

Chapter 16

Inventory Cost Share for Supply Chain Coordination by Means of Contracts

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ABSTRACT

This chapter highlights the importance of contracts for coordination between companies in a supply chain. It considers a dyadic situation, with a supplier and a retailer. Coordination is achieved by two types of decisions: economic (concerning prices established and stated over a contract), and physical exchange of products (concerning the inventory that is going to be held by the retailer). First one contract with a simple pricing scheme is considered, and then two contracts with inventory holding cost shared among the companies of the supply chain. The former is presented to explain the general situation and the two last ones to explain different schemes of inventory cost share. A numerical example is also shown. The objective is to illustrate that a supply chain may be efficiently coordinated if the companies establish contracts with inventory holding cost share.

INTRODUCTION

The study of dyadic supply chains has experienced a growing interest the last decade, and it has been approached from different points of view. One of the approaches is, like the one of this document:

cooperation, as Liu and Wang (2007) who revealed the importance of cooperation among members of a supply chain concluding that actual competition is between supply chains, not between companies. Other of the approaches is partnership. Tyan and Wee (2003) identify four strategies of retailer-supplier partnership and consider that vendor managed inventory (VMI) is the highest level

DOI: 10.4018/978-1-4666-0246-5.ch016

of partnership. “VMI partnerships occur when downstream supply chain customers choose to partner with their suppliers. Agreements are made as to where the inventory is stored, either at the supplier site or the customer site, and when the billing for the inventory will take place, either upon shipment to the customer or upon use of the part. Further, the supplier will often take control of actually managing inventory levels for the customer. In some cases, a customer representative may be located at the supplier’s site to help manage the activity, or vice versa, as in the retail store. The advantage to the supply chain is that transactions are often automated and redundancies in paperwork are reduced.” APICS, 2009 (p.57). VMI has also growing interested, and many approaches are found on literature, going from the conditions for adoption (Dong et al., 2007) to operational decisions for cost reduction (Yao et al., 2007; van der Vlist et al., 2007). VMI should not be confused with a buy back contract; under a VMI scheme the supplier will manage the inventory and in the approach of this document under a buy back contract scheme the retailer manage the inventory.

“Optimal supply chain performance requires the execution of a precise set of actions. Unfortunately, those actions are not always in the best interest of the members in the supply chain, i.e., the supply chain members are primarily concerned with optimizing their own objectives, and that self-serving focus often results in poor performance. However, optimal performance can be achieved if the firms coordinate by contracting on a set of transfer payments such that each firm’s objective becomes aligned with the supply chain’s objective” Cachon (2004). A contract is an agreement between two or more parties that creates for each party a duty to do something (e.g., to provide goods at a certain price according to a specified schedule) or a duty not to do something (e.g., to divulge an employer’s trade secrets or financial status to third parties); (Britannica Concise Encyclopedia online, July 2011). It is a business arrangement

for the supply of goods or services at a fix price (Merriam Webster dictionary online; July 2011). A contract may be oral or written. Contracts explain the financial flows and the physical flows generated among contracting companies, this is the reason why our attention is centered on contracts.

This work centers on identifying, for the companies of a dyadic supply chain related under a given contract, what are the decisions to be taken considering his own interests of profit. Each company knows that these decisions are going to influence the decisions that the other company will take and will impact the coordination of the chain. The interest of this work is on financial flows and physical flow. Attending the financial flows, the analysis is in terms of price and in terms of the reasons that activate a monetary transfer between the companies. Attending the physical flows, the interest is in terms of quantities of the exchanged product. A financial flow may occur by several reasons. A very clear reason for a financial flow is that a company buys a product from his supplier, but there exist other reasons depending on the contract, two examples are: when the company sells a quantity of products over the final market, or when the company doesn’t sell all the products and has to hold them as stock. Physical flows occur when one a company orders a quantity of products, so the ordered quantity will be physically transferred, and this units will be either sold, kept in stock or put aside as unsold.

From an economic point of view, the contracts will determine the behavior of each company taking into account its objectives of profitability (profit maximization). The economic conditions of the exchanges specified over contracts, determine the behavior of the companies and thus the effectiveness of coordination of the supply chain.

The document first presents a literature review concerning coordination and contracts and then the general model is introduced. This general model is not considering the type of contract, and specifies the profit maximization functions for the retailer and the supplier. With the general model

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