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# The role of C-products in providing customer service—refining the inventory policy according to customer-specific factors

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## Abstract

An approach is provided for categorizing C-products on the basis of their significance for the business through their customer service effects. In the approach, C-products are considered significant for two types of service reasons: (1) C-products, which are mainly sold to the most important customers, and (2) C-products, which are mainly sold in connection with A-products and are necessary for making a complete order. These customer service-related aspects are combined with product-related variables such as demand volume and variation to categorize the products into distinct clusters for which different service policies can be exercised. A self-organizing map, which is a flexible tool for clustering problems, is used for creating product groups. The approach is illustrated with an application of a wholesale company in a constructing business. As a result of the analysis, the C-products are categorized as service products (with local availability policy), slow response products (centralized stock policy), and non-important products (potential ones to be discarded).

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*Keywords:* Customer service; Inventory; Clustering; Self-organizing map

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## 1. Introduction

In practical inventory management, stock-keeping units are usually classified according to their demand (usage) volume so that a whole category of items can be managed with one policy. This is

efficient especially with low-volume C-items in order to keep transactional costs low. In some circumstances, such as retail and wholesale businesses, new products are introduced frequently and this may change the demand rates of the existing products or even make some products obsolescent. This causes the number of SKUs to increase and may create excess inventories in the course of time. Therefore, it is useful to analyze whether there is real need of keeping all the products in the assortment and whether a high

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service level is needed for all of them. In practice, manager's time is a very scarce resource and approaches are needed by which the manager's working time is reduced as much as possible. Therefore, it is essential to use managers' time to become convinced that the selected items to be discarded are really not necessary for the business. In other words, our fundamental aim has been to develop a method to reduce the work needed to tackle with the C-items.

A useful approach to improve the efficiency of the inventory resources is to differentiate the service level offered. This means improving the service when it most affects customer satisfaction and sales, and reducing the service when resources can be saved without the risk of losing any significant business. An important question is, how to decide on and what information to use for the service differentiation. To get a balanced view, information is needed about the products' demand pattern as well as the individual customer's service requirements. Furthermore, to make economically justified decisions, the importance of the products to the business has to be included in the analysis, too. There are several examples of using some parts of the required information in logistics service planning, e.g. segmentation of customers on the basis of service requirements (e.g. Christopher, 1992; Lambert & Stock, 1993), and on the other hand differentiating inventory policy on the basis of product sales volume (the standard ABC-analysis). There are fewer examples in which all types of information are effectively utilized in making the policy decisions. This is the research question in this paper: *how to incorporate the relevant customer-specific information (service requirements and economic importance) with the other product-logistics information (such as demand pattern, order behavior) in inventory policy decision-making*. More precisely, the purpose of the study is to present a procedure, which categorizes a company's products on the basis of this input information into distinct groups for which specific policy decisions (such as service level, inventory location and assortment decisions) can be made (Fig. 1). Especially, we focus on C-products for which managers do not want to use too much analyzing time. From the managerial point of view

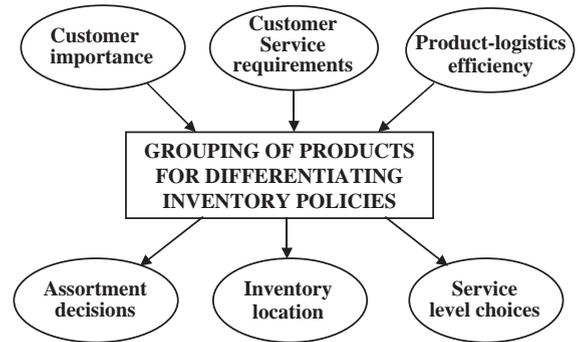


Fig. 1. Inputs and outputs of the analysis.

in this case, the developed approach gives an answer to three questions:

1. Are there some C-items we can stock centrally?
2. Are there some C-items we can totally discard?
3. What C-items do we need and why?

The contribution of the approach is that it is a much less resource-consuming method than scanning the C-items one by one. It also gives a general view of the C-items to the managers.

The study is made in the context of managing a wide assortment of products with different customer service effects. Since the analysis requires the use of multiple variables in product categorization, a neural network technique, a self-organizing map (SOM), is applied for dealing with this clustering problem.

The paper is organized as follows. In the next section, the problem context is described and the related theoretical viewpoints referred. Section 3 explains the phases of the analysis, the variable selection, and the technique used in the clustering phase. Section 4 presents the results of the analysis and the interpretation of these results in the case example. Finally, conclusions are drawn concerning the research problem in general and the techniques used during the analysis.

## 2. Description of the problem

The problem studied in this paper is relevant to any situation in which the stock is kept for serving

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