How to decide on the right degree of adapting to Mass Customization Principles

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Abstract

Although the principles of agile manufacturing & mass customization are widely known, the actual, full implementation of these principles has only taken place in a few rare cases. Even some of well regarded MC pioneers often only provide "false" mass customization. This means, their MC businesses are mainly set up for marketing/research purposes and not to make profits. They actually loose money which is subsidized by their sales out of the "traditional" operating system.

This situation leads to a few key questions:

- Are the core principles and necessary changes of the operating system (R&D & Manufacturing with SC) really understood and correctly implemented ?
- · What types of products / businesses are suitable for Mass Customization?
- What is a reasonable / necessary target level of adapting MC principles to gain competitive advantage?
- · What are the key inhibitors adapting Mass Customization principles?
- How to motivate an organization to start the journey transforming from traditional (manufacturing) operations to mass customization ?

In this paper (knowledge presentation), we discuss what products/businesses are suitable for real, traditional Mass Customization and which ones are suitable for a "light" version. This leads to a discussion around necessary or reasonable target levels of adapting MC principles taking key inhibitors into account. The knowledge presented in this paper derived from many years of consultant work implementing agile manufacturing systems in various industries.

Keywords: Degree of Mass Customization, Operations, System Design

1 INTRODUCTION

Nearly any product group (e.g. electrical tooth brush, laptop computers) offers some degree of customization (different basic options to choose from). The degree of offered features to choose from (customization level) varies quite a bit depending on the type of product and business. This degree of customization is mainly driven by the potential revenue (price x volume) increase vs. increased cost in providing variety. Thus, managing both perceived customer value and cost are critical for the business success.

With a high degree of choice becoming more and more the norm, customers less and less accept product price premiums for "customized" products. Offering more choice (variants) or letting the customer select his desired product features from a list (product configuration) has become a "normal" requirement in some product groups / businesses. Thus, assuming the product fit-functiondesign matches the customer needs, managing the total cost of providing the required variety becomes the key factor for business success.



2 UNDERSTANDING COST DRIVERS

Obviously, it is the degree of offered variety plus the increasingly shortened product life cycles that drive operational cost.

- Increase of variety (product features): Any additional feature offered is adding cost to the overall operational cost which consist of overhead and manufacturing cost. As the management processes as well as manufacturing operations (including logistics) have been set up for a certain "product variety", exceeding these natural boundaries (e.g. optimum space requirements, store size, point of use material supply, work place organization, tools, ...) overhead and operational cost go up exponentially as it becomes much more difficult to coordinate the increasingly "out off-control" operations
- Shorter product life cycles: Not only do they have a negative effect on parts proliferation but they also increase the required R&D as well as management capacity to ensure stable product introduction and proper order management. Typical examples are increasingly frequented car, printers, fax machines model changes.

This means, that there is a certain "optimum" (profit maximization) for any given operational / business set-up but at a "locked-in" degree of variety.



Chances are high that this perceived "optimum" does not deliver the required variety requested by the current and future markets. This will lead to market share losses which in consequence increases the single unit cost (due to a "worse" overhead allocation) further reducing profits. A downwards spiral starts.

Unfortunately existing financial business systems (performance management systems) are weak so that companies often do only have a limited understanding of their total cost, thus can not clearly evaluate cost for additional variety offered nor can they make good product quotations.

This leads to the situation that instead guiding the customer to a certain "standard" variety (features with linked option packages) to get at least some benefits on economies-of-scale, excess variety in all combinations is

offered to cheap thus actually loosing money on the single customer order looking at total cost.

So what to do? Does this mean to not offer customized product at all or to do it accepting reduced profits? The next chapter provides some guidelines.

