

Creating Competitive Advantage through Mass Customization

By Christopher W. Hart, Ph.D.

Executive Summary

Across the broad spectrum of industry, companies are achieving unprecedented levels of market success through mass customization, an approach to business that integrates and takes to a higher level an organization's efforts to become more innovative, increase quality, improve agility, reduce cycle time, and, above all, create customers who do not want to buy from anyone else.

At the core of mass customization is the principle that customers want products and services as unique as their individual tastes and preferences, at prices that translate into superior value.

The need for firms to adopt mass customization is driven both by heightened customer expectations and companies' never ending quest to develop and sustain competitive advantage. New technologies and a new way of thinking about strategy are enabling them to respond to both forces.

This article explains mass customization in a way that clarifies the concept, explores the competitive reasons for mass customization's emergence, and provides a diagnostic and prescriptive framework for evaluating the potential it holds for your organization.

Check into any Ritz-Carlton Hotel anywhere in the world and you will be greeted not only by the doorman, but also by a number of small, pleasant surprises. The hotel does not need to ask the name of your employer, your home address, whether you want a non-smoking room, or if your preference is for foam, non-allergenic pillow. All of this information was obtained during your previous visit to the Ritz Carlton.

To your delight, the desk clerk greets you by name when you phone for a morning wake-up call and asks if you would, as usual, prefer breakfast in your room. When you awaken the next day, your favorite newspaper, *The Wall Street Journal*, is outside your door. You didn't even have to ask. Indeed, you sense that the hotel staff is somehow able to anticipate and respond to your every need, providing you with a feeling of satisfaction that comes from being among people who care about you as an individual. "Why would I ever stay anywhere else?" you wonder.

Why, indeed? Ritz-Carlton is closing in on the concept of delivering exactly what you--as an individual customer--want. They are customizing the hotel experience to satisfy your unique preferences and those of each of its thousands of other guests. Each day, Ritz Carlton's highly perceptive staff, carefully groomed through a selective and intensive hiring and training program, discreetly record on small pads of paper the unique habits, preferences and dislikes of each of its guests. This information is then transferred into a corporate-wide "guest-history database." Every morning, a fully dedicated "guest historian" at each hotel pulls up the guest-history files for all the guests who will be arriving that day who have stayed previously at a Ritz-Carlton, and develops an initial suggestion list of extra touches that might surprise and delight individual guests. This list and the guest-history data are then distributed and reviewed by department teams to determine what they think would best add to their guests' experiences. Ritz-Carlton guests might not notice these extras, but over time, they should lead to an overall sense of comfort and warmth that their

competitors lack the ability to match. As Horst Schultze, CEO, told me, "We want our guests to feel increasingly like they are at their home away from home."

Your experience at the Ritz-Carlton was not accidental, but something planned and coordinated, the result of an explicit strategy of mass customization. This strategy is embodied in a management system that combines a focus on individual guests' needs, information technology, flexible processes, empowered employees, and--perhaps most important--continuous *learning* about guests' needs based on observation over time.

The result? According to Laurie Lemmons-Murphy, Guest Recognition Program Manager at The Ritz-Carlton Hotel Company, since designing and implementing the guest-history system, Ritz Carlton has increased guest retention by 23%.

One in 11 million

A mass-customization strategy is not limited to service companies. Manufacturing firms have been at its vanguard as flexible manufacturing has made short runs of customized items--down to lot sizes of one-- economically feasible. However, the strategy is most effective for those firms that have leveraged their agile manufacturing capability by developing an integrated company-wide system that includes collaborative design processes (often using CAD or AI software), flexible production processes and "learning relationships". This type of system does not create overwhelming choice complexity or increase costs to a point where a company prices itself out of the market. Rather, it painlessly and easily provides customers with exactly what they want, at prices that create the best value on the market.

Consider Japan's National Bicycle Industrial Company. Based on a customer's requirements for model, color, components, and personal measurements taken by a dealer, National receives a faxed set of specifications. Computers digest the specs and print out custom blueprints from which the customer's 1-in-11 million bicycle is created out of cut-to-fit and common parts. Robots do most of the welding and painting, while skilled workers complete the assembly--including the silk-screening of the customer's name onto the frame. (One would think that when buying a new car for, say, \$35,000, it would be reasonable to request that the manufacturer be able to put your initials somewhere, if you so desired.)

Within a day, this one-of-a-kind bicycle is finished, packed, and ready for shipment. While other cyclists on the block are tooling around on off the shelf wheels, National's customer will soon be showing off a *made-to-order* machine.

On the surface, mass-customization strategy may seem to add only a few new technological wrinkles to an already existing organizational framework. However, adopting a mass customization strategy implies considerably more. It represents a major paradigm shift in the way business is conducted and is destined to have enormous ramifications in industry after industry.

In this article, I will clarify the concept of mass customization, explore the competitive reasons why mass customization is being pursued with such zeal by many companies, and provide a framework to evaluate the potential of mass customization for your firm.

First, let's address the apparent oxymoron: mass customization.

