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Centralized and decentralized inventory policies for a single-vendor two-buyer system with permissible delay in payments

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Abstract

In today's business transactions, vendors usually offer their buyers a delay period in payment. This strategy has benefits to the vendor since it attracts new buyers who consider the delay period as a type of price reduction. In addition, permissible delay in payments also is advantageous for the buyers since they do not have to pay the vendor immediately after they receive the items. In contrast, the buyers can delay the payment until the end of the allowed period and during the credit period they can earn interest on the accumulated revenues. However, if the payment is not settled by the end of the credit period, a higher interest is charged. Under this scenario, an inventory model consisting of a single vendor which supplies an item to two different buyers is analyzed. First, we address the problem assuming that buyers and vendor are willing to cooperate and the integrated model is derived in terms of single-cycle policies. Next, we analyze a decentralized model where the buyers and the vendor make decisions independently. A numerical example is solved to illustrate both strategies. We carry out a computational study to compare integrated and decentralized policies. A sensitivity analysis is also performed to examine the effects of each parameter on both total costs. According to the computational results and the statistical analysis, in most scenarios the integrated policies outperform the decentralized strategies.

Keywords: One-vendor two-buyer inventory system, permissible delay in payments, integrated policy, decentralized policy.

1 Introduction

Traditional inventory models are based on the assumption that the supplier is paid for the items immediately after the buyers receive them. However, in today's business transactions it is frequent that vendors offer their buyers a delay period in payment. In fact, nowadays trade credit is widespread and represents an important proportion of company finance. Especially small businesses with limited financing opportunities may be financed by their suppliers rather than by financial institutions. Under this strategy the buyers can delay the payment until the end of the allowed period and during the credit period they can earn interest on the accumulated revenues. In contrast, if the payment is not settled by the end of the credit period, a higher interest is charged. From the perspective of the

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