

Mass Customization at Adidas: Three Strategic Capabilities to Implement Mass Customization

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The idea of mass customization is to turn customers' heterogeneous needs into an opportunity to create value, challenging the "one size fits all" assumption of traditional mass production. In this paper, we explore the characteristics of successful mass customization implementation at the example of the footwear industry, using the method of a single case study of mi adidas, the mass customization initiative of one of the largest global sport brands. We will start with a brief overview of the mass customization concept and introduce a framework of three strategic capabilities that make mass customization work. We will then discuss the situation of the athletic footwear industry and different approaches to mass customization in this industry. The main part of this chapter will focus on the development of mi adidas, the central customization offering of Adidas. The paper ends with a reflection of the development of mass customization at Adidas.

1 Introduction

In today's highly competitive business environment, activities for serving customers have to be performed both efficiently and effectively – they have to be organized around a customer-centric supply and demand chain (Piller & Tseng 2010). Since the early 1990s, mass customization has emerged as an idea for achieving precisely this objective. In accordance with Joseph Pine (1993) we define mass customization as "developing, producing, marketing, and delivering affordable goods and services with enough variety and customization that nearly everyone finds exactly what they want." In other words, the goal is to provide customers what they want, when they want it. Hence, companies offering mass customization are becoming customer-centric enterprises (Tseng & Piller 2003), organizing all of their value creation activities around interactions with individual customers.

However, to apply this apparently simple statement in practice is quite complex. As a business paradigm, mass customization provides an attractive business proposition to add value by directly addressing customer needs and in the meantime utilizing resources efficiently without

incurring excessive cost. This is particularly important at a time where competition is no longer just based on price and conformance of dimensional quality. When the subject of mass customization is raised, the successful business model of the computer supplier Dell is often cited as one of the most impressive examples. The growth and success of Dell is based on this firm's ability to produce custom computers on demand, meeting precisely the needs of each individual customer and producing these items only after an order has been placed (and paid for), with no finished goods' inventory risk at all. However, beyond Dell, there are many other examples of companies that have employed mass customization successfully (Salvador et al., 2009, see www.configurator-database.com for a broad listing of examples).

As we wear shoes every day, most of us have quite a precise idea of a perfect shoe. But in reality, there often is a trade-off in terms of fit, form, and function. As a result, the footwear sector has been among the industries that have embraced mass customization quite early, with mixed success. Consider the following examples:

- In the mid 1990s, Custom Foot was one of the first companies to embrace mass customization for the footwear industry. Based in Westport, Connecticut, customers could order shoes that promised a perfect fit. Their feet were measured in 14 different ways electronically. Orders were then transmitted to one of a dozen Italian factories. There, custom orders took their place on the assembly line alongside mass-produced shoes. Customers could pick from 150 styles in sizes from women's 4AAAA to men's 16EEEE, at prices ranging from \$100 to \$250 (Wong 1996). While in its announcements the company's founder promised to increase the number of stores from three in 1996 to 100 by the end of 1997, the company went out of business in 1997. The reason for this failure was not a lack of customer demand, but a lack of stable processes in fulfilment. First, there was a problem with differing cultures. The Italian factories were used to working in batch mode, versus individual production, which caused some problems. For example, the factory workers in Italy wanted to take the usual four weeks off in August, when customers in the US wanted their shoes. But the single biggest problem was that the company couldn't reliably measure a foot and determine what size options would best fit that foot. The system was not stable enough to produce replicable results.
- More than 10 years later, US sneaker brand Keds took a different approach. In 2009, it launched a custom footwear offering, called Kedsstudio.com. The focus here is the aesthetic design of the shoes, and products retail for about US\$40-60. Users can upload any design or picture on their shoe, which then is printed on the canvas, laser cut, and assembled to a sneaker. Shoes are manufactured with an advanced digital printing tech-

nology that offers great variety in high quality. Manufacturing takes place in China within 24 to 48 hours, allowing for order lead times for US consumers of one to two weeks, depending upon the shipping method selected. To build its mass customization offering, Keds could rely on a new breed of mass customization outsourcing services. It contracted California-based Zazzle Inc. to not just organize its supply chain and custom manufacturing in Asia, but also to connect Keds with creative consumers online. 48 hours after the launch, over 18,000 designs had been published on Zazzle.com. Today, millions of designs have been created. While not all designs are being transferred into an actual order, within a few weeks Keds created more designs with mass customization than its in-house designers in the entire 100-years of the company's existence.

- Selve, a London- and Munich-based manufacturer of women's custom shoes, is a fine example of a company that interacts well with its customers both in the traditional store and online. Selve enables its customers to create their own shoes by selecting from a variety of materials and designs, in addition to a truly custom shoe fit, based on a 3D-scan of a customer's feet. Trained consultants provide advice in the company's stores; the online shop offers re-orders. Shoes are all made to order in a specialized factory in China and are delivered in about two weeks. Customers get this dedicated service for a cost between Euro200 and 400, not inexpensive but still affordable for many consumers compared to the price level of a traditional shoe maker (starting at 1000 Euro and more). In its ten years of existence, Selve could build a growing customer base, and after improving its manufacturing and supply chain processes, also scale up output and sales.
- In 2010, Barcelona, Spain, based brand MUNICH launched a line of custom sports shoe (munichmyway.com) that are not just characterized by a wide variety of designs, but by a local manufacturing approach that strives to relocate manufacturing back to Europe. All custom shoes are made in a small factory in Barcelona, allowing the company to ship shoes quite fast, but also to adjust styles and fabric choices rapidly. Despite the higher manufacturing cost, shoes retail for about 120 Euro, not much more than the standard shoes of the brand.

