



Manufacturing and the demanding customer

Can mass customization meet the challenge—and yield profits?

Mass customization is a growing trend in manufacturing today. Fueled by customer demand and enabled by modern technology, customization is fulfilling two needs: It appeals to modern consumers, and it helps manufacturers find a much-needed competitive edge. These two benefits are the main drivers that are causing manufacturers, small and large, to explore new operational strategies for producing highly customized and configured products. In order for the trend to be sustainable, not just a short-lived fad, manufacturers must find ways to combine standard lean principles with Made-to-Order (MTO) tactics. In this brief we explore the issues, particularly the role technology plays in making mass customization more efficient and profitable.

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What's driving customization

Mass customization in manufacturing is a growing trend. Fueled by customer demand and enabled by modern technology, customization is fulfilling two needs: It appeals to modern consumers, and it helps manufacturers find a much-needed competitive edge. These two benefits are the main drivers, the impetus that makes manufacturers push traditional operational boundaries in order to produce on-demand highly customized products. Let's take a closer look at the influences behind the trend.

As manufacturers are struggling to find competitive distinctions, the consumer appeal of personalized products is causing more of them to test the waters. Can individualized products, or mass customization, be profitable and be worth the extra efforts? It appears so.

Business analyst firm, [Bain and Company](#), published an article, "Making it personal: Rules for success in product customization" that explains why manufacturers are taking this trend so seriously. "By providing customization options, brands raise loyalty at a time when it's more important than ever," the article says. It also cites a survey it conducted of 1,200 global executives. Not surprisingly, 67% believed their customers are becoming less loyal to their brand. "Customization helps companies differentiate their products from those of their competitors at a time when the Internet is rapidly creating high price transparency and making it easier for customers to compare products with standard features," Bain says.

Consumers today are bargain-hungry and willing to make an effort to uncover the lowest price. According to [Nielsen](#), 49% of mobile phone owners use their device to compare prices, including making comparisons while they walk the aisles of stores. Ecommerce and global supply chains that can deliver products from low-wage countries, such as China, also give consumers more options.

Get a firm grip on the roller coaster ride

A recent survey conducted by Manufacturing.Net examined the issues around customer demands and the impact mass customization is having on manufacturing profitability. The survey results tell a tale of dramatic ups and downs.

Expectations go up. Manufacturers said that half of their customers expect higher quality, but at the same price. Speed of delivery is even more important, it seems, with 64% of manufacturers ranking it as a top pressure from customers. The rankings climb yet higher, though, with 69% saying greater availability is the top concern.

Performance drops. Next, the survey looked to the impact these pressures have on customer satisfaction. Almost half of manufacturers—46%—reported poor customer experience, more late deliveries, and more orders that did not meet as-promised specifications. For 43% of manufacturers surveyed, this poor response has even lead to loss of customers.

Changes go up. Manufacturers are not content to settle for poor results; 53% said they have made changes to their operations in order to save costs and 59% have made changes to increase speed of delivery. It seems these changes are not short term, 90% said they expect to continue to make changes for the next 12 months.

More changes and strains. Improving service is a goal for 38% of manufacturers, while 43% are adding more made-to-order and engineer-to-order products to meet customer demand. Yet, 58% said these changes are straining operations and profitability for the short term.

Positive finish. Despite the twists and turns and negative impact on profits, manufacturers still have an overall positive view of the higher standards customers are driving, with 83% of manufacturers saying they think the long-term benefits of meeting customer demands will have a positive impact on their growth.

As low-cost competitors deliver knock-offs, often violating patent and copyright laws, the risk of products becoming commoditized is higher than ever before.

For global brands, customization can ward off the threat of commoditization, [McKinsey and Company](#) says. In the article, “How technology can drive the next wave of mass customization,” the authors point to the benefits of driving purchase decisions away from price alone. “Benefits for successful companies are compelling, not least for global brands struggling with a decrease in loyalty after the recession and eager to avoid a painful race to the bottom of the cost curve in globalized and standardized product arenas.”

McKinsey and Company names other benefits of mass customization, saying, “Mass customization has the potential to help companies increase revenue and gain competitive advantage, improve cash flow, and reduce waste through on-demand production.” Another important consideration mentioned: Customization allows manufacturers to tap into the consumer’s mindset and “generate valuable data that may be used in the development of standard products and in online marketing and public-relations campaigns.”

[BloombergBusinessweek](#) also suggests that creating an experience is the ultimate way to counteract commoditization. “It wasn’t long ago that time-to-market was two years, then 18 months, and then 12 months. Now, a competitor can knock off your ‘innovation’ in six months or less. Many businesses understand that being ‘new’ or ‘different’ is no longer a differentiator,” the article says, explaining that feature-rich products are no longer enough to capture the attention, spark the imagination, and instill loyalty in today’s highly fickle and me-focused consumer.

