A partial backlogging inventory model for deteriorating items with time-varying demand and holding cost

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Abstract: In this paper, we propose a partial backlogging inventory model for deteriorating items with time-varying demand and holding cost. Deterioration rate is assumed to be constant. The demand rate varies with time until the shortage occurs; during shortages, demand rate becomes constant. Shortages are allowed and assumed to be partially backlogged. The backlogging rate is variable and is inversely proportional to the length of the waiting time for next replenishment. Taylor series is used for exponential terms approximating up to second degree terms. We solve the proposed model to obtain the optimal value of order quantity and total cost. The purpose of this paper is to minimise the total cost of inventory with optimal order quantity. The convexity of the cost function is shown graphically. Two numerical examples are given in order to show the applicability of the proposed model. Sensitivity analysis is also carried out to identify the most sensitive parameters in the system.

Keywords: inventory model; partial backlogging; time dependant demand rate; deteriorating items.

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