3 DECIDING ON THE RIGHT DEEGREE OF ADAPTING MC PRINCIPLES

Although 5 levels of customization can be identified they group into 3 major cases:

LEVEL	S OF MASS CI	JSTOMIZATION	MENC HEA	
\bigcap	Pure customization	Customized in every aspect of design, fabrication and assembly Customers and Manufacturers Buyers collaborate in developing the product Example – custom-made house		
customization	Tailored customization Customized standardization	Customized fabrication, assembly Manufacturers control design that can be modified within a range Example – custom-made suit, windows, shoematix Products assembled from menu of choices (configurator & option Customers can affect flow a product is assembled Customers can affect flow and production	vithin a range (configurator) rator & option list)	
Levels of	Segmented standardization	Example - additionale, bains terms (insertime Few variations of the basic products Customers have on influence over design or production Example - electrical tooth brush, electrical shaver, laser printer		
	Pure standardization	Dedicated assembly line production of identical items Customers have no influence over design, fabrication, production Example – Lights, suitcase		
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No Customization (Standard Product): If your product is competing in the mass market in which consumers only require some choice (basic options) and go for low price and "one stop shopping", stick with the mass production paradigm as long as your operation is highly efficient. For example electrical shavers, digital photo, microwave, printers. Bur even in this mass production environment in most cases – the operational capabilities must allow frequent but stable product model changes (facelifts) at low costs. This requires some adaptation of lean/agile/mass customization principles.

Pure Customization: If your product basically only sells if it can be customized by your customer, you have no choice but setting up a 100% mass customization operating system following all MC principles. But transforming an existing "traditional" operating system into mass customization is a very difficult task. Nearly all operating procedures (order management, logistics, and product design) and the complete manufacturing system typically need to be changed to reach desired flexibility, lead times and cost levels. Regardless if it is a new fresh business or an existing manufacturer of a given "standardized" product (now also to be offered as customized product), it is necessary to create a stand alone, mass customization operating system to be successful (profitable). Typical examples are customized shoes and clothing.

But most often products or more increasingly product fall under category three.

Some Customization: Your product needs to be offered with a certain set of variety (features to choose from). Companies usually have already spent quite some effort in creating an operating system that can handle variety/

complexity. But with business growing, decisions/actions are often done in a rush so that mass customization / lean principles are often not taken into account. The result is that the constant changes outpace needed adjustments to the operating system which in most cases now work in "fire fighting" modus thus at high cost and poor performance (order fulfillment). Competitive advantage therefore is driven by the degree of achieved perfect lean & agile operations combined with appliance to mass customization principles to ensure true total cost advantages.



So to answer the question "Do pure MCP or stick with the mass production paradigm":

- If the product is a typical high-volume, low-options product, use efficient mass production capabilities. Efficiency comes from best adaptation of lean manufacturing and Design-to-Cost and LeanProductDesign principles

- If the product only sells due to consumer's customization experience / individuality, do pure MCP with a separate operations set-up. Pure MC means setting up a totally lean and agile operating system taking into account MC principles to ensure acceptable lead times and cost. Do not merge mass production with MC production of a similar product. Do not try to run mass production in your MCP environment. Typically, you need to set up new operations from scratch as transforming existing mass production operations into MC is nearly impossible (management capacity – change resistance – cost – time for completion – procedure changes in logistics)

- If the product needs top offer a certain degree of variety (features to choose from) the answer depends on the current level of operating excellence and the business situation:

- If you plan on building a new factory anyway, set it up based on pure MC principles
- If you have to stick with the existing operations, you need to constantly drive the transition towards a pure lean & agile operating environment based on MC principles to maintain (slight) competitive advantages. How intensive this need to be driven depends on market requirement (competition) and on the transition

cost vs. total cost benefit ratio (payback). The Transformation steps need to be well planned and executed

4 SUMMARY

In all three cases the best strategy is to constantly drive for operational excellence in producing goods, in response to a particular customer desire. This can only be achieved if all processes throughout the organization are set-up and aligned to match these market-driven needs.

As operational excellence is mainly driven by the design of the existing production system and the product design, existing manufacturing capabilities as well as product development excellence are key for success. Mass customization as the highest possible form of operational excellence will therefore sooner or later find its way into the business model as, if set up perfectly, it can even produce pure mass production at mass production efficiency. The implementations boundaries are management (change) capabilities and transformation cost, the drivers are market & shareholder requirements.

5 REFERENCES

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