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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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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

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