Logistics Process Model for Mass Customization in the Footwear Industry

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Abstract

Introduced by Joseph Pine in 1993, the marketing strategy of Mass Customization has become indispensable for the strategic development of many enterprises. The basic idea of Mass Customization along with all its different facets excites marketing and retail workers as well as marketing directors and CEOs. Nevertheless, Mass Customization is still not a worldwide standard. The reason for this can be seen in the complexity of implementing Mass Customization in existing mass or serial production. Pioneering examples often focus on newly founded enterprises or exclusively on production lines already set up. Precisely because every product, every form of production and every logistics system have evolved individually, no standard solution is or can be offered for implementation in an existing production or joint production line. Thus, questions remain such as which product, which possible features and how many of them should or could be individualized. In addition, time is becoming an even more crucial factor than it was before. Logistic systems have to be redesigned in order to meet new challenges. Long transport times have to be reduced in and between production lines. A lot size of 1 in a machine does not imply a lot size of 1 in transport. Both information and goods have to be controlled and managed in order for them to be at the right place at the right time. Therefore, logistics plays an extremely important role in Mass Customization.

1 Mass Customization – A Strategic Approach

Classic strategies of differentiation are no longer sufficient in many industrial sectors. Globally interconnected markets offer enterprises only marginal leverage to improve their operating results. Only enterprises that manage to establish individual and enduring relationships with their customers can achieve strategic advantages in the face of increasing global competition. Therefore, the highest directive for modern enterprises has to be to ensure consistent customer orientation, always and everywhere. Modern multimedia services such as the worldwide web are spreading throughout the world and gaining popularity. These can be used to enhance the power of Mass Customization. Individual users and business partners can satisfy their individual needs by using Internet services, e.g. a simple mouse click signs a contract. Compared with the classic approach to mass production, a new development, the interconnectivity between worldwide electronic data exchange and the actual production and transportation of parts and goods, is giving rise to additional challenges Having to ship and produce individual items adds to the classical challenges, especially time delay and cost increments.
The strategy of Mass Customization provides a way out of the dilemma caused by customer demand for differentiation on the one hand and customer demand for low prices on the other hand.

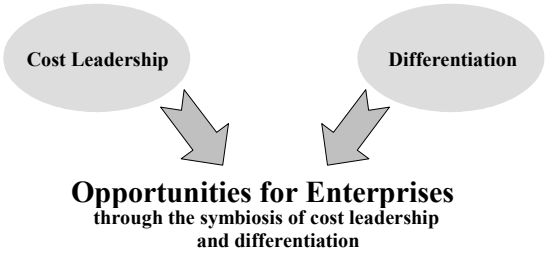

Figure 1 – Symbiosis of cost leadership and differentiation

The strategy of Mass Customization, which originated in and was taken from marketing, stipulates that providing exactly the desired products and services will satisfy every customer. Moreover, this must be done without greatly exceeding the price of a comparable standard product. Thus the advantages of mass and serial production should be combined with those of single item production, resulting in mass or serial customizing. Consumers expect outstanding products and services with all the desired features at a very reasonable price and with a lead time close to zero.

An enterprise's goal therefore must be to recognize customer demand faster than customers do themselves and consequently to be able to provide the right products when customers demand them. This applies to the customer goods sector as well as the capital goods sector. In this situation, Mass Customization offers enterprises the chance to act instead of react.

2 Research Objectives

Part of a project called EwoMacs funded by the German Ministry of Education and Research is the development of a model logistics process for the footwear industry. This model process is being developed in cooperation with the footwear manufacturers 'selve' and 'adidas' and the logistics providers DHL Danzas Air & Ocean and IFB GmbH. IWT GmbH is developing a qualification concept. The Universities of Munich and Ilmenau as well as the Fraunhofer IFF Magdeburg will bring the newest research findings to EwoMacs.

Since footwear encompasses all three individualized customer needs – fit (products near to the body), taste (design, fashion) and functionality – the footwear industry is an ideal research field. In the last 20 years, the German footwear industry has continuously lost importance in terms of market shares of the global footwear market as a result of strong, price-orientated competition. The main reason for this is traditional manufacturing techniques: The industry is characterized by a low degree of industrialization and scant utilization of modern manufacturing and logistics structures.