Defining Mass Customization

How should one define mass customization? First, consider a visionary definition:

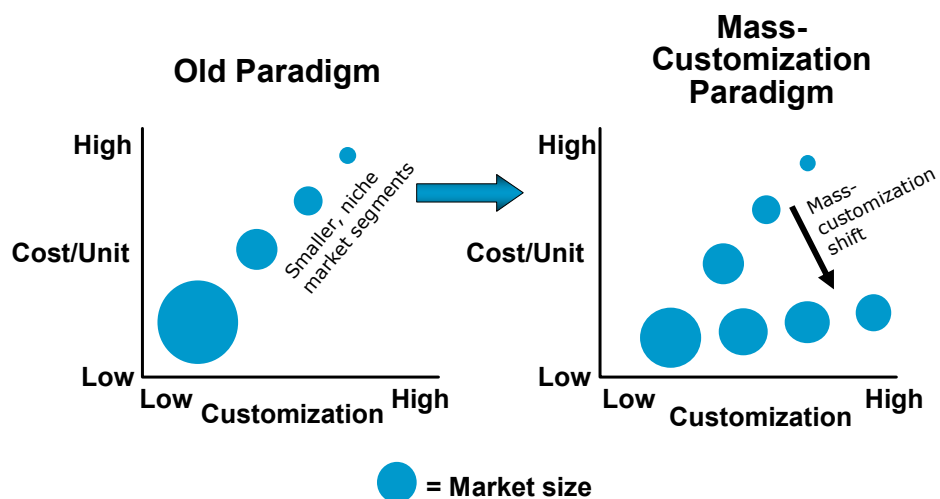
Mass customization is a business strategy for profitably providing customers with anything they want, anytime, anywhere, in any way.

This definition--representing the absolute ideal--would make mass customization seem practically unachievable by even the most dedicated firm. And so it is. (See Sidebar 1, "The Rationality of Irrationality.") Since a firm can only approach that ideal, a second, more realistic definition of mass customization follows:

Mass customization is the use of flexible processes and organizational structures to produce varied and often individually customized products and services at the price of standardized, mass-produced alternatives.

A strategy grounded in this second definition does not promise the "anything-at-any-time" products and services embodied in the visionary definition. Rather, products and services are customized discriminately so as to: (1) be meaningful to the customer, (2) be feasible to design, produce, sell, distribute, and service; and (3) increase customer value relative to competitors' offerings. Figure 1, "Breaking the Old Mindset", illustrates the fundamental difference between the traditional production and mass customization paradigms. The cases of Lutron Electronics Company and Individual, Inc. demonstrate how the mass-customization paradigm can translate into a significant competitive advantage.

Figure 2
Breaking the Old Mindset



Lutron, which designs and produces lighting controls--switches and dimmers for residential, commercial, and industrial markets--offers over eleven thousand items in over a dozen product lines. Using modular components, Lutron customizes each of its lighting systems to individual specifications while maintaining low costs. Customization occurs both in light

switches (e.g., custom-matching a paint sample) and in systems integration (e.g., combining a lighting system with a separate security system).¹

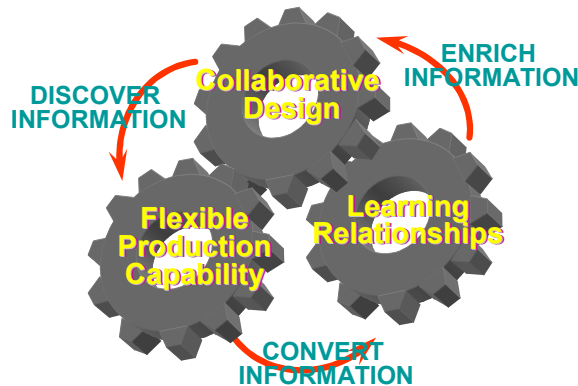
Lutron developed its strategy in response to a competitive threat that held dire consequences-- an assault on the industry by General Electric. The proverbial 2,000-pound gorilla entered the business in the mid-1960s with the explicit objective of becoming the lowest-cost producer and wiping out its higher-cost competitors--like Lutron. Faced with this threat, Lutron executives looked to their competitive strengths. Lutron had developed good relations with its customers, particularly interior designers and architects. By entering into a dialogue with customers about how Lutron should respond to GE's assault, they discovered something amazing: customers were interested in more variety than a single-toggle light switch in off-white! Indeed, interior designers and architects wanted electrical switches and faceplates customized in a wide variety of shapes, colors, and sizes. In response to its customers' needs, Lutron unconsciously developed a mass-customization system by utilizing collaborative design and flexible production processes to create competitively priced, customized products that made it #1 in the U.S. lighting-controls market.

<p style="text-align: center;">Sidebar 1 "The Rationality of Irrationality"</p> <p>Producing tailor-made goods or services with very short cycle times and mass-production efficiencies seems a far more realizable explication of the mass-customization concept than that offered by the visionary "anything, any time, anywhere, in any way" definition. But becoming a world-class mass customizer depends upon internalizing the visionary definition, and upon continuous progress toward the almost irrational ideal of <i>profitably providing customers with anything they want, any time, anywhere, in any way.</i></p> <p>The quality movement provides an instructive analogy. Ask executives at the most quality-oriented companies if they have reached their ultimate quality goals--"zero defects"¹ and "zero defections" (of customers), --and they will inevitably answer "no." But they will quickly point out that progress on both fronts would be much slower if these irrational goals were not present to galvanize and align the organization. Visionary, "stretch" goals are essential for shifting an organization's mindset and for illuminating the changes that could transform a company and change the competitive rules of its game.</p> <p>Thus, the rational managerial approach is to establish and strive for an irrational goal.</p>

GE? They exited the business, unable to compete successfully against Lutron, whose engineers hold over 80% of industry patents. Lutron, enhancing its strategy by developing learning relationships with its customers, has enjoyed revenue growth in excess of 20% per year ever since.

Figure 2 illustrates the fluid interaction of the various components comprising an explicit mass customization strategy. Such a strategy, integrating collaborative design systems, flexible production processes, and learning relationships, has translated into revenue growth, increased customer retention and new growth opportunities for Lutron and an increasing number of leading-edge firms.