What do these examples have in common? Regardless of different product categories, price points, and fulfillment systems, they all have turned customers' heterogeneous needs into an opportunity to create value, rather than regarding heterogeneity as a problem that has to be minimized, challenging the "one size fits all" assumption of traditional mass production. The idea of this chapter is to explore the characteristics of successful mass customization in the

footwear industry, using the method of a single case study. We will discuss the mass customization initiative of Adidas AG, one of the largest global sport brands.

The remaining of this chapter is organized as follows: We will start with a brief overview of the mass customization concept and introduce a framework of three strategic capabilities that make mass customization work. We will then discuss the situation of the athletic footwear industry and different approaches to mass customization in this industry. The main part of this chapter will focus on the development of miadidas, the central customization offering of Adidas. The chapter ends with a reflection of the development of mass customization at Adidas.

2 Mass Customization: Definition and Strategic Capabilities

From a strategic management perspective, mass customization is a differentiation strategy. Referring to Chamberlin's (1962) theory of monopolistic competition, customers gain the increment of utility of a customized good that better fits their needs than the best standardized product attainable would. The larger the heterogeneity of all customers' preferences, the larger is this gain in utility (Kaplan et al., 2007). Davis, who initially coined the term in 1987, refers to mass customization when "the same large number of customers can be reached as in mass markets of the industrial economy, and simultaneously [...] be treated individually as in the customized markets of preindustrial economies" (Davis 1987: 169). Pine (1993: 9) popularized this concept and defined mass customization as "providing tremendous variety and individual customization, at prices comparable to standard goods and services" to enable the production of products and service "with enough variety and customization that nearly everyone finds exactly what they want". A more pragmatic definition was introduced by Tseng and Jiao (2001) who suggested that mass customization corresponds to "the technologies and systems to deliver goods and services that meet individual customers' needs with near mass production efficiency" (Tseng and Jiao, 2001: 658).

More recently, mass customization has been described as a set of organizational capabilities that can enrich the portfolio of capabilities of their organizations (Salvador et al. 2009; Piller & Tseng 2010). Companies that profit from heterogeneities in their customer base successfully have built competences around a set of core capabilities. While specific answers on the nature and characteristics of these capabilities are clearly dependent on industry context or product characteristics, three fundamental groups of capabilities form to ability of a firm to mass customize: Solution space development, robust process design, and choice navigation (the derivation of these capabilities builds on work by Salvador et al., 2008; Salvador et al., 2009):

Solution Space Development. First and foremost, a company seeking to adopt mass customization has to be able to understand the idiosyncratic needs of its customers. This is in contrast to the approach of a mass producer, where the company focuses on identifying “central tendencies” among its customers’ needs, and targets them with a limited number of standard products. Conversely, a mass customizer has to identify the product attributes along which customer needs diverge the most. Once this is understood, the firm knows what is required to properly cover the needs of its customers. Consequently, it can draw up the so-called solution space, clearly defining what it is going to offer and what it is not.

Robust Process Design. A second critical requirement for mass customization is related to the relative performance of the supply chain. Specifically, it is crucial that the increased variability in customers’ requirements does not lead to significant deterioration in the firm’s operations and supply chain (Pine et al., 1993). This demands a robust supply chain design – defined as the capability to reuse or re-combine existing organizational and supply chain resources to fulfill differentiated customers’ needs. With robust process design customized solutions can be delivered with near mass production efficiency and reliability.

Choice Navigation. Finally, the firm must be able to support customers in identifying their own problems and solutions, while minimizing complexity and burden of choice. When a customer is exposed to too many choices, the cognitive cost of evaluation can easily outweigh the increased utility from having more choices (Huffman and Kahn, 1998; Piller, 2005). As such, offering more product choices can easily prompt customers to postpone or suspend their buying decisions. Therefore, the third requirement is the organizational capability to simplify the navigation of the company’s product assortment from the customers’ perspective.

The methods behind these capabilities are often not new. Some of them have been around for many years. However, successful mass customization demands the combination of these methods into capabilities in a meaningful and integrated way. To discuss how this capability framework can be applied in the footwear industry, we will use the case of one of the core offerings of customization in this industry, the mass customization program of Adidas.

3 Mass Customization at Adidas

3.1 Company overview

Germany-based Adidas AG is the second largest global supplier of sport goods, with a sales volume of nearly 12 billion Euros across all brands. Among these sales, about 50% account for sport shoes. The rest is made with apparel and accessories. The company employs about 42.500 members of staff. The core brand adidas has net sales of 8.7 billion Euros in 2010. The production volume of Adidas shoes is about 200 million per year. The company itself today is a pure brand owner, focusing on developing and selling its products, while manufacturing is done by independent suppliers.

