Mass Customized Technical Textiles in the B2B Sector

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Abstract. Mass Customization is a great opportunity for textile companies for both staying competitive in high-wage countries and offering inexpensive, customized products. Within the area of Technical Textiles, this study focuses on the B2B sector and shows the status quo, potentials and strengths. Both management and technological issues are addressed. For the former, business models and the value co-creation process are dealt with, for the latter, the focus is on modelling.

1. Mass Customization in the B2B Sector
In recent years, an increasingly greater shift of classical manufacturing of textile products with large quantities towards countries and regions with low salaries has been shown. The European textile and clothing industry was confronted with a reduction in employment, which has been now stabilized at a low level. One reason for the stabilization can be seen in the focus of companies on technical textiles, a field with high growth rates. Usually, this field is addressed with customized products in small quantities but with a high degree of innovation due to consistent cutting-edge technologies, which is a great opportunity for the European textile industry. These complex products are demanded by industrial customers. In the literature, this context is typically referred to as engineer-to-order (ETO) or solution business, and not with mass customization (MC). However, IT linkages and the value creation process with the customer are still under research. Processes need to be further analyzed to effectively produce small quantities, up to batch size of one, under industrial conditions with regard to MC principles.

MC offers a solution to provide products which are both inexpensive and customized ([1]). While MC has been typically introduced to mass production, it is the opposite for our context that has always profited from customized offerings. MC relies on a number of principles for its realization, for example modularization of production, technologies which enable a direct conversion between digital and real world (e.g., 3D-scanning, 3D-printing), and high customer integration, in particular in the process of outcome design which is usually supported by toolkits ([2], [3]). Numerous papers dealt with MC drivers, success factors, or the solution space in B2C markets. However, less attention has been paid to B2B. The case of business customers differs fundamentally from the situation of end consumers: a single business customer is usually much more important than a single consumer and relationships are long-term. Moreover, they buy rather for economic than for emotional reasons ([4]) and are capable of handling much more complex configuration tasks because they often bring much more technical expertise ([5]). In the B2B literature for our context, ETO and solutions ([6]), the
offering is created within an individual and personal customer-manufacturer interaction, a time-consuming process with a high degree of product customization and hence complexity ([5], [7]). The offer fulfills specific functions for the customer, also through assistance in internal processes and provision of certain resources ([8], [9]). Hence, the promise of MC with respect to business customers is rather the opposite and poses several challenges: How can the established degree of customization be managed while moving from ETO production or solution-orientated approaches to a more standardized MC offer? What are the central customer value components of MC for business customers? How can these value components be addressed? To answer these questions, business models of the companies need to be adjusted accordingly ([1]). Core of such a MC business model is the customer-manufacturer relationship and the value provided to customers ([10]). In this case, these value-providing activities are represented by consulting and prototyping services. These services are essential for the customization and finally the fit of the product regarding the customer’s needs.

2. Results of the Study about Mass Customization in B2B sector

For a first study, 60 companies have been selected [11]. Over 50% of them are interested in individualization and mass customization. The basic project “Key technologies and core competencies to transform traditional textile value chains in sustainable customer oriented value networks based on mass customization strategies” was a part of the futureTEX project. The production of customized and cost-effective products is not really new. However, the research focus until now is strongly on the retail markets and the end-user (B2C). The project tries to close the backlog and the research gap in the B2B sector and for technical textiles. In this paper, we take stock of the current challenges for specialized textile companies to implement MC. Data collected at 80 companies provide information on the current positioning, technical possibilities as well as typical customer-manufacturer interactions. The data contains 69 surveys and 35 interviews conducted with CEOs, sales personnel and heads of development. Final results of the studies on the individualization of textile processes and possible diversification potential for new applications will be presented.

2.1. Results of the quantitative analysis

The qualitative analyses based on 68 interviews with 14 basic questions, 10 about individualization, 11 about IT and 4 about market position. The textile industry in East Germany is dominated by small and medium-sized companies (Figure 1).

![Figure 1. Proportional distribution of numbers of employees in interviewed companies](image1)

![Figure 2. Percentage in the branch segment (multiple selection)](image2)

The interviewed companies represent a good mix of branch segments (Figure 2) and the complete textile chain (Figure 3). Further results are:

- 83 % of the companies have the largest share in business activities with a physical product, 17% in service.
65% access a supplier pool, 42% are part of a fixed supplier network and 69% are partners in the manufacturing process.

The market positions of the companies are “Strong and continuous” (50%), “Partially wide product range” (22%), “Established with strong demand” (18%) and “Low percentage/very strong competition” (10%).

The companies receive their supplies primarily from EU countries (71%) and Germany (68%), less from China (13%), Switzerland (13%) and Turkey (10%).

The own production processes are carried out mostly in Germany (85%), 19% in EU countries, only 3% in Eastern Europe (without EU) and 3% in South-East Asia.

Figure 4 shows the typical types of orders.

