VALUE OF INFORMATION SHARING AND COMPARISON WITH DELAYED DIFFERENTIATION

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15.1 INTRODUCTION

The industrial supplier-customer relations have undergone radical changes in recent years as the philosophy behind managing manufacturing systems continues to be influenced by several Japanese manufacturing practices. As more organizations realize that successful in-house implementation of Just-In-Time alone will have limited effect, they are seeking other members of their supply chain to change their operations. This has resulted in a certain level of co-operation, mainly in the areas of supply contracts and information sharing, that was lacking before. This is especially true when dealing with customized products, and is most commonly seen between suppliers and their larger customers.

The motivation to study the benefits of information arose because of differing reactions to Electronic Data Interchange (EDI) benefits from industrial sources: while some were very happy with improved information, others were disappointed at the benefits (see [1] and [16]). Thus, while information is always beneficial, we would like to know when it is most beneficial and when it is only marginally useful. In the latter case, some other characteristic of the system, such as end-item demand variance or supplier capacity may have to be improved before expecting significant benefits from information. Thus, our computational efforts will be directed towards understanding some of these issues.

In section 1 we incorporate information flow between a supplier and a customer in a two-echelon model that captures the capacitated setting of a typical supply chain. We consider two situations: (1) the supplier has the information of the \((s, S)\) policy used by the customer as well as the end-product demand distribution; and (2) the supplier has full information about the state of the customer. We show that order up-to policies continue to be optimal and develop solution procedures to compute the optimal parameters. Study of these models enables us to understand the relationships between capacity, inventory and information at the supplier level and how they are affected by customer \(S - s\) values and the end-item demand distribution. We estimate the savings at the supplier due to information flow and study when information is most beneficial.

In section 2 we extend the models in section 1 to incorporate two customers, each using an \((s, S)\) policy, ordering two different products or the same product. The customers may or may not be providing information about their inventories to the supplier. This gives rise to four models as depicted in Figure 15.8. These four models are connected through delayed differentiation and information sharing. The goal of this section is to study (from the supplier's perspective), in a simple yet representative setting, when one strategy would be preferred over the other and how one can enhance the other if applied simultaneously.

Majority of the previous research in this area, i.e. incorporating information flow into inventory control and supply chains, has assumed the presence of infinite capacity which is not the case in this chapter. Zheng and Zipkin