Medium-sized manufacturers and commercial enterprises in particular are facing increasingly and – in the present state of organization and technology – barely manageable problems resulting from

- long idle periods in the retail trade,
- low levels of customer satisfaction with the variety of models available,
- shorter product lifetimes,
- competition in terms and conditions.

Tapping the full potential of Mass Customization – virtually implementing mass production for ever smaller market segments or even a segment of one – offers competitive advantages and accordingly the chance to regain lost market shares. The main challenge is returning as many parts of the value chain as possible back to Germany as well as regaining lost market shares by using modern technologies, innovative business processes and the intelligent integration of organization and information technology. Meeting this challenge and demonstrating with a feasibility study that such problems can be surmounted is the focus of this project.

A pilot project and a demonstration of feasibility using a concrete example have an effect not only for the entire industry, but also for all other pioneers in the field of customized mass production.

3 Aims and Subtasks

Subordinate targets and research tasks are:

- Conception of an integrating process model for the holistic mapping of the logistic cycle of Mass Customization. This will result in new requirements on logistics in the control of the material and information flow as well as of components from suppliers.
- Conception of physical logistics structures suitable for reducing delays caused by transportation times and for bridging the distances between the individual members of the supply chain. The great diversity of variants and the high degree of delivery service make specific demands on efficient, ecologically compatible and competition-oriented logistics service.
- Agent-based modeling of process chains and actors in order to be able to appropriately map the freedom of customer planning and action provided by Mass Customization as well as all companies involved in the production of a respective product. This will also permit sufficiently allowing for the extreme

decentralization of decision-making processes in such a production network.

- Increase of transparency of the overall system. The goal is to be able to specify delivery dates especially for capacity requirements for individual customers as a function of the configuration selected.
- Agent-based conception of architectures interfaces and coordination methods to connect the information systems among the companies involved. Integrated online planning methods ensure the greatest planning flexibility of the Supply Chain while simultaneously securely encapsulating local IT systems.
- Conception, prototypical implementation and testing of a model agent-based system to simulate the influencing factors and processes significant for Mass Customization along the Mass Customization supply chain.
- Development of prognosis systems suitable for Mass Customization both on the level of final products (quantitative) and on the level of individual components. This includes an agent-based simulation system to be made as a prototype.
- Planning of new general components. The industrial partners' value added models presently envision final customers configuring their footwear using special aids (e.g. Internet and kiosk system configuration by selecting predefined options). So far, customers have not been involved in planning components (standardized and then offered to all potential future customers). However, this option would be advantageous both from the viewpoint of the experience economy and to improve new-product planning.
- Codesign of customized components. Allowing the respective end customer to design individual components is also conceivable. The effects of implementing this option on the supplier and information processes have to be systematically analyzed and redesigned, especially when manufacturing individual components is planned.
- Increase of system sustainability in the sense of reducing waste in all stages of the value added chain: An integrated economic feasibility study of the logistics processes developed on the level of both the material and the information flow will achieve waste avoidance and optimization along the value added chain. Up to now, singular optimization of individual process stages has been too greatly emphasized in MC systems.

4 Approach

The model logistics process described features the specifics of the Mass Customization strategy for the first time. The objective of this project is to create a complex mass customization process for various products, industries and corporate groups. Apart from focusing on the overall process, individual processes are also being analyzed (see Figure 2).

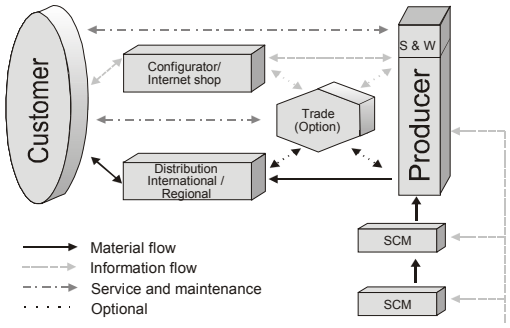

Figure 2 – Model Mass Customization logistics cycle

To model the logistics process in the footwear industry, the value adding processes in two companies are being analyzed. These two processes have very different characteristics because the two companies have very different corporate structure. Thus this approach provides the greatest chance to set up a universally valid model process for Mass Customization in the footwear industry. One of the companies selected, selve, is a start-up enterprise in the German footwear industry. selve is able to react flexibly to customer demand because its infrastructure is designed for customized production. Production of individual shoes is outsourced to a factory in Italy. Distribution channels are accordingly short. Since only very few participants are in the value added chain, the chain is substantially shorter and simpler compared to that of adidas, the second enterprise being studied. Figure 3 shows the participants in the selve and adidas value chains.

