

Inventory Optimization

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# Decision Making in Inventory Management

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# Chapter 7

## An Inventory Model for Deteriorating Items with Constant Demand Under Two-Level Trade-Credit Policies



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**Abstract** In today's competitive market, inventory management is a difficult job for every business enterprises. Objects are getting deteriorate after some period of time and result into economic loss. Keeping this in mind, this inventory model is for perishable objects where the rate of deterioration is considered to be constant with a constant demand rate. To reflect the real-life situation, the model explores a two-level trade-credit policy, i.e. the supplier offers certain credit period to the retailer and simultaneously the retailer permits a permissible delay in payment to the consumers that helps to increase the demand. If the retailer clears its entire amount during the end of first credit period, then the retailer can utilize it to earn interest. Moreover, if the retailer fails to clear the account by the end of first period, then he/she is allowed to pay off the balance after first credit period or by the end of second credit period. Here, the financial loans can be reduced through constant demand and interest earned. This paper uses a classical optimization method and calculated several numerical examples to elaborate the model. Convexity of cost function is proved through graphs. The objective of the paper is to minimize the total cost with respect to the inventory cycle time. At last, sensitivity analysis is done to study the effects of varying inventory parameters on decision variable and optimal solution.

**Keywords** Constant deterioration · Constant demand rate · Two level trade-credit · Cycle time · Sensitivity

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### 7.1 Introduction

With the rapid development of competition and technology between the business enterprises, companies are feeling the necessity of inventory models as a decision-making device for developing their business effectively. It is well-known fact that a

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