Beyond ‘Read a plant – fast’ (for lean): read an enterprise for mass customization?

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Abstract: In this paper, a preliminary tool is presented for use in the analysis of the mass customization situation at an enterprise. The new tool is a modification and expansion of an existing lean manufacturing tool called the Rapid Plant Assessment (RPA). To do so, the relationship between lean manufacturing and mass customization is first discussed in terms of the similarities and differences between the two manufacturing strategies. Next, a review of existing tools for lean production and mass customization is made, with a focus on a popular RPA lean manufacturing tool, which is described in detail in “Read a Plant – Fast” (Goodson, 2002). Following this, the requirements for a modified and expanded tool are suggested, leading to the initial development of what the authors call “Read an Enterprise for Mass Customization” (REMC). The REMC is then applied to a number of cases in Swedish industry, and the results of this application are presented. The ensuing discussion includes the applicability of the tool in practice and the benefits of such a tool for industry. Finally, suggestions are made for the further development of the tool and its continued utilization in industrial settings.
The Lean Manufacturing – Mass Customization Relationship

Lean manufacturing and mass customization are two of the most popular manufacturing strategy “buzzwords” heard today, and given their close relationship, they are often spoken of together. For example, in their review of the customization literature, Da Silveira et al. (2001) grouped what they called the enabling processes and methodologies for mass customization into the areas of agile manufacturing, supply chain management, customer-driven design and manufacturing, and lean manufacturing. According to the same authors, lean manufacturing represents an efficient way to satisfy customer needs while giving producers a competitive edge. Mass Customization, they continue, addresses four elements of lean production: product development, the chain of supply, shop floor management and after-sales services. Sahin (2000) also showed the relationship of mass customization and lean manufacturing based on her review of the literature. In figure 1, the similarities and differences between several currently implemented manufacturing initiatives – Focused Factories, Lean Manufacturing, Mass Customization, and Agile Manufacturing – are shown.

Figure 1. Current manufacturing initiatives and their features (Sahin, 2000).
Others authors view lean manufacturing as part of the evolution of manufacturing leading up to mass customization. Oleson (1998) calls his concurrent evolutionary model, shown in Figure 2, “Stages of Development”.

![Figure 2: Stages of development (Oleson, 1998)](image)

In Figure 2, Oleson’s Stages of Development focus on the major shifts in technology throughout history, and include the innovation of new manufacturing methods and technologies. For example, Oleson’s model shows the transition of the Hunter/Gatherer to Planter/Reaper, as well as the transition from Mass Production to Lean Manufacturing, which he seems to view as equally significant. According to Oleson, we are now in the midst of a transition towards a new stage of development, namely Mass Customization, which will be enabled by yet the “next wave of manufacturing innovations”.

Taking a similar but yet different view, Pine (in Anderson and Pine, 1997) also notes the evolutionary shift from continuous improvement to mass customization (see figure 3), but sees this as an ongoing, repetitive process.

![Figure 3: The new competitive reality (Anderson and Pine, 1997)](image)
In Figure 3, Pine defines four different business models, beginning with the Invention Model. Invention includes craft producers, entrepreneurs, units of large companies, and others that compete on high differentiation. In this model, both product and process change are dynamic. Inventors are linked to the model of Mass Production, as they are the research and development organizations that develop products for Mass Production. Mass Production, in turn, is typified by stability in both product and process change. Continuous improvement then takes the stable processes of Mass Production and makes them dynamic. In the next shift, Modularization of both products and processes enables the realization of customized production with the low cost and high quality typical of Continuous Improvement. The loop is completed when the input for mass customization is renewed with a return to the invention model. This could be, for example, when there are requirements for a new product. Pine et al. (1993) are emphatic, however, that Mass Customization not be viewed as "continuous improvement plus" - i.e. an extension of continuous improvement. Rather, these authors are of the opinion that the two concepts are in fact distinct paradigms, with different organizational structures, values, management roles and systems, learning methods, and ways of relating to their customers (Pine, Victor, and Boyton, 1993).

Support Tools for Lean Manufacturing and Mass Customization

Lean manufacturing has been a popular manufacturing concept for a longer period of time than mass customization, given its rapid development at the Toyota Motor Company in the aftermath of Post World War Two Japan and its eventual implementation throughout much of the industrial world following Womack and Jones’ (1990) *The machine that changed the world*. Mass customization, on the other hand, is a relatively new concept. Despite its prediction by future-oriented thinkers such as Toffler (1970) and Davis (1987), mass customization did not begin to gain mainstream popularity before Pine’s (1993) landmark *Mass Customization – The New Frontier in Business Competition* was published.

