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International Journal of Production Research ›
Volume 52, 2014 - Issue 1

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Vendor-managed inventory with consignment stock agreement for single vendor–single buyer under the emission-trading scheme

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Pages 20-31 | Received 26 Jun 2012, Accepted 23 Apr 2013, Published online: 01 Aug 2013

Cite this article https://doi.org/10.1080/00207543.2013.812812

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Abstract

This paper presents a joint economic lot size (JELS) model for coordinated inventory replenishment decisions under the vendor-managed inventory (VMI) with consignment stock (CS) agreement and an emission-trading scheme. The paper assumes a single product that flows along a two-level supply chain system, with a single vendor and a single buyer. The total cost of the system is the performance measure, which is the sum of the vendor's and the buyer's total costs. The total cost includes the set-up and order costs, inventory holding costs, greenhouse gases (GHG) emissions tax and penalty costs. A mathematical model is proposed to determine: (1) the vendor's production lot size quantity; (2) the number of shipments sent by the vendor to the buyer in a cycle; and (3) the production rate that minimises the total cost of the supply chain. Some numerical examples are carried out, as well as comparisons with the

traditional JELS model for a classic two-level supply chain. Results show that the performance of the system is better when it is operated under a VMI with CS agreement, which is capable of reducing the traditional inventory holding costs and, for some values of given parameters, the GHG emissions tax and penalty costs.

Keywords:

JELS | consignment stock | emissions tax | emissions penalty | variable production rate

Acknowledgements

The third author thanks the Social Sciences and Humanities Research Council of Canada (SSHRC) – Environmental issues – for supporting this research. He also thanks the Università degli Studi di Brescia for its support. The authors sincerely thank the reviewers for their constructive and valuable comments and suggestions that helped improve the paper.

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