The study deals with an inventory system for perishable products that are subject to effects of constant deterioration and fixed lifetime, facing a price and stock-level dependent demand function, and under the last-in-first-out (LIFO) issuing policy. The model in the study is a generalized version of the previous research work by considering the price as a decision variable coupled with the deteriorating effect. The purpose of the model is to jointly determine the optimal selling price, order-up-to level, and inventory cycle over an infinite planning horizon so that the net profit per unit time is maximized. The problem is formulated as a constrained optimization model solved by a procedure incorporating Karush-Kuhn-Tucker (KKT) rule, secant search method and enumeration scheme. To demonstrate the applicability of the generalized model, a case study of greater amberjack for sliced raw fishes, i.e., so-called sashimi, at a local retail store is carried out. The study also shows that the demand-side pricing scheme is a more effective mechanism on profit-boosting than the supply-side inventory policy.

Keywords: LIFO, demand-side pricing, order-up-to level, infinite planning horizon, deterioration.