Not surprisingly, there are a large number of tools that have been developed to measure the "leanness" of a company, but far fewer exist which can determine a company’s level of mass customization. One of the support tools for mass customization include Pine’s (1993) Market Turbulence Map, which can help a company to determine if it should consider a mass customization strategy based on its competitive situation. Another such supporting tool is a recent checklist by Berman (2002). Berman’s checklist builds upon Zipkin (2001), who describes three main elements for mass customization realization: (customer) elicitation, process flexibility and logistics. There are also several mass customization frameworks that can be further developed into checklists to use in determining the status of the strategy at a company. For example, Comstock (2001) developed an extensive questionnaire based on the “Key Decision Factors for Mass Customization” framework by Hart (1995) to guide his analysis of a case in the Swedish mobile telephone industry.

The Rapid Plant Assessment (RPA)

A representative example of a tool that can be used to rapidly determine if a factory is lean or not is called the Rapid Plant Assessment (RPA). The RPA, which is
described in detail in Goodson’s (2002) “Read a Plant – Fast”, was developed to train managers “…to approach a plant tour with an educated eye, one that could discern a plant’s strengths and weaknesses…” in the area of lean manufacturing. The RPA is also a tool that has been used in more than 400 tours of over 150 operations since 1998, not to mention its current application in Swedish industrial studies. The RPA consists of a “yes” or “no” checklist of 20 questions addressing various lean manufacturing areas. The total number of yeses that a company achieves on the questionnaire, according to Goodson (2002), is an indicator of a plant’s leanness, i.e. the more yeses, the leaner the plant. These questions, in turn, are considered in a rating sheet that addresses 11 categories ranging from “customer satisfaction” to “commitment to quality”. Each category in the rating sheet, which is linked to two or more of the checklist questions, receives a rating and associated point value ranging from “poor” (1 point) to “best in class” (11 points). The RPA tool is designed for simplicity, and can be used by the “trained eye”, according to Goodson (2002), “to tell if a factory is truly lean - in as little as 30 minutes”.

Given the existence of tools like the RPA, and the previously mentioned suggestion of lean manufacturing as a prerequisite for mass customization, an obvious question begs to be answered: are there any similar tools for the determination of the level of mass customization in a company, and if so, how suitable are these tools for their purpose? Also, if such a tool were lacking, what would be its requirements? One fairly simple approach would be to take a popular existing tool for lean manufacturing, such as the RPA, for example, and modify or expand it for the purpose of investigating the level of mass customization at a company. That is, in short, what this research attempts to accomplish.

Requirements for an RPA-type tool for mass customization

In the development of the new tool, with the tentative name of Read an Enterprise for Mass Customization (REMC), the basic assumption taken is that lean production is a prerequisite for mass customization, and therefore what is mass customized must be lean (see figure 4). However, the previous statement by Pine et al. (1993) that “mass customization should not be viewed as continuous improvement plus” will be further considered here.
The requirements for the new tool will be determined by a thorough review of the RPA tool in order to determine what should be modified or added to make the new tool applicable for the investigation of a mass customization strategy. Thus far, preliminary requirements for such a tool include:

- one that is not limited to a plant but rather considers an entire company or even enterprise;
- a tool with a focus expanded to include the three main elements of mass customization (Zipkin, 2001) – Customer Elicitation, Process Flexibility and Logistics – and the associated technological, methodological and conceptual enablers that these three elements require; and
- simplistic design and, as in the case of the RPA, relatively fast to administer.

The contributions and shortcomings of current tools for mass customization will also be taken into account. For example, the previously mentioned Market Turbulence Map of Pine (1993) is limited in that it has a limited focus of answering the question of “does my company need to mass customize given the current market situation”? Taking the example of Berman’s checklist (2002), a shortcoming could lie in the checklist’s simplicity, which only superficially touches on lean manufacturing.

Initial application of the tool: cases from Swedish industry

The modified and expanded tool, or REMC, will be applied to several ongoing cases in Swedish industry to determine its practicality and value in actual industrial situations. The results from the industrial cases will be presented in the paper.

Conclusions

Conclusions will include a summary of the applicability of the tool in practice and the benefits of such a tool for industry. Any difficulties encountered during the application
of the REMC will also be summarized. Finally, suggestions will be made for the further development of the REMC its continued utilization in industrial settings.

References