The history of Adidas can be traced back to the 1920s when Adolf "Adi" Dassler and his brother began making shoes with the basic materials available after the First World War. At first, slippers were made using old tires to produce the sole. Later those shoes were changed into soccer shoes and gymnastic shoes by adding cleats or nail-on studs (Seifert 2006). The reason for this development was a simple idea to provide every athlete with the best possible equipment. The first time, Dassler shoes were showcased during the Amsterdam Olympics in 1928. The major breakthrough was achieved in the Berlin Olympics in 1936 when a gold medalist wore their shoes. Only one year later, the Dassler brothers already manufactured shoes for 11 different kinds of sport.

However, in 1948 both brothers argued on how to proceed with the development of their business, which led to Adolf Dassler's foundation of Adidas whereas his brother Rudolph established the Puma sports company. From that point of time, Adidas was focusing on performance sport shoes. Its portfolio was complemented by soccer balls in 1963 and apparel in 1967. By then, Adidas was booming and nearly 80% of all medal-winning athletes were equipped by Dassler's company.

New competitors, such as Nike or Reebok in 1979, started to enter the market focusing on low-quality, fashionable leisure wear targeting teenagers. Those turbulent times were accompanied by the founder's death which led to organizational and management changes. After financial troubles, investor Robert Louis-Dreyfus was appointed chairman of the executive board and led the company to an amazing turnaround by focusing on market needs and establishing a strong brand image (Moser et al., 2007). This successful leadership was followed by Herbert Hainer, CEO and Chairman of the Executive board of Adidas since 2001. In the last years, Adidas positioned itself as number two of the world's largest sport manufacturers, a position being reinforced by its acquisition of Reebok in 2006, a former competitor. Today the company is split

into three major divisions which target different customer types: sport performance, sport heritage, and sport style.

3.2 Industry background: Reasons to enter mass customization

The global sports shoe market is characterized by a high level of rivalry between the existing suppliers. Acquisitions like the one of Reebok by Adidas AG in 2005 or supplier Umbro by Nike in 2007 lead to permanent movements of market shares. Furthermore, low entrance barriers allow new, mostly specialized suppliers to enter the market, even if they are only regionally competitors of the global players. Most companies have outsourced their production facilities to low wage countries in the Far East. Simultaneously, shortened innovation cycles have led to higher costs in research and development as well as less time for product and quality testing before a product enters the market. From the consumer perspective, the internet has created an environment where customers are confronted with a huge bandwidth of products as well as better information to compare these (specialized category retailers like Zalando, an online footwear shop, are among the most successful examples of e-commerce). In most cases, a change to another brand evokes no costs. As a result, quality aspects as well as a psychological brand commitment and a perfect fit to customers' needs are becoming key enablers of a successful strategy in the sports shoe industry.

At the same time, the industry moved into a model of high variety and choice. Between 1980 and 2000, the number of styles available in the sport goods market increased by more than 3000 percent (Cox & Alm 1999). One of the great strengths of any successful footwear company is its ability to create a compelling variety of offerings that excite consumers. But there can be too much of a good thing, as Adidas's competitor Nike has observed: Each quarter, Nike sells about 13,000 different styles of footwear and apparel. Many additional styles make it part way through the process, but don't end up in the final line that goes to market. But each one of these tens of thousands of styles drives costs; costs for design, development, sampling, transportation, storage and sales. For footwear, 95% of Nike's revenue comes from about 35% of the styles; for apparel from about 40% (Piller 2007).

Costs of samples to showcase this variety to retailers add up to more than \$100 million. In addition, an enormous supply chain complexity has to be handled to plan, distribute, and sell this variety. Still, retail outlets face high overstocks, an increasing fashion risk, and the necessity to provide often large discounts in order to get rid of unwanted products, not to mention lost sales caused by products which have performed better than expected and that are therefore not available in adequate quantities or sizes. Facing these challenges, Adidas decided at the end of the 1990s to "go back to the roots" of its long history and to introduce footwear that is being

produced only on-demand according to the exact input of a particular consumer. The motivation to enter mass customization clearly was to find a way to reduce the high complexity of a forecast-based system of high variety.

3.3 Adidas' mass customization offerings

Adidas' product development team envisioned already in 1999 that offering custom manufactured products are suited to counter the trend of growing heterogeneity of customer needs (Moser et al., 2007). An internal pilot was launched in 2000, called *miadidas*, to evaluate the feasibility of a customized product line within Adidas. The objectives narrowed down the project to emphasize a customized product and to test the demand for customized products. Pilot studies were successful, and the offering was continuously extended to its recent form. Today, Adidas has several product lines for customized goods:

- *miadidas*: In the core of Adidas' customization offerings is its original mass customization program, *miadidas* (Berger & Piller 2003; Seifert 2006). The program is focused on performance shoes and combines fit (measurements), function (climate control, insole), and form (color combination). The program started in 2001 after two years of planning and testing. Today, *miadidas* is offered both online and in selected flagship stores. Custom shoes are available across a number of categories, including soccer, running, basketball, and tennis. *miadidas* has been positioned as a promise to consumers to achieve the same level of footwear as top athletes would get as part of their custom sponsorship package – building on the company's heritage of being a close partner of sportsmen and women.
- *miteam*: This section of Adidas is targeting sports teams, where a coach, for example, can customize sportswear for all team members. The *miteam* portfolio does not only offer customized shoes, but also customizable apparel and accessories in addition to shoes.
- *mioriginals*: This offering resembles the programs of Keds, Nike or Converse and allows consumers to create their own style, based on the selection of style options for predefined color fields of a shoe. While the previous offerings focus on the performance aspect of the product, *mioriginals* clearly is positioned as a fashion product.
- *micoach*: An interesting addition to the Adidas customization portfolio is *micoach*, offering users a personalized online training program. Customers can provide input on their

training objectives and lifestyle habits, and receive a personalized (however, automatically generated) suggestion for a training program to reach this objective. The site also allows users to monitor their goal achievement. Similar to miadidas, micoach has been positioned in the market as providing average users the same training and coaching knowhow as it is available to top athletes.

