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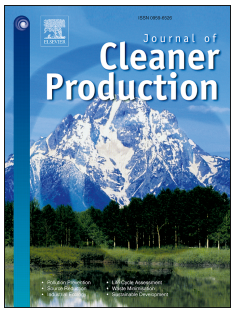

Economic and social collaborative decision-making on visit interval and service level in a two-echelon pharmaceutical supply chain

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Economic and social collaborative decision-making on visit interval and service level in a two-echelon pharmaceutical supply chain

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Abstract

In this paper, simultaneous coordination of visit interval and service level in a two-echelon pharmaceutical supply chain (PSC) with stochastic demand is studied. In the investigated model, a single pharmaceutical supplier (pharma-supplier) visits a single pharma-retailer at constant intervals and subsequently delivers the order after a deterministic lead-time. The pharma-retailer employs a periodic review inventory system and decides on the PSC service level, which impacts on the pharma-supplier's profitability. On the other hand, the pharma-supplier has full authority over the visit interval which determines order delivery frequency and consequently impacts on the pharma-retailer's inventory costs. Firstly, both members' decisions under decentralized and centralized decision-making structures are investigated, and afterward collaboration models are proposed in two different scenarios: (1) economic collaborative decision-making and (2) social collaborative decision-making. Finally, a set of numerical examples is carried out to compare the performance of different decision-making structures. The results indicate that collaborative decision-making on visit interval and service level could be of great benefit, both socially and economically.

Keywords: Pharmaceutical supply chain, Collaborative decision-making, Visit interval, Service level, Social responsibility

1. Introduction

Reports show that pharmaceuticals form a significant proportion of healthcare expenditures. For instance, health statistics indicate that expenditures for prescription drugs in the United States accounted for 9.8 % of all national healthcare expenditures in 2014 (National Center for Health Statistics, 2016). Moreover, global spending on medicines is estimated to be about $1.07 trillion in 2015 and it is projected to reach $1.4 trillion by 2020 (IMS Institute, 2015). The pharmaceutical industry can be considered as

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