Figure 2
Components of an Explicit Mass-Customization Strategy



Perhaps no consumer company is better at mass customization than Amazon.com. Practically everyone who has had a shopping experience on Amazon and the experience of Amazon's software that creates a "collaborative design shopping experience" in which

terrific Individual, Inc., a Cambridge, Massachusetts company, is one of a growing number of mass-customization-oriented publishers that help busy professionals and their companies digest an increasingly greater wealth of information. Individual, Inc. conducts computerized news searches using a proprietary search technology called System for Manipulation and Retrieval of Text (SMART). The company's flagship product, *First!*, is a business-intelligence service that provides subscribers with the full text of selected daily-news stories from over 400 sources worldwide. Using a collaborative-design technique, each subscriber's interest profile is created during a personal interview with one of Individual, Inc.'s editorial managers. The SMART information-retrieval system then searches for stories with "high-relevance" to the client's interests profile. A fully screened set of articles is delivered Monday through Friday via E-mail, fax, or groupware.

According to Yosi Amram, President, and Richard Vancil, Vice President of Marketing, at Individual, Inc., *First!*'s primary subscriber benefit is immediate and comprehensive access to vital information that otherwise would require considerable time and cost to uncover. To efficiently maximize the correlation between this information and an individual customer's needs, the company continuously identifies its customers' changing preferences through a weekly feedback survey, transmitted immediately via FAX or E-Mail. Customers rate each article received during the previous week according to its degree of relevance. The SMART software incorporates this information to enhance the system's capability to determine customers' needs more precisely. Within four weeks, customers' "article-relevance rates" generally rise from approximately 40 percent to 80 to 90 percent. This is an excellent example of a learning relationship. Customers contribute to the learning relationship by providing feedback, which in turn allows the company to provide customers with greater value in the form of a more precisely customized service at no increase in price. Because customers invest their own time educating Individual, Inc. about their interests, they are far less likely to cancel or defect to a competitor. The learning relationship results in a significantly higher degree of customer service, creating customer switching costs and defection barriers. What would it take for a competitor to acquire such detailed information on customer preferences?

Customers are not alone in their "investment" in Individual, Inc. Recognizing the potential of the company's mass customization strategy, investor interest in the company's initial public offering was very strong.

Datavision Technologies, a West Coast-based consulting company, offers a 360°-feedback process where individuals are evaluated anonymously by their superiors, peers, and subordinates. Surveys completed by a client manager's subordinates, peers, and superiors are scanned, the data tabulated, and the output translated into a mass-customized product that includes an integrated feedback report and a combination personal workbook and developmental video. The video is produced automatically from a library of over two hundred and fifty digitized training modules; video clips are selected on the basis of the developmental needs identified from the survey findings.

While Datavision employs collaborative design and flexible processes, the third component in a fully integrated mass customization strategy, learning relationships, is missing. If the company utilized a customer-feedback and learning loop like Individual Inc.'s, it would better understand each client's on-going developmental needs and could, for example, provide a tailored developmental program using multiple learning elements which span many years. Datavision Technologies is an excellent example of a company that has successfully mated mass customization tactics, but conceivably could create additional value if it were to develop an explicit mass customization strategy that addressed all three core elements of the paradigm.

The implications of the learning-relationship strategy for such industries as cellular-phone service, credit cards, and long-distance are staggering. For example, credit-card companies enjoy an implicit learning relationship with their customers every time a purchase is made. However, when was the last time a credit-card company offered you a personalized, high-value benefit that was custom-created from the ongoing stream of purchase and payment information you provide them for free? The offers that typically arrive with your monthly billing statements for "deals" on stereos, Pierre Cardin luggage, exercise equipment, and vacations are of little value to the vast majority of customers. Indeed, these offers represent in "value subtracted." They take time to look at, insult your intelligence by implying that you might consider paying the inflated prices they charge, and most important, put you on guard to question the value of any future offers the card company makes. Imagine the possibilities for a credit-card company that enables you to custom tailor a credit card to your preferences and budget using choice and selection technology that enables you to identify your preferred features ranging from frequent-user credits, to interest rates, to calling-card services. This would create substantially greater customer value and also increase revenue potential for the card company. A mass customization strategy provides the opportunity to realize revenue drivers which may have otherwise been forgone and seized by competitors. Suppose you were offered free on-line access to your purchase and payment information, which could be inputted directly into your personal financial software? If you could, and if such a feature held value for you, which credit card would you use to the exclusion of the other?

Eliminating Customer Sacrifice

While many argue that management's primary goal should be the creation of "shareholder value," shareholder-value creation clearly is driven by customer-value creation. In speaking with Curt Reimann, architect of the Baldrige Award framework, at the Quality in Services conference 3 in Carlstad in 1992, he made this point when he said, "I had a revelation when developing the Baldrige framework. It was realizing that without satisfied customers, the sophistication of a company's quality effort is irrelevant." Peter Drucker recognized the same

truism thirty years ago when he wrote. “. . . what [the customer] considers ‘value’ is decisive--it determines what a business is, what it produces and whether it will prosper.”²

History reveals dozens of business concepts that enabled companies to create greater customer value. These business concepts can be thought of as lenses for viewing the world. A lens shapes and focuses our view, enabling us to see meaning in what were otherwise unrelated occurrences. While some conceptual lenses are weak or have flaws, others, like Statistical Process Control (SPC), Just-in-Time (JIT), and concurrent engineering hold greater power and, over time, become woven into the fabric of accepted management practice. From the customer’s perspective, the power of a conceptual lens is a function of its capability to eliminate “customer sacrifice.”

