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Optimal inventory system with two backlog costs in response to a discount offer

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Abstract

Apparel manufacturing industries face seasonal discount scenarios where the demand for a certain material type is increasing at a specific time, such as wool during wintertime. Suppliers offer a price discount per unit during a period in order to increase the cash flow or decrease the inventory of certain items. The buyer (manufacturer, retailer, etc.) must improve his inventory systems in order to get the maximum benefit during that sale period. It is essential to combine the scenario with shortage and the supplier's offer during a sale period. Most researches maximise the total discount gain only during the sale period, not the whole year as in this research. The two important keys in an inventory system are the special ordering quantity and the time to place the order. In this article, the optimal value of the special quantity and the time to order are found for different discount cases. Moreover, the effect of on-hand inventory and shortage level on the size of the special order is investigated. A sensitivity analysis is

conducted to test the performance of the case when the buyer cannot order the optimal special quantity. Finally, a numerical analysis is used to demonstrate the impact of these factors.

Keywords:

backlog | sale period | optimal order quantity | discount offer