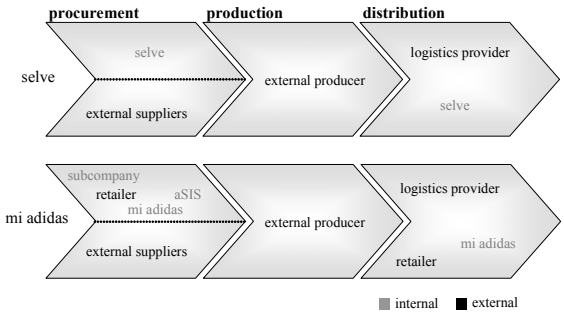

Figure 3 – Participants in the selve and adidas value chains

adidas is a large, globally operating enterprise in the athletic footwear industry. Adidas has complex structures that are not optimized for customized production. adidas' mass production guideline combined with its aim to minimize production as well as shipping and handling cost has led to its footwear not being produced in Europe but in Asia. Distribution channels are relatively long.

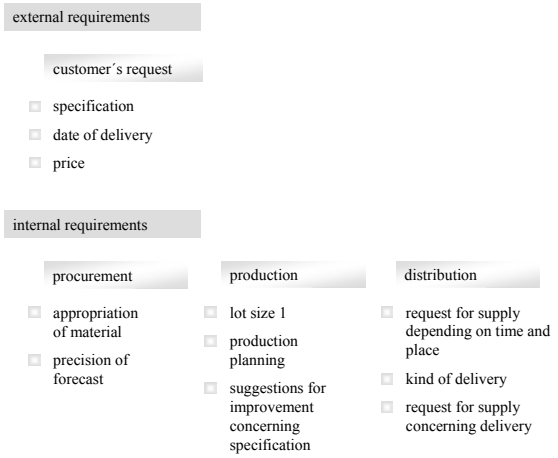

Figure 4 – Primary requirements of the logistics concept

The information gathered in the two companies is being processed in two descriptive production flow process chains, one for each company. An initial concept for a logistics model process in the footwear industry is being derived by superimposing the individual process chains. Specific model process variables have to be introduced to ensure the adaptability of the model process developed. These variables have been identified by a business associate functioning as a logistics service provider for industries predisposed to Mass Customization. The data acquired can be used to generalize the model process so that industry-wide validity of the model can be derived with respect to different products and different corporate groups.

For implementing the new logistics model for Mass Customization the logistics model process has to be redefined. Here the external and internal requirements, as shown in figure 4, have to be considered. But these requirements are interdependently, because the external requirements influence the internal requirements. Furtheron it has to be considered that not every enterprise is able to fullfil these requirements. That´s why it is necessary to adapt the enterprises framework to the requirements of the ideal model concept or by the implementation of these concept limitations within the concept of the enterprise are required. Furthermore it is essential for implementing the concept, whether this new strategy in logistics has to be implemented in existing structures or a new structure can be established.
But in general this logistics model concept can devided in four fields. These are configuration, procurement, production and distribution. As shown in figure 5, these four fields are not running all sequentially. In the course of optimizing the leadtime it is necessary to run the procurement and the configuration parallel. This concept holds some difficulties in it, but it is the only possibility to reduce the leadtime to a duration that the customer will accept.

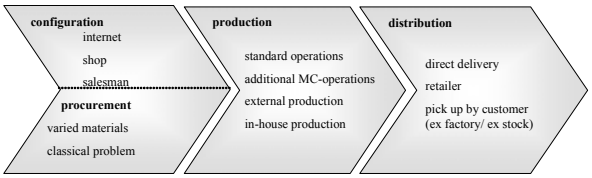

Figure 5 – Aspects of the ideal logistics concepts

5 Conclusion

Mass Customization presupposes that an adequate logistics concept has to be designed for enterprises and value chains. The research project "EwoMacs" contributions the redesign of this new logistics concept for Mass Customization. The subjects of investigation are two completely different value chains – one from a start-up company and the other from a globally operating company. Both companies' experiences are being used to devise an ideal logistics concept for Mass Customization which will be valid not only for the footwear industry but for other industries as well. The final project results will be published by October 2004 at the end of the project.

6 References

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