Figure 3
Conceptual Lenses for Recognizing and Eliminating Customer Sacrifice

Customer Sacrifice	Conceptual Lens	Objective	Methods
1. Unavailability of quality goods.	Craft production.	Produce the highest quality.	Artisans system; cottage industry.
2. Unavailability of low priced goods in quantity; difficulty of repair; high prices.	Mass production.	Be the low cost producer.	Standardized parts and products; specialized labor and equipment; assembly line.
3. Shoddy goods from mass producers; poor service.	Total quality management.	Eliminate variation.	Statistical process control; continuous improvement; quality teams.
4. Insensitive, bureaucratic, unresponsive service.	Service excellence.	Do anything to satisfy the customer.	Extraordinary guarantee; empowered workers; 800 numbers.
5. Choice complexity; gap between ideal and available products; high price for customized products; demand for unique products.	Mass customization.	Give customers what they want, when and where they want it, at high value prices.	Collaborative design tools; flexible production; learning relationships.

I define customer sacrifice as *gaps between the ideal product-and-service benefits desired by customers and what they are actually able to purchase*. I coined this phrase to de-emphasize customer satisfaction. Customer-satisfaction measures do not identify the gap between the benefits your customers currently receive and the benefits they would *love* to receive for little or no additional cost. Your customers might be highly satisfied simply because your company is the best option available. Think about it. The concept of customer sacrifice forces you to recalibrate the customer-value scale in a way that highlights unmet (and unrecognized) customer needs.

In business as in science, our viewing lenses must change as the value-creation potential of one lens is tapped and another comes to the fore. Figure 3 shows a general progression of the conceptual lenses that have enabled companies to eliminate sacrifice and create customer value. Mass customization is the newest of these lenses, building on those that preceded it.

How much power does the mass-customization lens have? The answer lies in an analysis of the following equation:

$$\text{CUSTOMER VALUE} = \frac{(\text{PERCEIVED BENEFITS}) - (\text{CUSTOMER SACRIFICE})^3}{\text{PRICE}}$$

Custom Clothing Technology Corporation (CCTC) is a start-up company that demonstrates the strength of the mass customization and I believe is destined to create major change in the apparel industry.

The Situation: The average female tries on thirteen pairs of jeans before making a purchase. Why? Simple, they do not fit. Ironically, even after this considerable amount of effort, a substantial proportion of women leave the store without purchasing what they came to buy. Even more profound, approximately 30% of women do not buy pants at all because they can not find ones that fit them properly.

The Problem: Whereas the sizing of men's' jeans is rather straightforward, based on simple waist and inseam dimensions, proper sizing for women's jeans is more complex--a function of waist size, hip size, rise, inseam and most important, wide variance in the difference between waist and hip sizes. The number of combinations is so vast that a jeans outlet carrying all possible combinations of sizes, styles, and colors would be the retail-clothing equivalent of The Home Depot! Additionally, women's sizes are not consistent across stores--size 10 pants at Talbots could be size 12 at Limited Express.

The Customer Sacrifice: Considerable time is wasted throughout this process of trying to find a good-fitting pair of jeans. For many, the quest is fruitless. Those that do make a purchase are often left with a nagging dissatisfaction with both the product and the retail store. The key question exists: *what costs do customers incur in time, aggravation, and disappointment when they cannot find jeans that fit?* CCTC's mass-customization system addresses these issues.

The Solution: With a collaborative design-and-selection system similar to National Bicycle's, a woman's measurements are taken in an in-store boutique and fed into a computer. Within minutes, customers effectively select from 14,280 fit variations instead of 52 traditional Levi's jeans. Within two weeks, the customer receives a custom-cut pair of jeans at a price for \$15 more than off-the-rack alternatives. Is it worth fifteen dollars to eliminate the aggravation of trying on

thirteen pairs of jeans while still sacrificing a perfect fit? CCTC's test results with Levi Strauss are confidential, but Levi's expansion of the concept throughout its Old Levi's Store chain and its September, 1995 purchase of CCTC to obtain the exclusive rights to its technology indicate that women--and hopefully men!--are about to experience a revolution in jeandom. I should point out that Levi's unit cost for Personal Pair jeans is far less than the \$15 price premium.

Mass customization offers other potential benefits. For example, the salesperson fitting you for jeans using CCTC's system asks you if you want to make a purchase. You say, "No thanks. I want to think it over." What if the salesperson then responds, "No problem. A lot of people feel the same way. But before you leave, would you mind taking a few seconds to let me know why you want to think it over? We would like your input to help us design the products you want." How many companies collect point-of-sale market research data immediately after you make a decision? And even if you were asked, how many firms couple this data with a computerized system for gathering and analyzing it, send you a thank you letter for your input, and communicate with you later explaining what they did with the information? Can you think of one company utilizing such a system? How would you feel if you received such a letter?

Now suppose that when the salesperson asks you if you want to buy, you say, "Yes." Zip. The information is then beamed off a satellite to a specialized Levi's manufacturing operation in Tennessee, where a bar-code tag to be sewn into the waist-band of your new jeans is automatically produced containing information about your name, measurements, and, possibly in the future, your purchase history (shades of Ritz Carlton). Want another pair without going through the in-store measurement process? Just flash the bar-code tag in any Levi's store that has the mass-customization system and your measurements will appear on the computer screen. If you want your measurements taken again, five minutes is all it will take.

What if my measurements change? Great. Imagine the Levi's equivalent of the Avon lady stopping by your house or workplace to take a new set of measurements. How could they afford to do that? Easy. Given that the CCTC system actually provides you with jeans that fit perfectly, a shopping experience that eliminates time and aggravation, and a convenient means for ordering additional jeans, *why would you ever buy jeans from anyone else?* Or Dockers? Or any other items in Levi's line? Is it worth \$25 to Levi's to pay a person to take your measurements -- and an order! If you spend an average of, say \$250 per year on clothes? It is as if they have all your business, effectively "taking you out of the market."

