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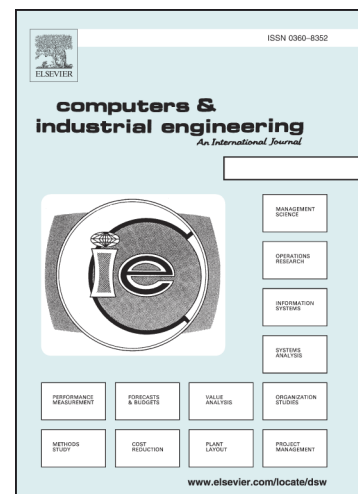
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PROFIT OPTIMISATION FOR DETERMINISTIC INVENTORY SYSTEMS WITH LINEAR COST

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Article Title: OPTIMISATION OF DETERMINISTIC INVENTORY SYSTEMS WITH LINEAR COST

Abstract

A well-designed inventory system is critical to the success of any business organisation. One of the major challenges of inventory managers is to determine an inventory optimisation strategy that ensures the right balance between keeping enough inventory on hand to meet customer demand and optimising costs related to holding inventory. This paper focuses on providing a general inventory optimisation strategy to support business organisations. We examine a general deterministic model of inventory in which the rate of demand is determined by price and the rate of decay can change over the cycle time. For this general model we examine the profit function arising when the costs are linear with respect to the number of items purchased in the inventory cycle and the total item-time of holding. This framework encompasses a wide range of deterministic models that have appeared in the literature and are useful in practice. Within this framework we derive optimisation results for the cycle time and price. We show how these results apply for particular deterioration functions and demand functions. This allows us to extend present inventory literature to give the solution to a more generalised problem. Our results are analytically and numerically compared with existing specific results in the inventory literature.

DETERMINISTIC INVENTORY MODEL; GENERALISED-EOQ MODEL, PRICE; DEMAND; DETERIORATION; PROFIT OPTIMISATION.

MATHEMATICS SUBJECT CODES (MSC 2010): 90B05; 93C15; 90C30; 91B38; 91B74; 60E05.

1. Introduction

Inventory management problems arise in many settings such as business and industry (Chou et al 2012; Porras and Dekker, 2008), military logistics (Attack, 1975; Bean et al 2016), humanitarian operations (Whybark, 2007; Balcik eta 2016; Hu eta 2017), water reservoir and oil depot (Xu et al 2012; Choi et al 2015), energy storage systems (Zhang et al 2014; Schneider eta 2016), and so forth. Inventory optimisation provides organisations with a useful

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