

# An approach to link customer characteristics to inventory decision making

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## Abstract

Differentiation of logistics services through distinct inventory policies is analyzed. A framework is presented in which product-based information is supplemented by customer-specific characteristics when deciding on the inventory policy for a specific product. Product-based information includes sales volume and variation by product. Customer information consists of purchase volume and its growth potential, and evaluation of the effects that service level has on purchases. Delivery time is used as service measure and inventory policy consists of selecting the production mode from make-to-order, make-to-stock, or one of their variations. As a result, distinct inventory policies are formed.

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*Keywords:* Inventory policy; Customer service; Make-to-order; Make-to-stock

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## 1. Introduction

One possibility for a company to differentiate itself from the competitors is to offer better logistics services. For a traditional make-to-stock company one alternative to carry out this value-added logistics strategy is to move the location of inventories at least partially towards the customers. In order to shorten delivery times for some of the products and customers, market area stocks or even customer-dedicated consignment stocks can be established (e.g. Meijboom, 1999). On the other hand, it could be feasible, from the cost-efficiency point of view, to operate with some of the products and customers on a make-to-order

basis. Therefore, it could be justified in many circumstances to design product and customer-specific production mode and inventory location policies (Giesberts and van der Tang, 1992; Fuller et al., 1993).

Classification of decision-making situations according to some identifiable criteria is a popular approach for designing policies that match the requirements of specific situations. A well-known classification scheme in production and inventory management is ABC analysis, in which the classification is based on the monetary value of item sales or usage. However, many decision-making situations require more refined classification according to more than one criterion (Vollman et al., 1988). The traditional approach has been expanded by including, e.g. item criticality as additional classification criteria (Flores and Whybark, 1989). Cohen and Ernst (1988) have

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presented a clustering method with which multiple criteria can be used in classification. With multiple criteria approach, criteria other than product-based criteria can be included in the analysis. E.g. in a physical distribution application Fuller et al. (1993) used criteria related to sales volume, order size, coordination, delivery and handling requirements. De Leeuw (1996) used characteristics of products, processes and markets to discriminate distribution control situations. For designing differentiated logistics service arrangements van der Veecken and Rutten (1998) determined separate customer order profiles according to three types of attributes: general customer attributes (sales), customer order attributes (e.g. number of deliveries), and product logistics attributes (product value, product size).

When designing differentiated policies, it is important to have a balanced view of both the effectiveness of service improvements and how efficiently they can be achieved. In this paper we make an attempt to link customer analysis into inventory policy decision making so that aggregate demand information is supplemented by customer-specific characteristics when deciding on the inventory policy for a specific product.

**2. A framework for linking customer characteristics to inventory decisions**

In business-to-business environment, it is often reasonable for a typical make-to-stock firm to produce part of the products on a make-to-order basis. Between these main options, there is a hybrid mode, the so-called periodical production, where products are made to order cyclically according to pre-announced fixed intervals. Furthermore, within the make-to-stock policy

there are typically at least three inventory location options. Inventories can be held at a mill warehouse, at a market area warehouse or at the customer’s premises (customer-dedicated consignment stocks).

Considering the length of order lead time provided to the customers, these five options form a continuum (see Fig. 1). The shortest order lead time is provided by consignment stocks and the longest by make-to-order alternative. The choice within this continuum between the operating modes is based on product-, customer- and market-specific factors. We propose a framework in which both products and customers are categorized and the solution is achieved by combining these two analyses.

The framework for choosing the inventory policy consists of four stages (see Fig. 2). First, the products are categorized in order to achieve an initial proposition for an inventory policy for each product. In the second stage, customers are analyzed to find out their present importance and potential future attractiveness from supplier’s point of view. In the third stage, the key issue is to identify customer groups or segments, which have similar requirements with respect to the inventory policy. In the fourth stage, the results of product analysis and customer characteristics analysis are combined in order to produce a refined inventory policy. Also, the service and inventory investment effects of the planned changes for the key customers are checked before the new, redesigned inventory policies are put into effect.

The framework is illustrated by a case study data material. The case company is a small firm producing packaging products for industrial purposes and retailers. The data consisted of one year’s events of 185 different products, which were bought by 384 customers. The firm was almost

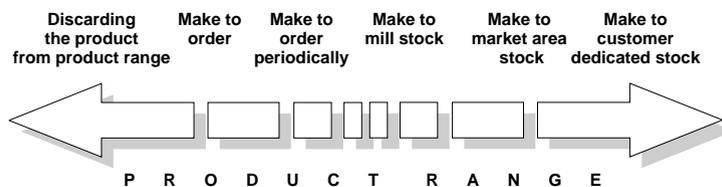


Fig. 1. Control policy alternatives.

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