4 miadidas: Capabilities and Challenges

Since the initial launch of miadidas, its fulfillment process has been improved continuously. Figure 1 shows miadidas' value chain today. The process starts with a configuration process between the consumer and Adidas via some form of consumer interface. A customer order then has to be processed by Adidas' order management system. This process triggers a respective manufacturing process within a corresponding production facility. The process ends with the distribution of the final product to the end consumer after manufacturing has been completed and the product has been shipped to the customers' order. In the following, this section will discuss the miadidas process in larger detail. To structure our arguments, we will use the three mass customization capabilities introduced before. We will first discuss the development of the solution space at miadidas, then the challenge to establish stable processes, and finally the way how choice navigation works in this case.

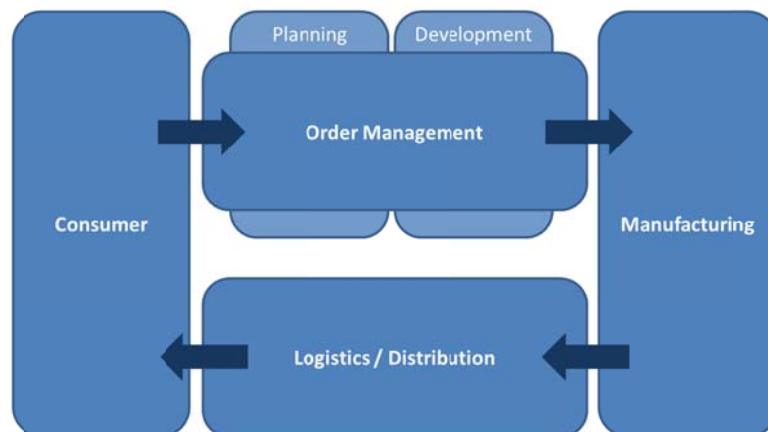


Figure 1: The miadidas fulfillment process

4.1 Solution Space Development at miadidas

To define the solution space a company has to identify those needs where customers are different – and where they care about these differences. Matching the options represented by the solution space with the needs of the targeted market segment is a major success factor of mass customization (Hvam et al. 2008). The core requirement at this stage is to access "customer need information", that is, information about preferences, needs, desires, satisfaction, motives, etc. of the customers and users of the product or service offering. Need information builds on an in-depth understanding and appreciation of the customers' requirements, operations and systems.

For miadidas, this process has been rather simple. First, the decision was made to build the customization activities on existing inline shoes. This allowed for efficiencies in the factory (tooling, production knowledge, inventory of fabrics and components), but provided a point of reference to consumers on the additional value of a customized products in comparison to a standard shoe. In general, the top-of-the-line variants were selected for each category.

Secondly, the miadidas team engaged in conventional market research techniques to gather data from representative customers about the scope of the options in a product that should be offered customizable. However, as consumer knowledge about the system had been very low at the launch of the program, Adidas decided to engage in piloting and full-scale prototyping to get deeper insight from potential customers. Participants were recruited during sports events, and focused on people actively doing sports in a serious way (e.g., members of running or soccer clubs, participants at a marathon race, etc.) These pilots revealed some interesting insight:

- 73 % of the testers had a very good feeling with the boots.
- Testers would be willing to pay between 10 to 30% more than the regular price for a customized soccer shoe.
- 100 % demand for an Adidas customization service in the future.
- 80% understand that the delivery time will take longer (21 days).

- Asked for the criteria were most important to the customer, fit was mentioned most often by far (68% of customer interested in custom soccer shoes, 75% for running shoes, respectively), followed by function (14% and 20%), and design (12% and 5%).

As a result, the decision was made to position miadidas as a performance product with the dimensions *mifit* (measurements), *miperformance* (functionality and components), and *midesign* (color options). Until today, miadidas is the only mass customization product by an established sports brand that offers these three options (all competitors, especially NikeiD, only offer design customization). Over the past few years, however, the design option became more and more important for two reasons: First, to scale-up the volume of the program, a focus has been placed on online sales. Those, however, are only easily possible for the design option. Here, Adidas was facing a trade-off between keeping its original point of differentiation (fit, form, and function) and the opportunities from using a pure online channel. Secondly, management had the feeling to serve the "create your own" trend in a better way, focusing on the young, creative consumer that is used to customize her Facebook page and cell phone cover. This trend has become the focus of the mioriginals program.

