

# The Influences of Defective Items and Trade Credits on Replenishment Decision

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## Abstract

In real business transactions, it is a common situation that a retailer receives some imperfect quality items from a lot, and additional costs are occurred by these imperfect quality items. In addition, a supplier may provide a permissible delay in payments to a retailer in order to encourage the retailer to increase order quantities. To capture this reality, in this article, we study an economic order quantity model for the retailers. We assume that all items must be inspected and all imperfect quality items from a lot can be screened out through 100% inspection by the retailer. The imperfect quality items are sold in the secondary market at a lower price to compensate the loss. Based on the above situations, we model a retailer's inventory system as a profit maximization problem to determine the retailer's optimal ordering policy. Three theorems are thus established to find the optimal solution. Finally, numerical examples are given to illustrate all these theorems and sensitivity analysis is also performed to obtain managerial insights.

*Keywords:* Inventory, lot size, economic order quantity, imperfect quality, trade credits.

## 1. Introduction

Traditional economic order quantity (EOQ) models commonly assume that all items offered by a supplier are perfect quality items. However, this assumption is unrealistic because items of imperfect quality can inevitably be found due to an imperfect production, transportation process, or other factors. These defective items will influence the on-hand inventory level, the service level, and the frequency of orders in the inventory system. Rosenblatt and Lee [26] studied the influence of defective items on the classical EOQ model and suggested producing in smaller lots when the process is not perfect. Paknejad et al. [23] considered the number of defective items in a lot to be random variable and examined the effect of defective items on the operation characteristics. Salameh and Jaber [27] extended the traditional EOQ model by accounting for imperfect quality items and assumed that these items are withdrawn and sold as a single batch by the end of the screening process. Singh et al. [33] developed a two warehouse model with imperfect quality items with learning effect which is more realistic. Hsu and Hsu [10]