DESIGNING PRODUCTS AND PROCESSES FOR POSTPONEMENT

Hau L. Lee
Dept. of IE-EM, Stanford University
Stanford, CA 94305.

Corey Billington
Hewlett-Packard Company
3000 Hanover Street, Palo Alto, CA 94304.

Abstract: Companies that compete in a global market have to manufacture and configure products to meet the diverse needs and demands of customers. Such diverse needs can result from geographical differences, government regulations, or simply differences in customer preferences and tastes. Uncertainty in the market place makes it extremely difficult to forecast product demands accurately. This results in high inventory costs and low product availability. Postponement is a strategy whereby the final configuration of a product is delayed as much as possible, usually until a customer order is received. Postponement ranges from simple packaging and labeling, bulk packing or special customization, to more complex forms such as localization, assembly and test, and final product integration. Effective implementation of postponement requires careful redesign of the products and the processes involved. In this paper, we describe a conceptual framework for design for postponement, and the appropriate cost drivers that can be used to assess postponement strategies for a company.

1. Introduction

In recent years, there has been increased emphasis on the incorporation of manufacturing considerations in the design phase of a product. It has been found that the product's manufacturing cost is largely determined by the design of the product. Consequently, it is important to include considerations of the costs, efficiency and quality aspects of manufacturing in the design phase. Concepts such as "design for manufacturability," have
emerged both in research and in practice (see Whitney, 1988, Dean and Susman, 1989, and Taguchi and Clausing, 1990). We note, however, that manufacturing is one step in the order fulfillment cycle of the product. We contend that product and process designers should look beyond manufacturability to order fulfillment in their considerations.

Today's marketplace is marked by diverse customer tastes and preferences, globalization of the market, and rapid technological advances. These factors, as described below, led to a proliferation of product options and models which, in turn, present major challenges to operations managers. While there have been increased pressures for marketing departments to control the proliferation of product variety (see Fisher, 1992, for an excellent review of such a problem), companies are beginning to discover that great opportunities can be found in the design of products that provide much greater efficiency and flexibility in the logistics and distribution aspects of the order fulfillment cycle. Lee (1991) coined the term "design for supply chain management" to describe such design concepts. In this paper, we describe and discuss one such concept, known as "design for postponement."

2. The Curse of Product Variety

In a global market, due to the different local requirements in taste, language, environment and government regulations, multiple versions of a single product are required, each meeting the specific requirements of a local geographical region. For example, computer products for various countries may differ in the power supply module to accommodate local voltage, frequency, and plug conventions. Keyboards and manuals must match local language. Telecommunication products may also be differentiated by the communication protocols supported. In some cases, the need for localized versions of a product results from government-imposed local content requirements. It is increasingly necessary for operations managers to overcome the challenges associated with the large number of product options existing in most products.

Even within the same geographical region, there may also be multiple models of the product within a product family that relate to different functionalities or capabilities of the product. These different models may also reflect the differential needs of different market segments, e.g., business, education, personal, or government sector. Hence, it is not uncommon to have significant proliferation in product numbers within a single product family. Moreover, with rapidly changing technologies, a company often has to produce multiple versions, representing different upgrades, of the same product. These factors have contributed to the need for mass customization of a product.