4.2 Robust Process Design at miadidas

A core idea of mass customization is to ensure that an increased variability in customers' requirements will not significantly impair the firm's operations and supply chain (Pine et al. 1993). This can be achieved through robust process design – the capability to reuse or recombine existing organizational and supply chain resources to deliver customized solutions with high efficiency and reliability. Hence, a successful mass customization system is characterized by stable but flexible, responsive processes that provide a dynamic flow of products (Pine 1995; Tu et al. 2001; Salvador et al. 2004; Badurdeen & Masel 2007). Value creation within robust processes is the major differentiation of mass customization versus conventional (craft) customization. Traditional (craft) customizers (like making a custom shoe for a top athlete in the conventional system if Adidas) reinvent not only their products, but also their processes for each individual customer. Mass customizers use stable processes to deliver high-variety goods (Pine et al. 1993), which allows them to achieve "near mass production efficiency", but it also implies that the customization options are somehow limited. Customers are being served within a list of predefined options or components, the company's solution space.

The latter principle is illustrated perfectly with the fitting option of miadidas. Traditionally, a custom fit of a shoe is delivered by measuring a customer's feet, creating a custom last representing these shapes, and then producing the shoe around the custom last. In a mass customi-

zation setup of footwear, however, in most instances a library of pre-defined lasts is being used (Boer & Dulio 2007). This library is generally larger than the standard sizing assortment (in the case of Adidas, it represents the entire size range, with three widths per size), and also allows to select a different size for the left and the right foot. Based on the measurement data of the customers, their feet are matched to an existing last. While such a system does not allow the "perfect" fit for all possible shapes, it is "good enough" to present a strong improvement compared to standard sizes available in a regular outlet. Matching a customer order with an existing library of lasts also has two further advantages: Molds and forms required for the production of outsoles can be reduced, which is a major cost advantage. Finally, using pre-defined sizes also allows for stable processes during the sales stage. Customers are enabled to even try the fit of their "custom" shoes by using a sample size in the store. This system improves quality of order taking enormously and transfers the subjective and error-prone process of fitting into a relatively stable and smooth activity.

To manufacture the shoes, Adidas uses the same suppliers for its custom shoes that also produce the corresponding inline products in huge quantities. Adidas was able to achieve this agreement by using its strong position in this market. In addition, for the suppliers flexible manufacturing also became a rather easy option as those companies in general have rather large sample room capacities, with an output of 500,000 pairs a year. For many start-ups in the field of footwear customization finding a suitable supplier became a long and demanding challenge (as the example of *Custom Foot* has shown). A global player such as Adidas, on the other hand, is able to bring all manufacturing activities together and reap the benefits of combining mass customization and mass manufacturing.

As soon as a customer order has been submitted to the order management system, the manufacturing of the individualized product has to be triggered. This is an enormously complex process (Figure 2), as Adidas shoes have to be manufactured alongside the inline products in the Adidas multi plant network. Adidas manufactures shoes in China, Indonesia, Vietnam, Thailand and Turkey, and the manufacturing process is different in every plant: For example, the number of local suppliers that is integrated in the respective supply chain varies from factory to factory. Thus, Adidas achieved a large improvement concerning the leverage of existing systems when the supply chain management for Adidas was fully automated in 2006. An ordering system was implemented which automatically allocates orders to production companies. Based on information from planning and development processes, the order management system automatically identifies the manufacturing facility that offers the best suitable combination of available resources and capacities. However, the administration of such an automated supply chain faces various problems: An inter-organizational information system is required to cope with all different interfaces of the network partners. Furthermore, all

information that is relevant for the decision making processes has to be gathered and made available in a network-wide ERP system. Naturally, all this data has to be updated constantly.

