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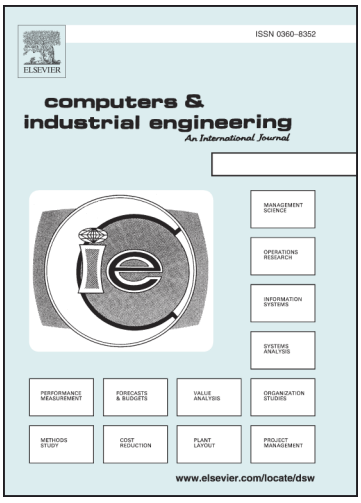

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Optimal lot-size policy for deteriorating items with stock-dependent demand considering profit maximization

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Abstract

This paper analyzes an inventory model for deteriorating items with stock-dependent demand rate considering that the holding cost is nonlinear in both time and stock level. The rate of deterioration per unit time is a constant fraction of the inventory level. The objective is to maximize the total profit per unit time, unlike other models in the literature with deteriorating items and stock-dependent demand rate, that minimize the inventory costs. An approximate optimal solution is obtained using a numerical algorithm easily implementable by practitioners. Comparisons with the model without deterioration and with the minimum cost model are presented. The optimal cycle time and the optimal lot size are always greater than the optimal values for the model with minimum inventory cost per unit time. A sensitivity analysis for the optimal solution with respect to the parameter of deterioration is developed, proving that the optimal inventory cycle and the optimal profit per unit time do not necessarily decrease when the deterioration parameter increases. Some models studied by other authors can be considered as particular cases of this one. Numerical examples are given to illustrate the theoretical results.

Keywords: inventory models; deteriorating items; stock-dependent demand rate; nonlinear holding cost

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