The Need for Collaboration in the Supply Chain For Successful Direct Shipments

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ABSTRACT

Manufacturers and E-commerce retailers have recently attempted to reduce transportation and warehousing costs by directly shipping products from factories to customers as part of their order fulfillment strategy in today's competitive market environment. The direct shipment is a promising strategy for reducing logistics costs and supply chain (SC) lead time. However, there are many factors to consider for processing the direct shipments, such as due date, transportation cost, production schedule, and so on. Thus, this paper addresses the needs for close collaboration of functions (e.g., marketing and production) in the SC to implement the direct shipment operation successfully.

INTRODUCTION

The traditional delivery of products is to send products from a factory to a D/C and then from the D/C to a customer. In today's e-commerce environment, an alternative approach to fulfilling the orders that is a direct shipment from a factory to customers has been employed to lessen transportation costs, eliminate warehousing costs, and shorten the logistic lead time. When manufacturers will implement direct shipments from their factories to customers, the direct shipment operation will be another new process added to the conventional order fulfillment process of delivering products from D/Cs to customers. In addition, direct shipments will require non-trivial decision processes in consideration of due date, transportation time, logistics costs, inventory aging at the D/Cs, production schedule, and material availability, and involve marketing, order processing, warehousing, and manufacturing departments in the process. Past direct shipment-related research, such as Barnes-Schuster and Bassok [1], and Liu, et al. [4], focused on mainly developing quantitative models for solving a specifically-defined problems rather than addressing strategic and managerial issues associated with the direct shipment operation.

Thus, this research presents a comprehensive study on the direct shipment processes, the dimension of factors to be considered, information necessary for the direct shipments, and departments involved and their collaborative roles required. Part of this research has been implemented at a U.S.-base sales subsidiary of Samsung Electronics Company of which headquarters is located in Korea.

DIRECT SHIPMENT PROCESSES

A decision process for determining direct shipments from orders requires accurate information about inventory and their aging at D/Cs and a factory warehouse, due date and delivery time window, production schedule, material availability, availability of trucks, transportation time, etc. Thus, a direct shipment decision support system (DSS) needs to be developed to determine which order itself can be a direct shipment because of sufficient order size, and which orders can be grouped for direct shipment. The direct shipment DSS should provide optimal decisions for the following questions:
(1) Are there too much or aging inventories in the D/C?

(2) Are there inventories in the factory?
(3) If there are not sufficient inventory for an order, can products for the order be produced and delivered to the customer by due date?
(4) Is the order a TL size?
(5) Is a direct shipment cost-effective?
(6) Can the order be delivered by due date using the direct shipment?

COMPLEXITY OF THE DIRECT SHIPMENT OPERATION

The complexity of the direct shipment operation increases in three dimensions: the number of products in a shipment, the tightness of delivery due dates (i.e., the length of allowed delivery time window), and the number of destinations. The direct shipment process involves several departments in the decision: marketing, logistics, manufacturing, order processing, and purchasing department. Collaborative cooperation and coordination among all relevant departments are necessary for successful direct shipments in the SC, as illustrated in Figure 1.