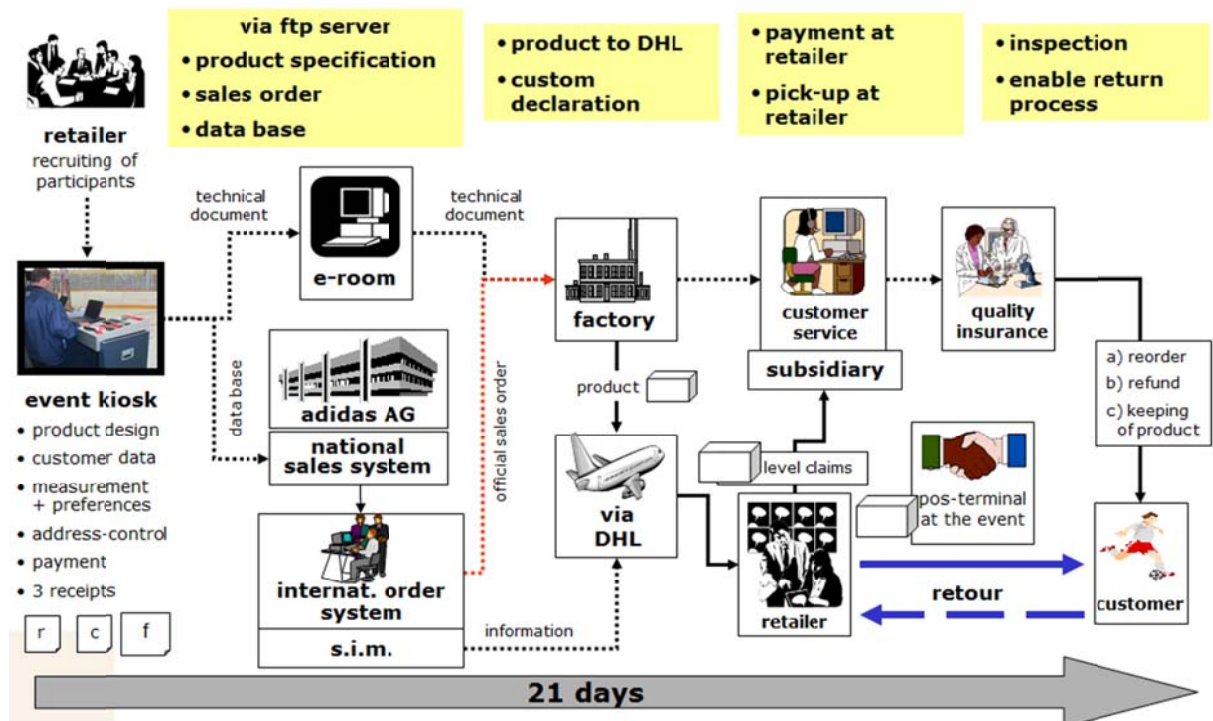


Figure 2: The miadidas business information process (Source: Adidas AG)

Hence, in an optimal world, designing stable processes for mass customization would start on a green-field with the development of new products and manufacturing lines as well as new planning resources to enable an automated processing of customer orders. Such a green-field approach however often is difficult for an established company: At the start of the program, volumes are not sufficient enough to justify all the investment. More importantly, also the knowledge and experience how to build such a system is not available but has to be acquired by a process for organizational experimentation and learning. Hence in our observation, most mass customization programs are based on the principle of trial-and-error and slow growth. Also within miadidas, sales volumes are not sufficient until today to justify a separate manufacturing line or even dedicated factory. This forces Adidas to provide a mass production system that meets the specific needs of mass customized products. For example, Adidas now has to deal with differences in inventory levels: For the standard inline products Adidas relies on finished goods inventories. For customized miadidas products, on the other hand, there is no finished goods inventory, but manufacturing demands a larger pool of raw material to cover all

variance from the options. Given however the relative value of materials compared to the value of the final product, and Adidas' market power towards its suppliers, the material inventory problem is relatively low.

A larger challenge and cost driver is distribution. For Adidas products, distribution has to be organized differently, as customized products at Adidas are manufactured after the customer has placed an order. That means, contrary to buying a pair of shoes at a retailer, Adidas customers cannot take their shoes home directly after the purchase. Instead, customers have to wait for the order to be transferred to the manufacturing facility, for the manufacturing of the shoes and for their distribution, before the product becomes available to them. For Adidas products this lead time should not exceed 21 days. In consequence, Adidas is using express courier services to distribute the finished goods to the end consumers. From the manufacturing facilities in China, Indonesia, Vietnam, Thailand and Turkey the finished products are flown to hubs in the US, Europe and Asia. For the US market Adidas uses FedEx services, whereas DHL services Europe and Asia. The use of express courier services offers an additional benefit to Adidas customers: The courier services offer a tracking system for all transported goods which allows customers a larger visibility of their order status. On the other hand, distribution via courier services is relatively expensive. Indeed, it is the largest additional cost factor of Adidas compared to the production and distribution of inline shoes. While at the current state of the system a relocation of manufacturing from Asia to Europe is out of consideration, some analysts are already predicting a move from Asia back to Europe or the US (Gowdner 2011). The additional production cost may be counterbalanced by the savings in time and cost of air delivery.

4.3 Choice Navigation at Adidas

Lastly, a mass customizer must support customers in identifying their own needs and creating solutions while minimizing complexity and the burden of choice. The traditional measure for navigating the customer's choice in a mass customization system has been product configuration systems, also referred to as "co-design toolkits" (Franke and Piller, 2003; Franke and Piller, 2004), configurators, choice boards, or customer design systems (Salvador and Forza, 2007; Hvam et al., 2008). They are responsible for guiding the user through the elicitation process. Whenever the term configurator or configuration system is quoted in the literature, for the most part, it is used in a technical sense, usually addressing a software tool. The success of such an interaction system, however, is by no means defined solely by its technological capabilities but also by its integration into the sales environment, its ability to allow for learning, its ability to provide experience and process satisfaction, and its integration into the brand concept. Tools for user integration in a mass customization system contain much more than arithmetic

algorithms for combining modular components. In a toolkit, different variants are represented, visualized, assessed, and priced with an accompanying learning-by-doing process for the user. The core idea is to engage customers into fast-cycle, trial-and-error learning processes (von Hippel, 1998). Thanks to this mechanism, customers can engage in multiple sequential experiments to test the match between the available options and their needs.

In the miadidas system, there are three possible ways for customers to place an order at miadidas, each of these order channels using a different customer interface: Adidas flagship stores, events, and an online configurator. All three sales channels use a configuration system which helps to visualize the products and which connects the point of sale with the order management system.

Retail stores. The first option is the use of specific Adidas-owned flagship stores. In this case permanent installations at dedicated retail outlets are chosen. Customers can visit these stores and go through the co-design process with the help of trained sales personnel. This approach offers one major advantage: In the brick and mortar stores special equipment is available and more detailed customer data can be collected, so that customers can make better use of miadidas' customization offers in terms of fit and functionality.