The keys to this customer-retention nirvana are these: (1) utilize a collaborative design process to determine exactly what your customers want; (2) create a flexible production system technologically capable of producing the needed level of customization at low incremental cost per unit; (3) grab the first mover advantage and be the first company in your industry to develop a system that provides customers with exactly what they want and that learns from each transaction to steadily improve the value of future purchases.

I envision the day when a catalog-clothing retailer will store all your measurements in its database and send you a catalog (via mail, video, or on-line) with only the pictures of the garments and accessories they offer. There will be no need for size or trying to find out what a size 10 "really is." All you do is provide the order numbers of the catalog items you want, you will do so with the full confidence that they will fit perfectly. If for some reason you are unhappy with an item, the company will send you a self-addressed, prepaid-postage box to return it, no questions asked, and give you a \$15 gift certificate for your trouble.

Benefits of Mass Customization

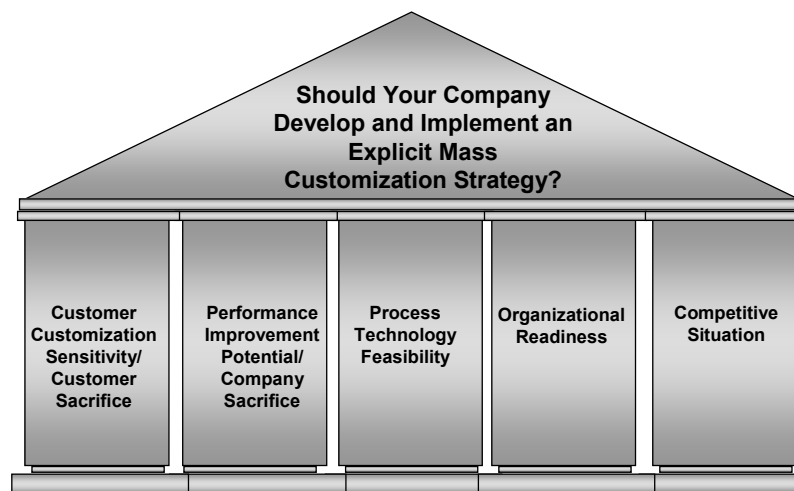
Management at CCTC and the other companies in this article are using mass customization to successfully create greater value for their customers and competitive advantage for their companies. They are also using this strategy to minimize their “company sacrifices.” Consider the performance-improvement potential of CCTC's system for the apparel business at large. Of course some retailers are much more advanced in these areas than others are. The point here is that the CCTC system largely does away with these costs. Significant costs are associated with inventory, including carrying costs, tracking, ordering, and logistics costs, and the labor cost for collecting, refolding, and reshelving jeans that were tried on but did not fit. In addition, there are costs associated with marking down slow-selling items and the high turnover rate of salespeople/folders.

I believe retailers who may benefit from a CCTC-type system have a choice: they can either see the imminent technological revolution as a threat and convert it into a competitive opportunity by adopting mass-customization --or they can die a slow, painful death as their customers' loyalty is undermined by their mass-customizing competitors one customer at a time.

Should Your Organization Adopt a Mass Customization Strategy?

While this article stresses the benefits inherent in a mass-customization strategy, whether it is the right prescription for your firm is another question. To answer this, we should look at five fundamental areas that need to be examined: (1) *customer-customization sensitivity*; (2) *business improvement potential*; (3) *process-technology feasibility*; (4) *competitive environment*; and (5) *organizational readiness*. (See Figure 4.)

Figure 4
The Five Mass-Customization Pillars



Pillar 1: Customer Customization Sensitivity

The first pillar is customer-customization sensitivity. While the demand for affordable customization is growing, do *your* customers care whether you offer them greater customization? Not only did few buyers care about Nissan's offer of 27 different steering wheels, but also most found this choice cornucopia to be a non-monetary cost! Who wants to spend the time required to figure out the merits and drawbacks of 27 different steering wheels? If your customers care little about customization, chances are that mass customization is not the strategic path for you.

Consider, for example, the market for salt. There are two basic kinds of salt: table salt and road salt. One is used to season food, the other to melt ice--and you can buy either in various sizes. To be sure, numerous specialty salts have hit the market (e.g., low-sodium salt, sea salt, and seasoning salt), but the market demand for salt customized to the needs of individuals is relatively low.

Investment counseling for the affluent presents a much greater mass-customization opportunity. Each customer's investment needs are unique and the use of "mass-produced" financial advice (e.g., *Money* magazine) results in obvious customer sacrifices. Since customers' customization-sensitivity is high, the market opportunity for mass customization is great.

Consider these diagnostic questions to assess your customers' customization sensitivity:

- Are customers in your industry confused by mushrooming options and choices?
- Do unique and important customer needs vary by customer?
- After purchasing your products or services, are customers customizing them, on their own or through third parties (e.g., Harley-Davidsons)?
- Would individualized products or services stimulate primary demand (e.g., increased demand for mass-customized pants from women who presently do not buy them)?
- What sacrifices do your customers make to do business with your company?

Pillar 2: Business Improvement Potential

The second pillar of the mass customization strategy is "performance improvement potential." While this article has stressed the role of mass customization in reducing customer sacrifice, the impact on **company sacrifice** must be considered as well. While evaluating the potential for a mass customization strategy, companies should look to eliminate performance sacrifices in such areas as these:

- Raw material inventory reduction.
- Finished-goods inventory reduction.
- Inventory storage and movement reduction.
- New product development effectiveness.
- Channel cost reduction (e.g., stores).
- Marketing cost reduction.
- Technological advancement.
- Manufacturing-complexity reduction.