Product design has lost its ability to be unique for long, and, therefore, has lost much of its value. Product customization and the entire personalization experience still hold value for consumers, manufacturers are finding. The pride that comes from “inventing” a personalized design offers consumers an experience that is not easy to duplicate.

“Choice-fatigued consumers are not looking for another product that hasn’t taken their true needs and desires into consideration,” [BloombergBusinessweek](#) says about modern consumers. “They are looking for companies in which to believe and give their allegiance. They are looking for experiences that cater to their deep-seated desires. This type of engagement requires much more than the latest technological breakthrough: It requires emotional engagement.”

[Harvard Business School Press](#) reiterated the value of the consumer experience, predicting we are on the verge of a total paradigm shift. Author Joseph Pine calls it the “experience economy” and suggests that businesses, including manufacturers, will be forced to orchestrate memorable events for their customers in order to remain competitive. “It will not be enough merely to flog products and services, no matter how individualized they are,” he says.

Starbucks® is the ultimate example. They took a very simple product—coffee—and turned the ordering and customization process into an enjoyable, indulgent experience, one that customers are willing to pay a premium to enjoy.

Can customization and profitability coexist in manufacturing today? That is the question many manufacturers debate as they attempt to meet consumer expectations for

highly configured and customized products, despite the strain it places on operations.

How manufacturers can meet the production challenges

Although the benefits of product customization are many, manufacturers still must find the right combination of production adjustments to make sure:

- The customizations are feasible on a mass scale
- They actually fulfill customer expectations
- The entire process is profitable

Those are not easy obstacles to overcome, especially considering that most manufacturing plants were designed for make-to-stock assembly, where profits came from producing large volumes of identical products.

As the *Economist* points out, mass customization does rely on some elements of the traditional mass production process. There is no need to throw out the entire core manufacturing concept, only refine it.

Successful manufacturers offering customization often break the product and the assembly process down into modules or components, keeping the majority of the modules standard and focusing on interchangeable options that can be introduced to the production line in later stages as finishing touches or accessories. For example, watch manufacturer Swatch® starts with an internal mechanism that basically is the same for all models. A wide variety of straps, colors, and add-on details ultimately give customers thousands of options, with the core time-keeping mechanism always the same.

Industry Week says that mass customization can be thought of as an extension of lean manufacturing principle—only the batch size is “one item” to meet customer specific demand. Mass customization combines the low unit costs of mass production processes with the flexibility of individual customization. It can also be seen as an example of bespoke tailoring.

This doesn't mean there aren't stresses to the operation—and the supply chain. Successful manufacturers offering customized products typically have highly engaged supply chain partners that are equipped to manage the unique picking, packing, shipping, and delivery issues associated with one-off orders. “As the concept of mass customization effectively postpones the task of differentiating a product for a specific customer until the latest possible point in the supply network, it can put a lot of stress on one's supply chain. Thus the need for both your manufacturing and supply chain processes to be Lean and agile...To be successful, this requires efficiency as well as integration and collaboration with customers and suppliers,” the *Industry Week* article says.

This is why some manufacturers employ a hybrid supply chain strategy to support their mass customization models. This is a combination of lean and agile concepts, where a manufacturer operates with flexible production capacity that can meet surges in demand along with a postponement strategy. Postponement simply means products are partially assembled, usually the core module that remains the same, no matter the customization. Then, when the actual order is received, the product is completed to the exact specifications of the customer. This minimizes waste, speeds the production process, and allows manufacturers to achieve mass production economy of scale on a large portion of the product.

Examples in action

Dell® Computers is a good example of a company using a postponement strategy. Dell allows customers to “design” their personal computers online. When the order is received, Dell technicians assemble the appropriate preconfigured modules, add the customers’ choices for features, then test and ship the product, one at a time.

Levi Strauss, was an early innovator in product customization, introducing the concept as early as 1994. Its “Original Spin” jeans for women used in-store technology to measure customers and then send details direct to the factory for customer-fit production. Although the program received considerable attention at the time of launch, it produced disappointing sales. The program was discontinued in 2004 when Levi’s closed the last of its domestic manufacturing plants.

Today several other fashion retailers have picked up the trend. Lands’ End offers custom-made shirts, jeans, and chinos on their web site, where customers can type in their measurements and make selections on style, fabric, and fit choices from a set of options on screen. Brooks Brothers goes a step further in its New York store, where it uses a 3D body scanner to collect customer measurements. Customers can then select style, fabrics, and design features from a computer screen in consultation with a trained sales professional, who guides choices.

