

A generalized management strategy for a single vendor single buyer system with a constraint on the transport capacity^{*}

Yesser YEDES^a, Anis CHELBI^a, Nidhal REZG^b

^a *Centre de Recherche en Productique (CEREP)*

École Supérieure des Sciences et Techniques de Tunis

5 Av. Taha Hussein, Montfleury -Tunis, Tunisia

^b *Laboratoire de Génie Industriel et de Production Mécanique (LGIPM), Université de Metz,*

Ile de Saulcy, 57045 Metz, France

Abstract

This paper presents a generalized model to manage production, inventory and shipment in the context of a single vendor-single buyer supply chain. We consider a standard continuous (r, Q) review policy according to which the buyer orders a batch of size nQ every time his on hand inventory reaches the reorder point r . The vendor manufactures separately smaller batches of size iQ and makes equal shipments of size jQ ($1 \leq j \leq i \leq n$) limited by the capacity of the transport equipment c_i . The objective is to determine the best combination (n, i, j, Q, r) that yields the minimal total joint average cost per time unit, incurred by the vendor and the buyer, under the constraint on transportation capacity, considering a normally distributed demand during a variable lead time. The mathematical expression of this average cost rate is developed and a computational procedure is used to determine an approximate optimal strategy for any given situation. The influence of some parameters (buyer's and vendor's holding costs) that could affect the solution is examined and a comparison with two previous strategies is performed to prove the pertinence of this generalised one.

Key words: Supply chain management, Inventory, Production, Shipment, Constraint

1. Introduction

The problem of supply chain optimisation has been treated widely and differently in the literature during the last decades. All integrated strategies and solutions proposed insist on the necessity of founding a strategic association between vendors and buyers. Such association, synonymous of a long-term cooperative relationship between all parties, is built through better collaboration and continuous information exchange.

Most of management models developed in different supply chain configurations deal with the integration of the vendor's as well as the buyer's production, inventory and shipment problems. The main objective being to minimize the total joint relevant cost (which represents the sum of the different costs incurred by the buyers and the vendors and considered in the problem formulation) determining optimal values of different decision parameters involved in the problem (production lot size, shipment lot size, reorder point, number of shipments, shipment dates, etc...).

^{*} This paper was not presented at any other revue. Corresponding author: Anis Chelbi Tel. +216-71-392591. Fax +216-71-391166

Email addresses: anis.chelbi@planet.tn (Anis Chelbi), yedes@univ-metz.fr (Yesser Yedes), nrezg@loria.fr (Nidhal Rezg)