Events. The second sales channel emphasizes special events at selected retailers or wholesale markets. Adidas is able to promote those events to their retail partners by offering them the potential to differentiate themselves from their local competitors by improving the image of their stores. In this case the retailer takes full responsibility for the marketing of the event and also takes care of the billing process (Berger et al. 2005). Adidas only provides the trained sales personnel for the interaction with the customers for the duration of the event which is usually two to four days. This form of event sales can also take place in the context of major sporting events. In this case Adidas is fully responsible for the whole process, but such events offer the additional benefit of reaching the core target group of miadidas.

Online. The third option for placing an order is the Adidas e-commerce platform. This channel is the latest addition to the sales channels of miadidas and will probably become the most important one in the future. In terms of customization of the appearance of the shoes, the online configuration process is mostly identical to the process of placing an order offline. However, the online process cannot offer all options concerning the fit and functionality of the shoes. For re-orders, however, this issue can be neglected buys: Customers can place a first order in an Adidas store and re-use their respective customer data for repeat orders online. That way, mass customization can be an excellent way to generate constant sales based on re-orders. On the other hand, the re-buy-situation is not only a chance for miadidas, but it may

also turn out to be a strong barrier: Due to the different distribution channels, island solutions have been produced. All distribution partners may not have access to the same pool of data. For example, it is possible to purchase customized shoes in brick & mortar stores and use the same data in e-commerce to re-order the shoes or configure new ones. But this does not yet work vice-versa. This is still an issue which needs effort to facilitate better integration.

The interaction between a manufacturer and the customer that is underlying a co-design process further offers possibilities for building loyalty and lasting customer relationships. Once a customer has successfully purchased an individual item, the knowledge acquired by the manufacturer represents a considerable barrier against any potential switching to other suppliers. Reordering becomes much easier for the customers. The more customers tell the vendor about their likes and dislikes during the integration process, the better is the chance of a product being created that meets the customers' exact needs at the first try. After delivery of the customized product, feedback from the customer enhances Adidas's knowledge of that customer. The company can draw on detailed information about the customer for the next sale, ensuring that the service provided becomes quicker, simpler, and more focused. The information status is increased and more finely tuned with each additional sale. This data is also used to propose subsequent purchases automatically, once the life of the training shoes is over (for Adidas customers who exercise intensively, this can, in fact, be the case every few months).

When Adidas enters a learning relationship with its customers, it increases the revenues from each customer, because, in addition to the actual product benefits, it simplifies the purchasing decision, so that the customer keeps coming back. Why would a customer switch to a competitor – even one who could deliver a comparable customized product – if Adidas already has all the information necessary for supplying the product? A new supplier would need to repeat the initial process of gathering data from the customer. Moreover, the customer has now learned how self-integration into the process can successfully result in the creation of a product. By aggregating information from a segment of individual customers, Adidas also gains valuable market research knowledge. As a result, new products for the mass market segment can be planned more efficiently, and market research is more effective, because of unfiltered access to data on market trends and customers' needs. This is of special benefit to those companies that unite large-scale make-to-stock production with tailored services. Mass customization can thus become an enabling strategy for higher efficiency of a mass production system. This learning relationship offers new cost saving potential based on the better access to knowledge about the needs and demands of the customer base (Kotha 1995; Piller et al. 2004; Squire et al. 2004).

Benefits of getting access to this knowledge are as follows:

- Reduced or eliminated need for forecasting product demand,
- Reduced or eliminated inventory levels of finished goods,
- Reduced product returns, and
- Preventing lost sales if customers cannot find a product in a store that fits their requirements and, thus, allocate the purchasing budget to another item.

Choice navigation, however, does not just refer to a technical process of selecting from options or using algorithms to provide the fit. Offering choice to customers in a meaningful way also can become a way for new profit opportunities. Recent research has shown that up to 50% of the additional willingness to pay for customized (consumer) products can be explained by the positive perception of the co-design process itself (Franke and Piller 2004; Schreier 2006; Franke and Schreier 2010; Merle et al. 2010). Product co-designs by customers may also provide symbolic (intrinsic and social) benefits, resulting from the actual process of co-design rather than its outcome.

Adidas tried to address this aspect of choice navigation by various iterations of its online tool, every time improving the user co-creation experience. The largest demonstration of this effect, however, has been the opening of a new kind of performance store that features a very different set-up and sales experience. In 2006, the "mi-innovation center (miC)" opened as part of the Paris flagship store of Adidas at Champs Elysees. The miC offers consumers customization in technology, style, and design, using many innovative technologies such as a configurator, laser and infra-red technologies, commands generated by gesture translation, a virtual mirror, a digital 3-D universe and radio frequency identification (Kamenev 2006). Until today, however, this concept has not been rolled out to a larger extent and can be considered as a unique experiment.

4.4 Alternatives to mass customized footwear products

Independently from Adidas, Adidas introduced two further radically new product designs which allow for customization in the actual product. We want to discuss these two alternative approaches at the end of this section to outline further ways of enabling customization from a consumer perspective. The company's underlying rationale is again to reduce risk and uncertainty with regard to product variants, but to do so without the complexity of custom order taking, on-demand manufacturing, and single-piece distribution. The key of these approaches are

adaptable, intelligent products (a strategy that dominates customization in many markets, including smart phones, laptops, mattresses, or office furniture).

