



Fundamental modes of operation for mass customization

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Abstract

The concept of Mass Customization (MC)—producing customized goods for a mass market—has received considerable attention in the research literature in recent years. However, the literature is limited in providing an understanding of the *content* of MC strategies (the organizational structures, process technologies, etc., that are best in a particular environment) and the *process* of MC strategies (the sub-strategy that an enterprise should select and how they should go about implementing an MC strategy). In this paper six published classification schemes of relevance to MC are reviewed. The classification schemes are applied to five case studies of enterprises operating in an MC environment. The limitations of the schemes are analysed and their failure to distinguish key characteristics is highlighted. Analysis of the findings leads to the development of a taxonomy of operational modes for MC. Five fundamental modes of operation for MC are identified. These modes are described and justified and their application is illustrated by contrasting the information requirements of two modes. The potential of these modes to provide the foundations for detailed configuration models is discussed.

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1. Introduction

The concept of Mass Customization (MC)—producing customized goods for a mass market—has received considerable attention in the research literature since its identification by Davis (1987) and the influential book by Pine (1993). MC research is now at the stage of investigating and understanding how the concept can be operationalized across sectors. However, the scope of MC and hence the range of operations that qualify as

MC are unclear. There is agreement in the literature that an important goal of MC is to obtain economies of scope that enable customized goods to be as affordable as mass produced goods (Pine, 1993; Hart, 1995; Alford et al., 2000; Tu et al., 2001), but beyond this agreement two viewpoints of MC are emerging. One view is that MC is a label to be given to manufacturing enterprises exhibiting particular structural characteristics, for example as observed in companies that are offering consumers personal discretion over the attributes of products that have otherwise been mass marketed to them in standard off-the-shelf configurations. The other view is that MC is a performance ideal—giving customers the opportunity to have a product ‘any time they want it, anywhere they want it, any way

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they want it’—in a similar way that ‘zero defects’ is an ideal in respect of quality (Hart, 1995). This latter view turns MC into a standard that is independent of context and so is relevant to customizing enterprises in general. A pragmatic interpretation of MC that blends the two viewpoints is that MC is different from pure customization in that some compromise, limitations and constraints are inevitable if mass characteristics—responsiveness, efficiency, high throughput with high quality—are to be achieved and if premium prices are to be avoided (MacCarthy et al., 2002).

A unifying framework of MC is a goal of the research reported here and an open and pragmatic view of MC is a starting point. A further goal is the development of a suite of configuration models that satisfy the requirements identified by Bozarth and McDermott (1998) of providing understanding of the *content* of MC strategies (the organizational structures, process technologies, etc., that are best in a particular environment) and the *process* of MC strategies (the sub-strategy that an enterprise should select and how they should go about implementing the MC strategy).

A number of schemes for classifying MC enterprises, which are a precursor to configuration models, have been presented in the literature. However the suitability and potential of these schemes to provide the foundations for configuration models is unclear. In this paper we firstly review published classification schemes of relevance to MC. We then apply them to five case studies of enterprises operating in an MC environment in order to observe whether the schemes have the potential to group enterprises in a manner such that each group can benefit from similar organizational and technological solutions. Analysis of the findings leads to the development of a taxonomy of operational modes for MC. These modes are described and justified. The potential of these modes to provide the foundations for detailed configuration models is discussed.

2. Classification of MC approaches

Many researchers use the point where customization is undertaken as the primary dimension for

differentiating MC operations. An influential work on the subject of customization which takes this view is by Lampel and Mintzberg (1996). They divide the value chain into four stages—design, fabrication, assembly and distribution—and argue that customization tends to work its way from the customer back up the supply chain. They define a typology of five strategies that includes *pure standardization*, *segmented standardization*, *customized standardization*, *tailored customization* and *pure customization*. No one type is considered as *the* MC strategy, but a trend toward customized standardization is discerned.

A value chain perspective is implicit in Ross’s (1996) five approaches to providing mass customers with a high degree of choice. Ross does not describe the categories but does include example products. At one end of the spectrum is *core MC*, an approach in which the customer can modify core elements (e.g. NBIC bicycle—discussed later). Then comes *post-product customization* where a customizing service converts a standard product into a customized one (e.g. business software). Below this is *mass retail customization* where customization takes place at the retailer (e.g. spectacles), followed by *self-customizing products* (e.g. PC software, mobile phones), and lastly *high variety push* (e.g. wrist watches). Ross also talks about levels of customization ability, with the lowest being *cosmetic*, which he classes as the easiest type and includes offering a number of colours, surface finishes or materials. A step up in level is *selectable functional options* and the third and highest level is *core customization*. Ross does not cross-link these to the five approaches identified.

Specifically in the context of the automotive industry, Alford et al. (2000) put forward three distinct strategies of customization—*core*, *optional* and *form* customization—in which the value chain perspective is also apparent. In *core customization* the customer is involved in the vehicle design process such as occurs in low volume specialist vehicles. In *optional customization* the customer is able to choose their vehicle from a very large number of options. In *form customization* customers are able to have limited changes or enhancements made to the actual vehicle which could be dealt with at the dealer or retailer.

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