Chapter X

Studies on Interaction and Coordination in Supply Chains with Perishable Products: A Review

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Abstract

We review the recent literature on supply chain management of perishable products. Our emphasis is placed on the interaction and coordination between inventory and marketing, financing, distribution, and production. We survey the recent research progress in this area, by discussing the motivations, features and extensions of various models.
Introduction

Perishable products are common in the contemporary world. Fresh fish decays in a few days. The value of novel electronic products quickly decreases because of technological development. Photographic film can be used only before the expiry date, subsequently becoming valueless. For these kinds of products, traditional inventory models that assume the inventory can all be used to fulfill the future demands are no longer applicable. Hence, many researchers have developed specific models on the inventory of perishable products. Some articles study the situation where all items in an inventory become obsolete simultaneously at the end of a period. Many such studies are reported in the field of yield management, such as airline management, which will not be included in our review here. In this chapter we focus on models in the manufacturing area, where we must handle material flow problems.

An early work on a perishable inventory problem was described by Whitin in 1957, where fashion goods deteriorating at the end of certain storage periods were considered. Since then, considerable attention has been attracted to this line of research. Nahmias (1982) provides a comprehensive survey of the research works published before the 1980s, where perishable products were divided into two categories; products with a fixed lifetime and those with a random lifetime. For products with a fixed lifetime there is a fixed expiry date. Before this date, they are assumed to be fresh and can be used without any decrease in their quality or quantity. After that, the products will have expired and become valueless. For products with a random lifetime, their quality or quantity decreases with time. More recent studies on the deteriorating inventory models can be found in Raafat (1991) and Goyal et al.’s (2001) reviews, where relevant literature published in 1980s and 1990s was reviewed respectively.

While inventory is an important element in supply chain management (SCM), focusing on inventory models without considering its interactions with other elements is not sufficient. It is clear that the relationship of the manufacturer, the supplier, the retailer, and the consumers may directly affect efficiency and effectiveness of the whole supply chain system. For example, the pricing mechanism and promotion strategy will affect the demand, which is the main parameter that affects the order quantity. The order quantity will affect the optimal production strategy, and in all these processes the financial element is always an important factor to be considered. The specific properties of
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