

Approaches to mass customization: configurations and empirical validation

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Abstract

Mass customization is a paradox-breaking manufacturing reality that combines the unique products of craft manufacturing with the cost-efficient manufacturing methods of mass production. Although this phenomenon is known to exist in practice, academic research has not adequately investigated this new form of competition. In this research, we develop a configurational model for classifying mass customizers based on customer involvement in design and product modularity. We validate this typology through an empirical analysis and classification of 126 mass customizers. We also explore manufacturing systems and performance implications of the various mass customization configurations. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Mass customization, once considered a paradox to be resolved in the future, has become an everyday reality for many manufacturers. Stanley Davis coined the term “mass customization” in his 1987 book, *Future Perfect*. Davis suggested that existing technology constrained possibilities for mass-customized products, markets, and organizations, although he said that the phenomenon would prevail in the future. More contemporary researches suggest that the advances in manufacturing, information technology

and management methods since the publication of *Future Perfect* in 1987 have made mass customization a standard business practice (Kotha, 1995; Pine, 1993). The confluence of these advances allows producers to customize at low cost and customers to reap the benefits of customized products with relatively low prices.

The practice of mass customization does not fit the conventional paradigm of manufacturing management. Historically, companies chose processes that supported the production of either customized crafted products or standardized mass-produced products. This traditional practice means that customized products usually are made using low volume production processes that cope well with a great variety of products and with design processes that

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can accommodate a high degree of customer involvement in specifying the product. In contrast, a mass production process is chosen for making standardized products in a high volume environment where great attention is paid to efficiency and capturing scale economies. Further, product variety is relatively low in mass production and customer involvement is sought through market research only to capture standard product design attributes that have wide appeal. In contrast to the traditional paradigm, Davis (1987) envisioned a one-of-a-kind product manufactured to customer specification without sacrificing scale economies. In this way, customers are able to purchase a customized product for the cost of a mass-produced item. Similarly, Pine (1993) defines the goals of mass customization as providing enough variety in products and services so that nearly everyone finds exactly what they want at a reasonable price.

Although these definitions provided by Davis and Pine sketch the essence of mass customization, they do not possess the specificity required to identify companies as mass customizers or how a company can achieve a mass customization capability. Accounts of mass customization practices in companies described in the literature label a broad range of production practices mass customization; however, the diversity of the practices and the companies further clouds the meaning of mass customization. In short, extant literature has not established good conceptual boundaries for mass customization, nor has that literature presented a means to distinguish among the vast array of mass customization practices in a way that lends clarity.

This paper addresses three important elements missing from the literature. First, we develop a conceptual model of mass customization to identify and classify mass customizers. This model is based on the key dimensions of mass customization and validated through literature, field studies, and survey testing. Second, we develop a classification scheme to group mass customizing companies according to the way they achieve mass customization. Third, we explore different approaches to mass customization implied by the typology by comparing the manufacturing approach of each type. Our approach yields mass customization configurations that are empirically validated.

We establish the external validity of the model through empirical investigation of companies in six different industries. By using a number of industries in our sample, we address the issue of whether mass customization is a robust concept applicable across a range of industries, or whether it can be applied only to a limited number of special cases. On the other hand, by limiting the study to six industries, we are able to show that mass customization is a competitive choice open to a number of competitors in the same industries. In addition, we are able to control and test for industry effects.

2. Research proposition

Because mass customization is a relatively new idea; scholarly literature related to the topic is scant. In this research, we seek to uncover the important dimensions of mass customization from an operations perspective. We argue that the essence of mass customization lies in resolving the seeming paradox of mass producing custom products by finding efficiencies in two key dimensions. First, mass customizers must find a means for including each customer's specifications in the product design. Second, mass customizers must utilize modular design to achieve manufacturing efficiencies that approximate those of standard mass produced products. Choices made by mass customizers on how they approach these two dimensions suggest a useful typology of mass customization:

Proposition 1. *Mass customizers can be identified and classified based on two characteristics: the point in the production cycle of customer involvement in specifying the product and the type of product modularity employed. Each mass customization configuration exhibits a distinct approach to the manufacture of mass-customized products.*

More specifically, we will suggest a classification with four fundamental, mutually exclusive types of mass customizers. We argue that this typology will also serve to identify manufacturers that *do not* mass customize.

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