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A Coordinated Single-Vendor Single-Buyer Inventory System with Deterioration and Freight Discounts

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Abstract This chapter deals with a coordinated inventory model by considering supply chain of two stage, single-vendor and single-buyer. An equally sized shipment from vendor to buyer is conducted, and the buyer's rate of market demand is taken as a constant. Also, in the model, the concept of cost associated with freight discount is undertaken, and formulations are done on the basis of all-weight freight discount model and incremental freight discount model. In this chapter, an estimation of the optimal values of replenishment cycle length, lot size by minimizing the buyer's total cost, vendor's total cost as well as total cost of the supply chain inventory system dealing deteriorating items are considered. The increase in the number of production batch lot size factor and number of shipments from the vendor to the buyer will lead to decrease the total cost. Numerical examples are provided to illustrate the theoretical results and convexity of total cost is established. Managerial observations are outlined using sensitivity analysis. The result analysis demonstrates that on imposing freight discount into inventory model results in significant reduction on total cost. Finally, it can be concluded that freight discount model associated with incremental concept gives substantial effects on minimizing the objective of system's aggregate inventory cost.

Keywords Inventory models · Single-vendor and single-buyer · Freight cost · Deterioration · All-weight freight discount · Incremental freight discount

1 Introduction

The inventory models related to system dealing with two-step supply chain having a buyer and a vendor are considered as a major research area which is joint economic lot sizing model (JELS). Model focuses majorly on combining manufacturing result in vendor direction as well as shipment plan in buyer direction to minimize aggregate

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