Inventory Model for Items with Imperfect Quality and Screening at Vendor Site

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During production, items produced cannot be of perfect quality and some items produced may be defective due to imperfect production. Identification of defective items at early stage and their efficient management is very important to reduce overall loss. Through this paper various ways to dispose defective items have been discussed and a model has been proposedfor screening of defective item from a lot of items at the vendor site in a single-vendor single-buyer situation for a single product. It is also assumed that the screening process itself is not perfect due to human errors.

Key Words: Imperfect Quality, Imperfect Screening, Single Vendor, Single buyer, Single product

Introduction

Defective items at production stages of a supply chain directly impact the coordination of the product flow within its supply chain. In response to this concern, production and inventory lot sizing models, which incorporate imperfect items into their formulation of models, have become an important and growing area of research. Items are being produced by the producer in a batch as per market demands and orders. The quality of the production could not be of a perfect quality, so each batch contains some defective items in it. The vender sends items produced to the consumer through its dealers(buyer) as soon as the lot size become equals to the Economical Lot Size determined by a Supply Chain Inventory Models. The dealer starts screening of the items as soon as it arrives. The dealer can have different types of screening.

Salameh and Jaber (2000) first gave Economic Order Quantity (EOQ) model. As per their paper assumptions used for economic order quantity (EOQ) models needs to be justified. They gave emphasis to include more factors that contribute to the cost of the inventory. They had given a situation where an item is of imperfect quality; not necessarily defective; could be used in other production/inventory where these items can be utilized. The paper extended traditional EOQ model by accounting for imperfect quality items.The paper also considers that poor-quality items could be sold as a single batch by the end of the 100% screening process.

Goyal&C´ardenas-Barr´on (2002) published a Note, whichpresented a simple approach with the optimal methodfor determining the economic production quantity for an item with imperfect quality.

Wee et al. (2007) had developed optimal inventory model as shown in figure 1 for items with imperfect quality and shortage back ordering with a view of the fact that poor-quality items do exist during the production. Defective items are filtered during the screening process and removed from the stock. It may lead to shortage of the items in the supply chain system and buyer has to wait for new the lot to arrive and to screen.

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