Common pitfalls to avoid

The *Economist* recently examined why some manufacturers are successful with mass customization efforts, and why others seem to be left struggling to find the profitable balance. The article identified some common issues:

- **Lack of clarity and boundaries**—Consumers need guidelines and boundaries and they need to be clearly communicated, if the manufacturer is to retain control of efficiency and profitably. “Consumers generally prefer to be told what their limits are, and then to be allowed free rein within them. Successful mass customizers first find out what limits their customers are happy to live within, and then organize their operations accordingly.” Without some carefully controlled limitations, manufacturers are likely to face unnecessary complexity and fail to achieve a scalable plan.
- **Failure to shift to loosely linked autonomous units**—The series of tightly integrated processes used in mass production simply will not work for mass customization. Manufacturers must, instead, be more flexible and shift to a process that links autonomous modules. Each of those modules can have variables, and the way they combine can vary in a classic mix-and-match concept. The end result is thousands of options, but in a controlled fashion.
- **Cannibalizing product sales**—Manufacturers often use customized offerings as a way to attract new customers, hoping to eventually transition customers to purchase more profitable products. That strategy seldom works. Once a customer has been tempted with a customized version, they are seldom willing to settle for anything less. Customized products tend to be so popular that they cannibalize sales of traditional products.

How to apply technology for success

McKinsey and Company says that, despite the obstacles, the time is right for manufactures to transition into product customization. “We believe the time for widespread, profitable mass customization may finally have come, the result of emerging or improved technologies that can help address economic barriers to responding to consumers’ exact needs in a more precise way,” it says in the article “How technology can drive the next wave of customization.” The article points to these technologies as key enablers:

- **Social media and crowdsourcing**—These tools allow companies to analyze the value that consumers attach to existing or proposed components of current or hypothetical “virtual” products. Starbucks does this with frappuccino.com, a social site where users build their own virtual Frappuccino. This allows Starbucks to measure the popularity of different ingredients and combinations.
- **Online interactive product configurators**—These tools provide a user-friendly and speedy way to gather a consumer’s customization preferences. Ease of use has made product configuration engaging and enjoyable.
- **3D scanning and modeling**—These technologies make it much easier to measure a human body for individualized products that are tailored to fit. Several companies have created scanning application that gather exact body measurements in seconds or minutes; these measurements can then be rendered into an online personalized 3D model.
- **Recommendation engines**—These tools use past selections to suggest choices. Recommendation engines are now moving into the customization space, helping customers configure products that are logical and most likely to be pleasing. Rules-based standards can also keep customers from ordering combinations that are either impractical to produce or that are destined to be disappointing.
- **Smart algorithms for dynamic pricing**—These algorithms help manufacturers price customized products based on difficulty and availability. On-demand custom orders can often challenge companies with unpredictable spikes in demand, resulting in long wait times—deal-breakers for impatient consumers. Some companies are managing this capacity issue by using smart algorithms and better data-processing capacity to enable dynamic pricing, which encourages customers to purchase the products that have low wait times and in-stock components. As inventories and demands shift, the pricing can shift too, always adjusting in order to offer consumers the lowest price for the “easiest to produce” product at that given moment. This strategy helps reduce the wait-time for consumers, increasing satisfaction.



- **Supply chain management (SCM) solutions**—These solutions, which fully integrate with the enterprise system, are needed in order to manage the complex resource planning and fulfillment of one-off orders. These advanced solutions help manage turning a single order into custom picking-packing-shipping lists for warehouse logistics. Modern software tools also connect the configurators at the front end with the procurement, production, and SCM systems. This total integration means that customers are promised realistic lead times and can be given reliable, real-time progress updates.
- **Flexible manufacturing systems**—These are essential to making small-batch production for mass customization profitable. Several industries, such as Auto and IM&E manufacturers have invested in dynamically programmable robotics with interchangeable tooling that can switch agilely between models and variants.
- **3D printing**—This new technology makes it possible to print objects with materials such as ceramics, metals, and even chocolate. At one time, 3D printing was primarily used as a prototyping tool, but today it is used by industries like aerospace and defense and medical devices, which require precision production of small quantities. For consumers, 3D printing is being used to create objects such as jewelry, home decoration, and adornments for clothing.

What it all means

Controlling manufacturing costs is vitally important in mass customization, since margins tend to be very thin. Modularization of product designs, advanced ERP solutions with robust financial capabilities, and flexible production technology for scheduling and managing shop floor operations are now available to manufacturers, so they have an end-to-end view of orders, production and outcomes.

These are just some of the technologies that can contribute to a profitable mass customization strategy. Manufacturers are still in the early stages of adopting tactics for personalizing products and creating lean batches of single items. Work is yet to be done to fully master efficiency and bring mass customization to more products and more industries.

It is becoming clear, though, this is no passing fad and demand will only continue to escalate for personalized items, whether it is clothing, décor, or building materials. As consumers—in all demographics—become more accustomed to ecommerce and the ease of ordering personalized items that meet their specifications, this may become the expected norm.

Manufacturers will continue to develop products that can be customized, with customizations that offer real value—not just a novelty factor. Although it remains to be seen how this trend will evolve, there are some conditions that are certain: True scale in mass customization can only be achieved with an integrated approach. To achieve that approach, technologies must complement one another. This will allow manufacturers to create a comprehensive, end-to end system that adds value for customers and profits for manufacturers.

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