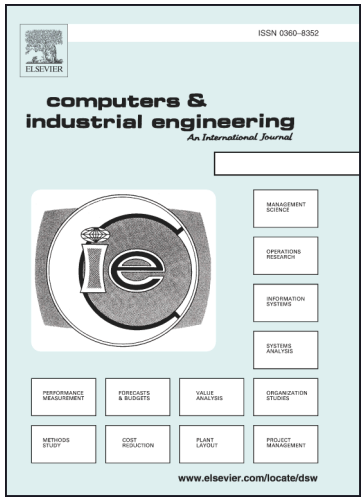
Accepted Manuscript



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PII: S0360-8352(17)30033-5
DOI: http://dx.doi.org/10.1016/j.cie.2017.01.014
Reference: CAIE 4614

To appear in: *Computers & Industrial Engineering*

Received Date: 2 March 2016
Revised Date: 4 January 2017
Accepted Date: 11 January 2017

Please cite this article as: Ferretti, I., Mazzoldi, L., Zanoni, S., Zavanella, L., A Joint Economic Lot Size Model with Third-party processing, *Computers & Industrial Engineering* (2017), doi: http://dx.doi.org/10.1016/j.cie.2017.01.014

A Joint Economic Lot Size Model with Third-party processing

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Abstract

This contribution presents a production-inventory model for a supply chain that incorporates three distinct entities a Vendor, a third-party external Manufacturer and a Buyer. The Vendor purchases raw materials from a supplier and performs preliminary manufacturing operations, the semi-finished goods are sent to a third-party Manufacturer for additional manufacturing operations then the products are sent back to the Vendor for final operations or assembly with other components and finally they can be sold to the customer. The study of this particular Supply Chain configuration has been inspired by an industrial case observed in the aeronautical sector.

The aim of this work is to analyse the performance of different supply chain configurations with third-party processing for operations carried out by the Manufacturer. The first option is to consider a traditional production-inventory system where the Vendor and the Manufacturer follow a centralised traditional agreement policy. The second option involves a centralised Vendor Managed Inventory policy with consignment stock agreement between the Vendor and the Manufacturer. The objective is to determine the optimal lot size policy, i.e. traditional agreement or consignment stock agreement, in order to minimize supply chain total cost.

Finished goods are assumed to have price-independent deterministic demand, while cost components are assumed to be constant over time. The analysis is carried out considering system total cost as the objective function to be minimized.

Keywords: JELS, supply chain, outsourcing, consignment stock, third-party processing.

1. Introduction

In order to create and maintain competitive advantages in today's business environment, a high level of coordination is required in supply chains. To assist decision makers in operations decisions in supply chains, the concept of joint economic lot size (JELS) model has been