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

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

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5 **Abstract**

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

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

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