Pillar 3: Process Technology Feasibility

The third pillar of a mass customization strategy is "process technology feasibility." If your customers **do** care about customization, how much process change would be required to customize at low cost? An auto company, for example, would likely need to start with a new vehicle platform and radically change its processes and culture. Ritz-Carlton, on the other hand, possessed an organizational culture that was highly receptive to new ways of understanding and responding to guests' needs. All they needed was the key process technology--an information system capable of creating a guest-history database--that would enable them to become a mass customizer. (Note, however, that significant process change can be a competitive advantage in that it magnifies the challenges to competitors.)

To gauge your process technology feasibility, consider the following questions:

- Does the **technology exist** to allow you to customize your products and services to individual customers? Without the existence of the single-ply fabric cutter, CCTC would only be a great idea in search of the necessary technology.
- What would be the impact of new technology on variable costs? Fixed costs?

- What investment would be required? Over what time frame?
- What logistical requirements would a mass-customization system create?
- What marketing capabilities are needed to enter into learning relationships with customers?

I should point out that the costs of becoming a mass-customizer are too high only if mass-customizing competitors are unlikely to take your customers.

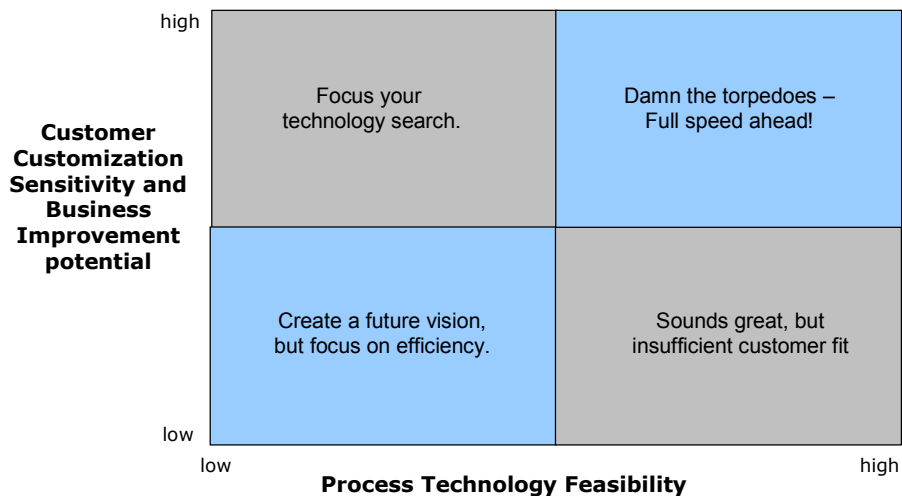
Consider the magnitude of change required to acquire the competencies needed to become a mass-customizer. Would you need to start with a green-field site, or does your firm already possess mass-customization capabilities that can serve as the foundation for migrating to a full-scale, explicit mass-customization strategy? Many firms already possess such capabilities, but do not view them in the context of mass customization.

Further consider which emerging technologies should be monitored most closely in your business by identifying the key areas in which new process technology would make mass customization possible. Viewing your company through the mass-customization lens brings focus and urgency to the search for new process-technology.

Combining Customization Sensitivity, Improvement Potential and Process Technology Feasibility

Figure 5 is a matrix that illustrates the relationships between customer-customization sensitivity, performance improvement potential and process technology feasibility. Using a comprehensive assessment approach, your company’s position on the matrix can be plotted.

**Figure 5
Strategic Implications Matrix**



Pillar 4: Competitive Environment

The fourth mass-customization pillar is “Competitive Environment.” Given that competition exists in your industry, if the market is ripe for mass customization, the technology is available, and it is financially feasible, it is axiomatic that your organization become a mass customizer? If your competitors are moving effectively on the mass-customization front, you must act. Because of the deep customer relationships and loyalty created through effective mass-customization, the company that achieves a first-mover advantage is like a

vacuum in the market, drawing customers out of the market. Reiterating from the CCTC example, "Why would you ever buy jeans from anyone else?"

Pillar 5: Organizational Readiness

Pursuit of a mass-customization strategy requires a major commitment of organizational resources. Not only must the business opportunity be available through mass customization, but also your firm must possess the ability to capitalize on it. That ability is primarily determined by your organization's culture and leadership capabilities to create and manage change.

- Does your company have a vision oriented towards maximizing customer value?
- Does your company have the ability to integrate marketing, manufacturing and engineering into a cohesive, collaborative system?
- How successful has your company been in implementing previous initiatives requiring major change (e.g., TQM, JIT, concurrent engineering)?
- Is senior management capable of generating support from the board as well as the employees?
- What else is going on in your firm? If you were in the midst of fending off a takeover attempt, creating a mass-customization vision would be low on the priority list.
- Consider *brand equity*. Will an expanded "envelope of customization" create customer confusion and dilute your brand? Ideally, your brand equity is sufficiently robust to permit the expansion of product-service variety that increases customer value without brand dilution.

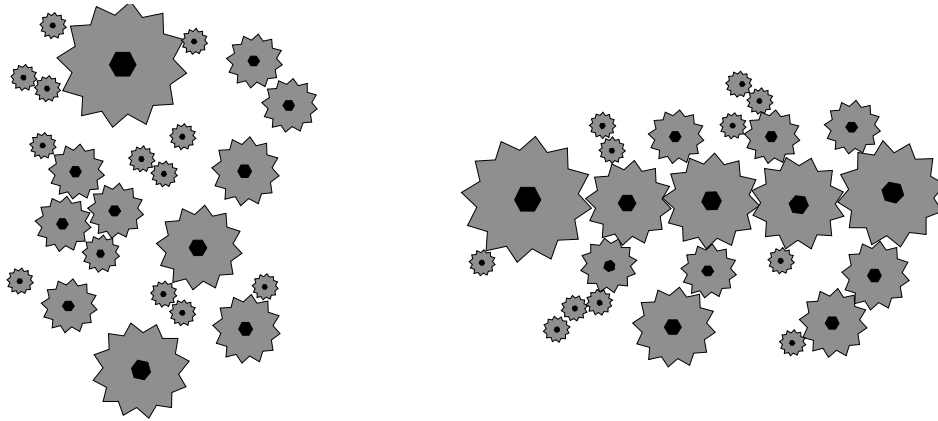
Analyzing the five mass-customization pillars just described will provide you with a strong indication of the opportunity mass customization holds for your firm.