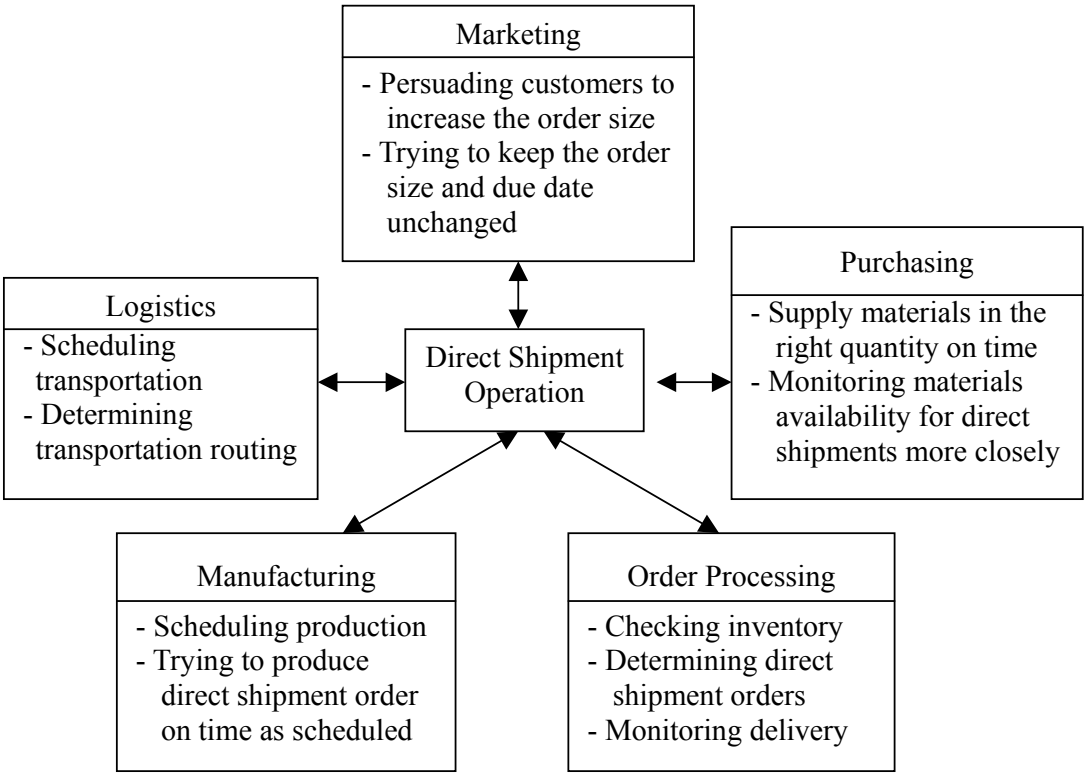

Figure 1. All Relevant Departments and Their Roles for Successful Direct Shipment

When customers applies penalty to early and/or late delivery beyond the pre-specified delivery time window, the direct shipment operation is not easy task to accomplish because scheduling and routing of a truck may be difficult due to the tight delivery time window, and the production schedule may be changed due to quality problems, lack of materials, or break-downs of machines.

When the products should be delivered to more than a destination, the direct shipment operation is getting more complicated. This kind of delivery is well known as “milk-run” delivery, which have been treated in the literature of vehicle routing and traveling salesman problems. Dumas, et al [2] presented an optimal algorithm for the traveling salesman problem with time windows which minimizes the total traveling costs. Similarly, Lau, et al. [3] developed an algorithm for the vehicle routing problem with time windows and a limited number of vehicles.

When the direct shipment involves more than an order and more than a destination, there should be a trade-off among savings in transportation cost, longer delivery time, and a risk for early or late delivery so that the number of orders and destinations should be determined optimally. If the products are not immediately available at a factory, it should be checked if the products are scheduled to be produced before the due date and transportation lead time. If they are scheduled to be produced, then the order fulfillment system can assign a direct shipment for the order and notify its decision to the factory.

REQUIREMENTS FOR SUCCESSFUL IMPLEMENTATION

There are many requirements for successful implementation of this direct shipment operation: (1) accurate real-time information for inventory, production schedule, container size for each product model, and transportation cost, (2) stable production schedule, (3) on-time procurement and schedule of containers and trucks, and (4) collaboration of all parties involved in the direct shipment. Since most firms are nowadays implementing JIT concepts with slim inventories at factories, the coordination of all necessary activities for the direct shipment is quite challenging.

CONCLUSION

More-accurate, up-to-date information on customer demands can allow products to be delivered in the most direct way, thereby lowering cost and improving efficiency. Manufacturing firms, as presented in this paper, can take the demand information that supply chains capture and use it to assemble and allocate final goods on demand, improving efficiency by shipping products to the final destination with fewer intervening stages.

If products are of high value and bulky and if customer demands are highly unpredictable, postponement of the logistics decision and keeping the direct shipment as a viable options should be part of the company's supply chain strategy. Without such an option, high product cost and customer demand uncertainty would require sizeable inventory, stocked in numerous locations—an undesirable and expensive proposition. To implement the direct shipment operation successfully and optimally, all participating department should work closely, and a well-designed decision support system should be employed to make several complicated decision processes explained in this paper. In addition, the direct shipment operation should be aware of the importance of on-time delivery for satisfactory customer service, especially to avoid penalty for early/late shipments.

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