On optimally coordinating supply chain inventory system for deteriorating items taking account of time value

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Abstract

In this paper, we employ the discounted cash flow approach to investigate inventory policy under time discounting for deteriorating items among all the partners in a supply chain system with a single vendor and multiple buyers. Our goal in the research is to find the optimal replenishments so as to minimize the average total costs over a finite planning horizon. By utilizing our theoretical results, we propose a search algorithm that can efficiently solve the optimal solution. Sensitivity analysis with respect to related parameters on coordinated replenishment policy is presented.

Keywords : *Single-vendor multiple-buyers, deterioration, time value of money.*

Introduction

This study addresses an integrated inventory policy for a deteriorating item in a supply chain system, where the decision is influenced by the time value of money. The vendor distributes a deteriorating item to the buyers, whose replenishment cycle, denoted by T_i, is assumed to be an integer-ratio fraction of the replenishment cycle of the vendor (denoted by T). That is $T_i = T/n_i$ and $n_i \in \{1, 2, 3, 4, \ldots\}$ for all i. The purpose of this research is to ascertaining the replenishment cycle and frequencies of

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