99% of the companies export to EU countries, 26% to Switzerland, 22% to the USA, 21% to Russia, 15% to China, 13% to Eastern Europe (without EU), 10% to Japan, 10% to Turkey, 7% to South-East Asia and each 3% to Egypt, Australia/New Zealand, Brazil and Mexico (other countries 19%).

The main competitors are located in Germany (74%), in EU countries (59%), in Turkey (31%), China (28%), USA (7%), Eastern Europe (without EU), India and South-East Asia (each 4%) and Mexico (3%).
• Strategies for MC are already implemented (43%), the implementation has been started (33%), strategy developed (7%), discussion stated (10%). 7% have no idea.
• Problems and impediments of mass customization in companies are shown in Figure 5.

2.2. Results of the qualitative analysis
In total, 39 interviews were conducted with CEOs, salespeople and heads of development and analyzed following an inductive approach (details on related papers & scientific publications forthcoming). This seems appropriate since it allows identifying new concepts and exploring new phenomena. We identified two areas which constitute a hotspot for future research, namely the business models and the value co-creation process that serves to specify the customized offering. For the business models, interviews revealed that companies often underestimate the impact of the services included and the importance of them for customers. They still consider their products as main value drivers. On the one hand, this is correct in respect to the utility of the final product. On the other hand, this falls short in recognizing that business customers often heavily depend on the expertise of the provider due to high complexity of the product – which is dealt with by extensive consulting. This also shows that business customers cannot always be perceived as experts, as mentioned earlier. Particularly, characteristics for technical textiles need to fit to achieve the desired function. Furthermore, some B2B textile manufacturers deal with designers that do not have technical expertise. So, consulting services appear very promising as a (labelled) part of the offering. But consulting effort is time-consuming and costly. Standardizing at least parts of this consulting process seems favorable for both designers and efficiency-driven customers. The interviews show that sales people often follow a standardized procedure, but which is not formalized for the company. This neglects a more systematical approach to automate a part of the sales process by a supporting toolkit as used in the B2C context. Also business customers could be approached by a toolkit asking for the purpose of the product and leading them afterwards to the relevant product characteristics. Thus, toolkits may decrease perceived complexity. Toolkits in this area represent a hotspot for future research.

With regard to the value co-creation process, we argue that it needs to be redesigned, too, for three reasons as follows. First, typically, usually, business customers are experts themselves and possess a relatively high degree of knowledge. Consequently, the identification of the customers’ requirements can draw on a more elaborate picture of actual customer needs. Emphasis is more on strong technical knowledge which indicates that real expertise is needed, and systematically stressed, within the co-creation process. Secondly, we see different customer values compared to B2C, where fun components such as creativity are valued too, for instance. At least for some industrial customers, it is the opposite, so a different design of the co-creation process seems necessary, i.e., with efficiency as main goal. Thirdly, in many B2B markets personal sales forces are used to perform one-to-one marketing and
personalization. Hence, the co-creation process is highly dependent on the personal interaction between sales personnel of the provider organization and procurement personnel of the customer organization.

3. Modelling

The Mass Customization study showed that 80% of the interviewed companies see an urgent need for action. The demand for automatic data exchange (85% exchange information manually) requests also the integration of knowledge. The complexity of textile development and production is very demanding and requires solid methodic support in the transition and re-engineering phase from standard production to Mass Customization. Conceptual modelling is an established instrument, especially supporting communication and manipulation of business objects, for design and re-design of business processes [12, pp. 31-33].

The research project futureTEX “Modellierung der Textilfabrik der Zukunft” is dedicated to the development of a conceptual modelling approach for business process design considering new concepts like Internet of Things or the industrial equivalent “Industrie 4.0” and technologies especially for flexible small scale production. In this context the aspects integration, decentralization, service orientation, self-organization and autonomy as well as cyber-physical systems as technological base are very important for the modelling approach [13, pp. 17,142-144].

The core element of the modelling approach is an intelligent entity. This entity is able to represent business objects ranging from machine modules up to complete production networks. The internal structure consists of several components enabling the entity to act as a dependent but also as an autonomous unit in a business environment. Figure 6 illustrates the various components. Each one describes elements needed to provide the intelligence and flexibility of the entity required in a future production environment.

![Figure 6: Internal structure of core modelling entity](image)

The components “Objects” (static knowledge) and “Rules” (dynamic knowledge) form the knowledge base of the entity [14, p. 99]. They provide the key resources for any activity of the entity. The component “Activities” defines the internal and external business processes realized by the entity. The connection to the environment for exchanging services and resources is established by collaborative agents in the “Intelligent Interface” component [15, p. 248]. The last component is the “Management”. It has two elemental purposes. The first purpose is to control the knowledge base, the business processes, and the collaborative agents to ensure a robustness of the entity. The second one enables the modification of the entity to adapt to external demand resulting in a flexible and autonomous entity that can sustain in changing business environments.
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