Mass Customization Scenarios

Frank Steiner\(^1\), Frank Piller\(^1\), Eduardo Saiz\(^2\), Eduardo Castellano\(^2\) and Jone Urietxeberria\(^2\)

\(^1\)Technology & Innovation Management Group, RWTH Aachen University, Aachen, Germany
\(^2\)Ikerlan-IK4. Centro de Investigaciones Tecnológicas. Paseo JM Arizmendiarieta, 2. 20500 Arrasate-Mondragón (Spain)

1. Mass Customization Scenarios (MCS) Introduction

A first key learning is that business strategy has to be an important subtopic of MCS: Mass Customization is a manufacturing paradigm that is completely different from Mass Production, a paradigm that has been widely accepted throughout the 20th century. Companies that want to change paradigms from Mass Production to Mass Customization need to reconsider their business strategy: How to restructure the organization and its manufacturing processes?

The most important difference of Mass Customization and Mass Production is that Mass Customizers accept the heterogeneity of the market; meaning customers are so diverse in their needs that they cannot be served as a group, but they have to be served as individuals. This leads to a second important subtopic: “user co-design”. This topic is supposed to represent the individual customer in the consideration of MCS.

Knowing that with Mass Customization every customer needs to be treated differently, the existing products and processes cannot be used anymore. Products have to be adapted in order to make them more flexible: important keywords in this sense are “modularity”, “product platforms” or “product architecture”. In an ideal case, MC-Products have to be structured in a way that allows the manufacturer to offer a product variation for each individual customer.

The same customer focus needs to be applied for the manufacturing processes: A company has to have processes in place to serve individual customers. However, it is not economically useful to have an individual process, for each individual customer. A successful Mass Customization strategy needs to have a stable process that is able to generate a varying product: Consider the example of Sushi. “Manufacturing” a Maki roll always builds on the same process, but the ingredients of the roll can be customized for each customer.

2. MCS literature research problems

2.1.- MCS research problem 1: How to pursue a successful Mass Customization strategy?

As manufacturers have to accept the heterogeneity of the customers, they also have to accept that they are different MC scenarios and a successful strategy needs to be able to handle all these scenarios. Thus, in our opinion, companies need to identify different Mass Customization scenarios first, before then developing respective approaches for these. But what are the necessary building blocks for a successful MC strategy?

2.2.- MCS research problem 2: How to mitigate the negative effects of variety?

Accepting the heterogeneity of customer needs means to offer a brought variety of products that match these individual needs. Variety, on the other hand, usually leads to negative
effects such as complexity, high inventory, etc. Therefore a successful MC strategy needs to compensate these negative effects. How can this be done?

3.- MCS literature research approaches

3.1.- MCS research approach to problem 1

Hart (1994) describes four pillars that are supposed to build a good MC strategy:

![Image: Pillars of a successful Mass Customization strategy.]

The pillars identified by Hart match very well with the subtopics that were identified in this literature review: There needs to be a customer focus and a completely new business strategy has to be defined that includes what Hart calls “organizational readiness”. However, the most important aspect lies with the re-organization of the manufacturing process and the product structure: Accepting the heterogeneity of customer needs means to offer a brought variety of products that match these individual needs. Variety, on the other hand, usually leads to negative effects such as complexity, high inventory, etc. Therefore a successful MC strategy needs to compensate these negative effects and "the effectiveness of strategies to mitigate variety’s negative effects, [...] depends on the order-fulfillment strategy the firm follows." (Pil and Holweg, 2004).

3.2.- MCS research approach to problem 2

"The effectiveness of strategies to mitigate variety’s negative effects, [...] depends on the order-fulfillment strategy the firm follows." (Pil and Holweg, 2004), but which different order-fulfilment strategies are possible? Companies need to understand the different types of customer inquiries with which they could be confronted. In the following the three different kinds of customer inquiries will be discussed:
Each inquiry starts with the customer approaching a manufacturer with his or her individual needs. The company has to have a tool or a procedure in place to translate the customer needs into product specifications. This step is crucial, because without a proper understanding of the customer needs the inquiry cannot be answer in a satisfying manner.

Once the specifications are understood there are four different options:

- **Option 1**: The customer inquires a product that already exists in the standard catalogue of the manufacturer. In this case the solution for the customer is already known and therefore the manufacturer can easily process this inquiry. A so called pick-to-order process takes place: “the pick-to-order (PTO) process involves [those] orders in which part of the order or the entire order consists of parts that are identified by an in-store item number, then taken out, packed, and sent to the customer.” (Hvam, 2006).

- **Option 2**: The customer needs an individual product that can be assembled by putting together standard components of the manufacturer in an individual way. Again, no new solution needs to be developed; the product just needs to be assembled according to the customer’s preferences. In this case the inquiry will be answered by a assemble-to-order (ATO) process: “The ATO process involves customer orders in which the entire order includes parts identified by a part number, and possibly item numbers from third party suppliers. Orders with ATO parts must be put through a configuration process to ensure that the structure is correct and to generate manufacturing specifications.” (Hvam, 2006).

- **Option 3**: The customer asks for a product that requires the manufacturer to come up with a new solution. This leaves the manufacturer with two options: the company can either decide to help the customer and develop a new solution or it could reject the customer order. Developing a new solution would require an engineer-to-order process: The ETO process is used when the customer’s requirements cannot be fulfilled by means of [a PTO or ATO] process. This refers to special products that have to be individually designed for a particular customer. When using parts of external suppliers this process is also called Integrate-to-Order (ITO) (Hvam, 2006).

**4.- MCS conclusions**

Having identified the different types of customer inquiries and the respective order fulfilment strategies, one can now move on to identifying different Mass Customization scenarios. In this case two different scenarios could be identified:

**Scenario 1**: In Option 1 and Option2 the respective customer inquires a product that builds on a known solution. In both cases the manufacturer can serve the individual customer
rather easily, by applying a pick-to-order or assemble-to-order strategy. This group of processes will be termed “configure-to-order” in the following.

Configure-to-order scenarios are most valuable for a mass customizer, because these customer inquiries can be answered very efficiently by using existing, standardized processes. Subsequently, this scenario offers the highest profits, because they can be processed with near mass production efficiency. However, manufacturers need to already have the respective standardized processes and modular products in place, in order to be able to benefit from this kind of customer inquiry. Thus, robust process design and intelligent product architecture are key topics for this scenario.

**Scenario 2:** This scenario builds on option 3 from above; the customer asks for a product that requires the manufacturer to find a new solution. In this case existing products or processes cannot be used anymore. The manufacturer has to either reject the customer offer or has to start an engineering process in order to find a new, innovative solution. In order to make this decision a company needs to have a good understanding of its on business strategy: Does the customer inquiry have a sufficient strategic fit to the existing fields of business or not? Subsequently, a mass customizer needs to have the respective decision making procedures in place and the innovative potential to find a possible solution for the customer.

Combining these two scenarios, one can see, in what way the selected subtopics are important for a successful Mass Customization strategy: The company needs to be willing to listen to the customer and the customer needs to be understood correctly. If the solution to the customer’s problem is know, the company has to have robust processes and the respective product structure; if the customer inquires something unknown, a successful mass customizer needs to have decision making procedures in order to accept or reject that customer according to its business strategy.

These results are visualized in Figure 3 below.

![Figure 3. Major MC scenarios derived from order fulfilment strategies.](image-url)
ACKNOWLEDGEMENT


REFERENCES

