Chapter 1

Optimal Ordering for Deteriorating Items of Fixed–Life with Quadratic Demand and Two–Level Trade Credit: Optimal Ordering... Two–Level Trade Credits

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ABSTRACT

This chapter studies the retailer’s ordering policies when items in the stocking system has fixed life time and subject to deteriorate with time. The demand is considered to be quadratically decreasing. The supplier offers credit period to the retailer which in turn is partially passed on to customer. The retailer is the decision maker and the objective is to minimize the total cost of the system by ordering optimum purchase quantity. Numerical examples are given to find the best possible scenario for the retailer. Sensitivity analysis is carried out to derive player’s insights.
1. INTRODUCTION

To boost the demand and attract more players, the business world is bricked on the trade credit as a promotional tool. The mathematical model incorporating idea of trade credit was first aired by Goyal (1985). For the literature available on trade credit from 1985 to 2010, one can refer to review article by Shah et al. (2010). Sarkar et al. (2010) discussed an inventory policy, where retailers are offered a credit period by the supplier with discount in unit price. They optimized objective function under inflation. Khanra et al. (2013) formulated an inventory model for time dependent demand by allowing shortages and under permissible delay payment policy. Chen et al. (2014) discussed an economic order quantity model when credit period from supplier to retailer is available only if retailer orders more than pre-specified quantity or the retailer opts for a partial payment to the supplier and take advantage of the delay settlement period for remaining balances. Some interesting articles are by Shah and Shukla (2010), Shah et al. (2011), Shah and Patel (2011), Shah and Raykundaliya (2011), Shah et al. (2012), Shah et al. (2013), Shah et al. (2014a), Shah et al. (2014b), etc and their cited references. Due to drastic environmental changes, most of the items losses its efficiency over time, termed as deterioration. Ghare and Schrader (1963) studied effect of deterioration in inventory model. The review articles by Raafat (1991), Shah and Shah (2000), Goyal and Giri (2001), Bakker et al. (2012), on deteriorating items for inventory system throw light on the role of deterioration. The citations in the review articles include constant rate of deterioration, weibull distributed deterioration etc. There are several researchers incorporating variable deterioration rate viz. Sett et al. (2012), Sarkar and Sarkar (2013 a, 2013 b). Shah et al. (2013) analysed marketing policy for non-instantaneous deteriorating items with generalized type deterioration and holding cost rate. Most of the articles cited above assumed that only supplier is offering credit period to the retailer. However, Huang (2006) advocated the retailer to offer the customer a partial trade credit period, which he received from the supplier. This will increase the profit of the retailer. Chung (2011) formulated simple algorithm for optimum decision under two-level trade credit policy. Ho (2011) studied a joint decision when demand is dependent on price and credit period under two level of trade credit policy. Sarkar (2012) modelled two-level trade credit policy with time varying deterioration rate and time dependent demand. Soni (2013) investigated policy for floor constraint and stock-dependent demand under two-level trade credit policy. Chung and Cardenas-Barron (2013) gave simple algorithm for deteriorating items under stock-dependent demand and two-level trade credit in a supply chain comprising of three players. Some interesting articles are by Ouyang et al. (2013), Li et al. (2014), Sarkar et al. (2014), Chung et al. (2014), Wu et al. (2014) and their cited references.
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