Chapter 7
Dynamic Pricing and Ordering Policies With Quality and Physical Deterioration Under Quadratic Demand

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ABSTRACT

This article includes policies regarding optimal dynamic pricing and ordering for items with synchronized deterioration of quality and physical quantity. Qualitative deterioration is an instantaneous process while physical deterioration-a non-instantaneous process. In view of the dynamic nature of the problem, selling price is assumed to be a time-dependent function of the initial price and discount rate. Initially with no physical deterioration, the product is sold at initial price value in the time period, successively in order to enhance customer's demand, price is exponentially discounted. For boosting the dynamic essence of the proposed model, the customer's demand is expressed as a quadratic function of time, price and changes in price over time, which is appropriate for the products for which demand increases initially and after sometime, it starts to decrease. Along with determining initial price, discount rate and optimal ordering cycle, the model also maximizes the total profit of the system. Numerical results with sensitivity analysis on the decision variables outputs managerial insights.

INTRODUCTION

In earlier literatures, unrealistic assumptions were made about infinite life cycle of goods, as such most of the goods by dropping their initial value undergoes deterioration over time by Geetha and Uthayakumar (2010). Deterioration reduces the quality and physical quantity of inventory and so, simultaneously system is burdened by an additional cost. Moreover, in recent research papers much emphasis on dete-

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