Where and How to Begin

I argue strongly for developing an explicit mass-customization strategy that is comprehensive and integrated. Otherwise, in the zealous pursuit of competitive advantage your organization may end up with a collection of non-aligned mass-customization tactics. (See Sidebar 2, "Needed: An Explicit Strategy and a New Mindset.")

Figure 6 symbolically represents the importance of an explicit strategy through two clusters of gears. Each cluster represents a business and the individual gears represent mass-customization tactics (e.g., collaborative design tools, customer-purchase tracking, flexible manufacturing systems and learning relationships). In the gear set on the left, some mass-customization tactics are linked together; others are spinning independently. Consequently, this gear cluster cannot be synchronized and potential power goes untapped. In organizational terms, confusion, wasted energy, and conflict exist.

Figure 6
Mass Customization Tactics vs. Strategy



The gear set on the right is a cluster of fully aligned gears. This represents mass-customization tactics that are interconnected, mutually reinforcing, and synchronized, the result of being guided by an explicit mass-customization strategy. Each gear contributes to the overall power of the machine. The benefits in an organization are synergy, efficiency, and rapid progress.

Figure 6 illustrates the difference between a company that implements mass-customization tactics in piecemeal fashion and one that adopts mass-customization as a unified approach to doing business. While the former might gain some benefits, it will commonly have various gear sets spinning wildly, burning out their bearings, spinning in opposite directions, and grinding off their teeth. I call this situation, "initiative overload" – and easy trap to fall into, but a tough one to get out of. Many companies are executing mass-customization tactics--most often in sales *or* manufacturing, *or* engineering *or* marketing--but few companies have created explicit, aligned strategies that tap the full power of the mass-customization concept.

Think about the enormity of change required for an organization to move from craft production to mass production in the early 1900's. Activities across the entire enterprise needed to be rethought and, in nearly all cases, overhauled to be brought into alignment with the mass-production concept. The same is true of mass customization.

The prospect of traveling to an unexplored place is exciting. The actual planning, packing, and traveling are not exciting--but they must be executed well if you want your trip to be a good one. Similarly, the prospect of becoming a mass-customizer might seem exciting. You might have visions of what it could do for your firm right now. But you need to determine where to begin, which processes to address, how fast to proceed, and the standards to use in gauging your progress. In short, you need to formulate a strategy.

While the strategies of other companies may be used to guide your thinking, your firm's mass-customization strategy must itself be highly customized. The approaches taken by firms that are mass-customization success stories cannot be copied wholesale. Rather, the core elements of the mass-customization concept must be understood and configured

according to your firm's combination of competitors, customers, production capabilities, environmental conditions, industry economics, and organizational agility.

As one of my colleagues told me, "Sooner or later, all good ideas turn into hard work." However, the hard work involved in successfully becoming a mass-customizer can result in an embarrassment of riches. In most industries, the first-mover advantage awaits. Why not your firm?

Sidebar 2 **"Needed: An Explicit Strategy and a New Mindset"**

The need to develop an explicit mass-customization strategy underscored a meeting I had in May 1994 with a management group from a major Detroit automaker. The central topic of conversation was customer interest in individualized vehicles and service. The company had developed advanced flexible manufacturing capability to mass customize vehicles, but had never capitalized on it. The manufacturing VP complained,

We have the manufacturing flexibility to produce billions of unique cars, but only produce hundreds. Why? Because customers don't want all that choice. Nissan learned that lesson the hard way . . . they offered customers 24 steering wheels and 28 hubcap styles, for one model! All the variety added nothing but aggravation for the customers . . . and added complexity and cost to manufacturing. So rather than mass customizing, we're planning to eliminate most of our flexible manufacturing capability--it isn't valued by customers and it creates cost, complexity, and quality problems.

While the manufacturer had the flexible manufacturing capability, it was not using collaborative design or learning relationships to identify customers needs and desires (both recognized and unrecognized). As a result, the company offered choices that were immaterial to customers, causing buyer confusion and increasing production costs. The problem resulted from the automaker's own failure to use its sales and distribution system to capitalize on its flexible-manufacturing capability.

As is common in this industry, the firm's traditional distribution system, in which independent dealers are encouraged to fill their lots with hundreds of cars in a sufficiently wide range of models and colors, provided only an approximation of what the customers actually wanted.

Dealers are encouraged to push their expensive inventory off the lot instead of helping car buyers to create and order the customized model, style, color, and option packages most suited to their needs -- especially since a car ordered from the factory takes four or more (mostly more) weeks to be manufactured and delivered. The new "one-price" strategy, developed to minimize price haggling, provides only a partial solution. Customers still have the cars on the lot pushed at them. Customer sacrifice is typically thought to be overcome through a combination of sharp-angle closes and price concessions.

This example underscores the importance of creating a mass-customization vision that encompasses all elements in the value chain and which hints at the opportunities such a strategy holds.

If an auto company could figure out how to radically reduce its sales and distribution costs, the competitive balance of the industry would change. If auto companies are aware of this opportunity why don't they do something about it?