The first of these products, dubbed *Adidas 1*, is a running shoe that shall provide a huge range of cushioning options in one product (for running shoes, cushioning is a large driver of variety as users demand different degrees of stiffness). To embed flexibility, the shoe is equipped with a sensor, a system to adjust the cushioning, and a microprocessor to control the process. When the shoe's heel strikes the ground, the magnetic sensor measures the amount of compression in its midsole and the microprocessor calculates whether the shoe is too soft or too firm. Then, during the seconds the shoe is airborne, a tiny motor shortens or lengthens a cable attached to a plastic cushioning element, making it more rigid or pliable. Each shoe also has a small user interface that allows for manual adjustments of the product, allowing users to trim the computer's decision to personal taste. According to Adidas, the shoe's range of cushioning options corresponds to at least five previous fixed variants of one shoe, reducing the planning uncertainty by this dimension.

Adidas' second adaptable product, *Tunit*, is a modular system that allows the user to mix and match the various parts of a soccer boot during the usage stage. The boots are sold broken down to three components: upper, chassis (insole) and studs. All components are interchangeable, transferring a sole product into a product system. Introduced for the 2006 World cup, the product is presently offered in a variety of 10 uppers, 3 chassis and 3 different sets of studs (uppers and chassis are offered in the standard soccer size range of 16 sizes). The Tunit system changes the conventional way of planning and launching a design variant even more than two other concepts of postponing into the user: First, the underlying form postponement of the Tunit system allows Adidas for much more flexible planning. The present scope of modules allows configuring 90 different variants. Forecasts have to be performed just on the level of the ten uppers (colors, fabrics), while studs and insoles are stable modules over many seasons. Conventionally, Adidas would have offered a comparable soccer boot in 28 to 36 different variants (color-insole-stud combinations), all subject to a detailed forecasting process. In the Tunit system, this risky decision of the final product configuration is postponed into the user domain. Second, the provision of special retail variants or limited editions becomes much more efficient. A new variant now just demands an additional upper. For example, presently Adidas is also offering its standard soccer boots in a "style version" intended for street use. Despite their similarity to the regular version, these streetwear products form an independent product line. With an extension in the range of outsoles and studs, Adidas could eliminate the entire "style" line and include it into the Tunit system. Third, the system provides value to users who don't have to purchase multiple pairs of shoes when playing on different grounds. For Adidas, on the

other hand, the opportunity to "upgrade" shoes and sell additional components is a new profit opportunity (with much higher margins).

5 Discussion

The development of miadidas reveals a long learning path and trial-and-error process for implementing and scaling-up a mass customization offering. Mass customization was considered as one possible solution to cope with the high variety and increasing complexity of the inline business. In the first years, miadidas' real function in the corporate strategy, however, was different. It primarily was a supporting function for the brand image, enhancing also the positioning of other products of the performance category. Besides that, the company could create an image of itself as an innovative player by offering a unique brand experience and improving relationships with its customers. However, serving as a marketing tool or pilot is not a sustainable position for a business unit in a global enterprise.

Therefore, in the last years the miadidas business unit has been reorganized and has been integrated more deeply into the existing processes and routines. Activities like special retail events become less significant whereas permanent locations and the online channel become more important (Moser et al. 2007). Most importantly, miadidas can be considered as a knowledge-rich activity that produces information to improve the inline business. The inline (standard) assortment benefits from more accurate forecasts of customer needs and trends as well as more appealing models. At the same time, achievements with regard to design (e.g. modular product architectures), manufacturing technology (flexible printing), logistics (fast distribution system, direct sales), and online sales (e-commerce configurator) served as learning labs for the entire company. Several new technologies that first have been introduced to enable miadidas are now supporting efficiency in the inline system.

From our observations of miadidas' development, we conclude that implementing mass customization and, thus, building its underlying three strategic capabilities is by far no easy or straightforward task. Mass customization demands a new customer-company relationship for all members of the organization. This proved to be much more difficult than expected. For the majority of employees at Adidas, the "customer" still is the sales organization, perhaps the retail partner, but -- in most instances -- not the final consumer. Mass customization, however, demands such a customer-centric perspective.

An indication of this challenge may be the fact that the re-ordering and learning process (outlined in the section on choice navigation) has not been established in most countries. While rather simple from a technological perspective, and also intuitive from a marketing point of

view, enabling a direct relationship with end consumers has proven to be much more difficult than expected. It is the mental gap and the dominance from the existing mass production thinking that is preventing its execution. At the same time, the customization unit within Adidas has to continuously prove its value set and survive as part of a traditional mass producer. Until today, the leadership of this unit masters this challenge very well and positioned miadidas as an experimental learning space for the entire company (Walcher & Piller 2006). But the case clearly demonstrates that even for an established and financially successful corporation such as Adidas, implementing mass customization is not easy, despite a suitable market and great customer feedback. Successful mass customization demands building a unique set of strategic capabilities, and changing the corporate mentality to become truly customer centric. But once mastered, it is exactly these challenges that provide the competitive advantage of mass customization.

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