Chapter 24
Supply Chain Design Approaches for Dual Demand Management Strategies

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ABSTRACT

Supply chain management involves efficiently integrating suppliers, manufacturers, warehouses, stores, and customers. To survive in a highly competitive business environment, manufacturing, resource planning and scheduling and distribution operations are the significant drivers that need to be optimized within supply chain management. In this chapter, we design the supply chain system considering dual demand management strategies simultaneously for the same company, both engineer-to-order (ETO) and make-to-order (MTO). This research has been inspired from the window manufacturer which manufactures and distributes vinyl windows to meet new construction and replacement/remodeling sector demand in the State of Ohio. The company manufacturers windows based on make-to-order strategy for new construction projects and at the same time builds replacement windows to individual customer specifications in very small quantities to be used for replacement in homes. In this study, a total of 174 individual customers and six big contractors are considered throughout the State of Ohio. This paper proposes to separate products based on demand management strategy and develop different supply chain networks for each group. The idea is to design bigger facilities for high volume (make-to-order products) as transportation cost per unit is reduced due to economies of scale whereas to place smaller and more facilities for low volume engineer-to-order products to be closer to the clients where it may not feasible to carry a only few products over long distances. All in all, this study provides nested models to integrate both design and operational aspects of supply chain system in the presence high-volume and low-volume of window products. Moreover, all location, design and manufacturing operations are performed by considering new mathematical models (mixed-integer and integer mathematical models) and heuristics in engineer-to-order demand management environment. Normally-distributed, probabilistic demand environment

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Supply chain management (SCM) is described as a “set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize the systemwide costs while satisfying service level requirements” (Simchi-Levi, 2009).

Simchi-Levi (2009) emphasizes that the objective of supply chain management is to be efficient and cost effective across the entire system. The overview of a supply chain system is illustrated in Figure 1.

Chopra (2007) indicated supply chain network design decisions that include the assignment of facility role, location of manufacturing, storage, or transportation-related facilities and the allocation of capacity and markets to each facility. In this dynamic supply chain, facility location decisions have

Figure 1. An overview of Supply Chain Network
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