

EPQ model with continuous quality characteristic and rework

Morteza Rasti Barzoki

Isfahan University of Technology, Iran
Department of Industrial Engineering and
Systems

E-mail: m_rasti@in.iut.ac.ir

Jia Chi Tsou

China University of Technology, Taiwan
Department of Business Administration
E-mail: jtsou.tw@yahoo.com.tw

Wen-Jinn Chen

China University of Technology, Taiwan
Department of Business Administration
E-mail: fg008.adsl@msa.hinet.net

Abstract

The economic production quantity (EPQ) is a well-known and commonly used inventory control technique. In this paper, we develop an EPQ model with continuous quality characteristic and rework. We consider a situation that the distribution of produced items follows a general distribution. We suppose when an item is produced, it may be a perfect, imperfect or defective item. According our analysis, we find there is an optimal lot size, which generates minimum total cost of our model. We also find that as the percentage of imperfect quality items is zero, or approaches to zero, the optimal lot size of our model is equal to the classical EPQ model.

Keywords : EPQ, Quality, Rework

1. Introduction

The relationship between quality and EPQ model has been diversely studied over the last decade and the work by Porteus was believed to be the starting point [1]. In Porteus' paper, the concept of quality control has been brought into a production system. Following his work, a stream of research has examined the relationship between the economics of inventory and quality of products. Rosenblatt and Lee [2] concluded that the presence of defective products motivates smaller lot sizes. In a subsequent paper, Lee and Rosenblatt [3] considered using process inspection during the production run so that the shift to out-of-control state can be detected and restored earlier. Tapiero [4] links optimal quality inspection policies and the resulting improvements in the manufacturing costs. Fine [5] uses a stochastic dynamic