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Mass customisation – an automotive perspective

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Abstract

Increasingly automotive manufacturers are aiming for mass customisation, providing such a variety of products that nearly everyone can find what they want. More product variety is causing escalating costs and complexity in manufacturing. It is not clear how the manufacturing system engendered by lean production will respond to this challenge. Manufacturers are experimenting with models of the assembly and supply chain as a cost-effective solution for customisation increased is yet to emerge. These models represent a continuum of supplier involvement in the assembly process, as manufacturers seek to establish the optimum balance between cost reduction, retention of control and devolution of responsibility to the supply chain. The authors argue that an effective approach must be developed to support decisions on initiatives aimed at promoting customisation and preventing escalating costs and complexity in manufacturing. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

In the past two decades, vehicle manufacturers (VM) have forged strategic alliances to develop core competencies and penetrate new markets. Western VM have achieved a parity of performance with their Japanese competitors in manufacturing and vehicle development. Similarly, Japanese VM have established facilities to transplant their lean production (LP) and vehicle development processes in the US and Europe. Those VM who have best exploited these alliances are consolidating their position in the global market, and seeking opportunities to extend their global enterprise. This may be at the expense of less successful VM, who are subject to acquisition by their powerful competitors.

The parity of performance in core processes is forcing VM to *seek competitive advantage not simply by following the lean principles that everyone will know and be implementing, but by defining other domains of competition,* as Cusumano suggests [1]. VM must aim for *mass customisation* – providing such variety that nearly everyone can find what they want at a price they can afford [2]. This paper discusses mass customisation, and its application in the automotive industry. Mass customisation emerged as manufacturers, enabled by their proficient LP systems, explored ways to better meet the needs of customers. Approaches for mass customisation are reviewed to identify three distinct strategies for the automotive industry — *core, optional* and *form customisation*. The authors suggest

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that the demands for cost-effective high volume manufacturing will force a focus on optional customisation.

Strategic responses to extend market coverage are discussed, and design initiatives enabling VM to expand the range of products offered to customers are explored. The authors argue that while these strategic and design initiatives are well developed, it is not clear how the model of vehicle manufacturing engendered by LP will meet the challenge of mass customisation. VM are experimenting with models of the assembly and supply chain to counter escalating costs and complexity in manufacturing. These models can be seen as a continuum of supplier involvement in the assembly process. Each model represents an attempt by the VM to find an optimum balance between total manufacturing costs, the retention of control of the supply chain, and the devolution of risk and responsibility to suppliers. As supplier involvement with the assembly process increases, some of the issues constraining mass customisation can be removed or their effects reduced.

2. Strategies of customisation

2.1. Mass customisation

Manufacturers responded to fierce competition with shorter product life cycles and quicker delivery of new products to the market. With product development times only one-third of their competitors and needing only a fraction of the resources, *time-based manufacturers* were able to deliver new products much quicker to the market [3]. This enabled quick response to changing market preferences, and the continuous introduction of innovative technology. Time-based manufacturers were able to continually introduce new products with more features, increasing the variety offered to customers. From the success of time-based competition emerged a new paradigm – *mass customisation*.

Mass customisers *develop, produce, market and distribute goods and services with such variety that nearly everyone finds exactly what they want at a price they can afford* [2]. Manufacturers must look beyond the provision of standard products at low cost, to better meet the needs and desires of customers. Customer purchasing decisions are based on a complicated set of interacting factors. With low cost, high quality and quick delivery simply qualifiers in the purchasing process, manufacturers must personalise products to meet customer needs and stimulate market demand [4].

2.2. Integrating the customer

The extent to which customisation strategies impact the value chain, indeed the extent to which mass customisation is embraced by the manufacturer, depends upon the ability of the customer to change the product and the point in the value chain at which these changes occur. Manufacturers may choose to proliferate the market with variety, in effect pushing the variety into the market and anticipating the demands of the customer. While the customer can choose from a mass of products, there is no integration into the manufacturing and design processes, and the customer is unable to alter the product in any way. In contrast, the customer may be involved with the conception of the product, working with the product designers to determine the design and features of the product to best meet their needs.

The ability of the customer to change the product, and the point at which these changes occur in the value chain is described by Lampel and Mintzberg with their *continuum of strategies model* [5]. The value chain is described as a series of four processes – design, fabrication, assembly and distribution. Standardisation of all processes, effectively neglecting the needs of the customer and pushing products into the market, defines the traditional mass production strategy. Four further strategies are developed as the needs of the customer are progressively integrated with each upstream process. This culminates in a strategy of pure customisation, where the customer is integrated into the design process.

The Panasonic National Bike Company is a well-documented example of pure customisation [4,6–9]. In a dedicated showroom, the customer is measured to provide the dimensions for a particular frame design. Other components are carefully

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