Solving the problem with mass customization: As a dealer, one of your greatest problems is a lack of outstanding salespeople. These people treat their customers like they treat their children -- they want only the best for them -- his customers don't buy cars from anyone else. Consequently, the margins on Joe's sales are higher. This has an enormous impact on a dealership's financial performance. The ideal would be to hire a sales force of Joe Girards.

However, finding, much less keeping, excellent salespeople in the auto business is difficult. The primary reason is low earnings, caused by low margins on new cars and a low closing percentage of sales to sales prospects. This problem is systemic in the industry because many customers entering the showroom have price-shopped every dealer in town and have their egos staked on bargaining the price down to the last nickel. This encourages various sales games, which only furthers the adversarial customer-salesperson relationship that is a staple of the auto industry. The vicious cycle is perpetuated as low closing percentages for salespeople translate into lower salesperson productivity, lower earnings and high turnover.

Saturn, Infiniti, and Lexus (and many individual dealers across all makes) have gone to great lengths to change the adversarial situation. Their efforts to radically change the sales process cannot overcome a fundamental system problem, however: cars on the lot need to be sold. An enhanced mass customization can change this system.

A mass-customization solution: What if, for a given model, you could walk into a dealer, meet a salesperson, and be invited to sit (with your family) in a virtual-reality simulator that could give you the ride, look, and feel of an actual driving experience? Imagine "feeling" the performance differential of various engine options. How about "seeing" the different color options on the model you are interested in? You can even enjoy the view as you drive down the California coast! Take a lot of high-mileage trips with little need to carry much luggage? How about a gas tank that holds ten extra gallons? Want a premium stereo built into the car, as opposed to spending \$2000 at an after-market stereo shop? Want a set of custom wheels? Push a couple of buttons and you can see how your car looks with a set of BBS mags. (You can't even see what different wheels look like at a custom-wheel shop unless they mount the tires on the wheels and put them on your car -- until, that is, a custom-wheel manufacturer acquires the kind of mass-customization technology I am describing.) Like those wheels? They are now incorporated into *your* master design. Want a vehicle that's less expensive with the equivalent of the choices you've made for this model? Push a couple of buttons to transfer the design-master information to the virtual-reality simulator for the next model down. The information will be translated into a set of features comparable to what you already selected. Interested in a lease? An audio-visual presentation will explain how it works. Just keep your seat belt (and your virtual-reality glasses) on.

The bottom line: You can buy a car designed to your individual tastes, in a way that is, shall we say, slightly different than having a picture of 27 steering-wheel options put in front of you.

Given this kind of sales and collaborative design-configuration tool, coupled with the flexible manufacturing to produce the product in a timely manner, what would happen to the average salesperson's closing percentage? If it doubled from say, 12.5% to 25%, **salespeople's earnings would double!** The turnover problem would effectively be eliminated.

This type of approach would not eliminate price shopping, but it could be used to focus dealers' efforts on creating new customers rather than beating their fellow dealers on price. The dealership that initially attracts a customer, gets him or her to "take a ride" in the sales/design simulator, and generates an individualized vehicle design could automatically receive a sales-generation fee, regardless of which dealer ends up with the sale. (The auto company would have the information to insure commission-distribution integrity by maintaining control over the use of the simulator software -- the system would automatically store the data about any customer who took a "simulator ride" at a particular dealership.) The potential impact of this type of system on the nature of dealer competition would be profound.

Soon after my meeting in Detroit, I saw the following in "The New Golden Age of Autos," *Fortune* (April 4, 1994):

Helmut Panke, the provocative chairman of BMW's North American operations, talks about building showrooms with driving simulators, which can replace the test drive, and with computers wired into German factories. Customers could sit at a terminal, customize a new car to their own taste -- whether by color, upholstery, or options -- and then order it directly from the plant. Says Panke: "This is something that is funny today, but may not be in three or four years. The tools are here now."

Additional Reading

The phrase "mass customization" was coined by Stanley M. Davis in his book, *Future Perfect*, Addison-Wesley, Reading, Mass., 1987.

Fisher, Marshall, (1993), "National Bicycle Industrial Company," The Wharton School, University of Pennsylvania.

Pine, Joe, (1995), "Do You Want To Keep Your Customers Forever?" *Harvard Business Review* (March/April), 103.

Pine, Joseph, (1993), *Mass Customization: The New Frontier in Business Competition*. Harvard Business School Press.

Rifkin, Glenn (1994), "Digital Blue Jeans Pour Data and Legs Into Customized Fit." *New York Times*, (November 8), A1.

Sherman, Stratford, (1994), "Will the Information Superhighway Be the Death in Retailing." *Fortune*, (April 18), 99.

Taylor, Alex III, (1994), "The New Golden Age of Autos," *Fortune*, (April 4), 66

Upton, David, (1995), "What Really Makes Factories Flexible." *Harvard Business Review* (July-August), 74.

¹ B. Joseph Pine II, *Mass Customization: The New Frontier in Business Competition*, Harvard Business School Press, Cambridge, MA, pp. 196-198.

² Peter F. Drucker, *The Practice of Management*, Harper & Row, New York, 1954, p. 37.

³ Examples of customer sacrifice costs include waiting, hassled shopping, and start-up aggravation.

About the Author

Christopher Hart, PhD, is an adjunct professor on the executive-education faculty at Babson College and president of Spire Group (www.spiregroup.biz), a Brookline, MA-based management-consulting and executive-education firm specializing in helping clients strengthen and expand customer relationships. Hart was a professor in the marketing department at Cornell and in the operations-management department at Harvard Business School. He may be reached for comments at chart@spiregroup.biz.