

Inventory Optimization

Nita H. Shah

Mandeep Mittal

Leopoldo Eduardo Cárdenas-Barrón *Editors*

Decision Making in Inventory Management

 Springer

Chapter 1

Upper-Lower Bounds for the Profit of an Inventory System Under Price-Stock Life Time Dependent Demand



Nita H. Shah , Ekta Patel , and Kavita Rabari 

Abstract Price is the most important factor influencing demand rate based on marketing and economic theory. Along with price, stock display is also a major factor, as displayed stocks may induce customers to purchase more due to its visibility. Moreover, the demand for perishable products depends on its freshness. However, relatively little devotion has been paid to the influence of expiration dates despite the fact that they are an important factor in consumers' purchase decisions. As a result, we develop an inventory model for perishable products in which demand explicitly in a multivariate function of price, displayed stocks, and expiration dates. We then formulate the model by determining the optimal selling price to maximize the total profit by using classical optimization method with the necessary condition given by Kuhn-Tucker. Furthermore, we discuss the optimal decisions under two scenarios: upper bound of profit and lower bound of profit by taking holding cost as a function of upper and lower bound respectively. Finally, a numerical example is demonstrated along with sensitivity analysis to describe the impact of inventory parameters on the optimal decisions.

Keywords Perishable products · Price · Stock and life time dependent demand · Expiration date · Lot-sizing and classical optimization method

MSC 90B05

1.1 Introduction

Inventory management for enterprises is continuously facing challenges associated with the development, quality, design, and manufacturing of new products.

Thus the demand for new products comes and goes at a faster pace. Recently, it is observed that customers are becoming more alert and cognizant about their health as their standard of living gets better than earlier, so the demand for products with a long life cycle has drastically increased in recent years. Only an increasing

N. H. Shah (✉) · E. Patel · K. Rabari
Department of Mathematics, Gujarat University, Ahmedabad, Gujarat 380009, India