Mass Customization in Apparel & Footwear Industry– Today's Strategy, Future's Necessity

Mass Customization has gained momentum over Mass Production in the apparel & footwear industry. This paper talks about why we should look at this business strategy and how this concept has evolved over a period of time. There are many apparel & footwear players adopting this concept but at intermittent stages. The prime drivers of mass customization are technology, supply chain transformation and organizational restructuring. There has been major advancement on technological front starting from taking customer's measurement through body scanning, to product development and finally to deliver the right kind of customized product to customer. There are plenty of supply chain changes happening at different level to customize the product and many small and large players are already there into this space. The research has also tried to explore various apparel & footwear industry players' movement towards mass customization and cost drivers and cost saver associated with this concept. Like any other technology or business strategy, Mass Customization has also brought many challenges along with it, which can be grouped into direct and in-direct challenges.

WHITE PAPER

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Introduction

Mass customization is a broad term encompassing vast changes in manufacturing, distribution and delivery of products. Given the changing characteristics of today's consumer interests and industrial competition, mass production systems cannot satisfy both manufacturers and consumers; however, a mass customization system may achieve both manufacturer and consumer satisfaction, providing a customized product.

It is imperative that to adopt mass customization, an organization has to bring many changes across the functions. Broadly we can classify these changes into three categories. First, Technological advancement such as computer-aided design, body scanning, digital printing etc., Second in terms of adopting flexible manufacturing systems, computer integrated manufacturing tools and techniques and third, organizational changes in terms of flexible culture and empowering employees by assigning more responsibilities. By adopting these kinds of business strategies under mass customization umbrella concept, it will shorten product-life and development cycles as well as allowing manufacturers to respond more quickly and flexibly to changing consumers' drives. Finally, consumers will have access to a variety of high-quality, customized products while manufacturers can reduce excess inventory and markdowns. Mass customization is a paradigm shift from Product Centric approach (made-to-stock) to Customer Centric Approach (which falls under made-to-order), where customers involvement also shift from purchase to development of the product.

Simply stated, mass customization is about choice; about giving consumers a unique end product when, where and how they want it. During the last 15 years, choice has become an important ingredient of consumer purchasing decisions. Within this timeframe, the number of automobile models has increased from 140 to 260; the selection of soft drinks from 20 to 90. Today, the U.S. market alone offers consumers 3,000 brands of beer, 50 brands of bottled water, and 340 kinds of breakfast cereals.

Retailers today not only want more collections per season but also more styles within the season. Various companies deliver new lines of clothes to their stores every four to six weeks. H&M and Zara, for example, have achieved this by speeding up the design cycle with computer technology. Zara uses data from its 426 stores to spot new trends, and offers 10,000 new products a year. TopShop sells as many as 30 pairs of knickers a minute, 6,000 pairs of jeans a day and 35,000 pairs of shoes every week. The shelf life of a garment has fallen from six months to a few weeks. This new consumer-oriented marketplace is forcing manufacturers to change from a "plan and push" product chain mentality to a demand-driven, "sense and respond" value chain.

If we look at the evolution of the mass customization, the history takes us many years back. In fact our civilization started with mass customization in the pre-industrialization era, moved to mass production and again today we are looking at mass customization in the near future. But there is huge difference in today's mass customization compared to previous one and this differentiation is eminent because of technological advancement. But, customer focus objective is common in both old

and current mass customization concepts. Below mentioned diagram talks about the mass customization journey which has started long back.

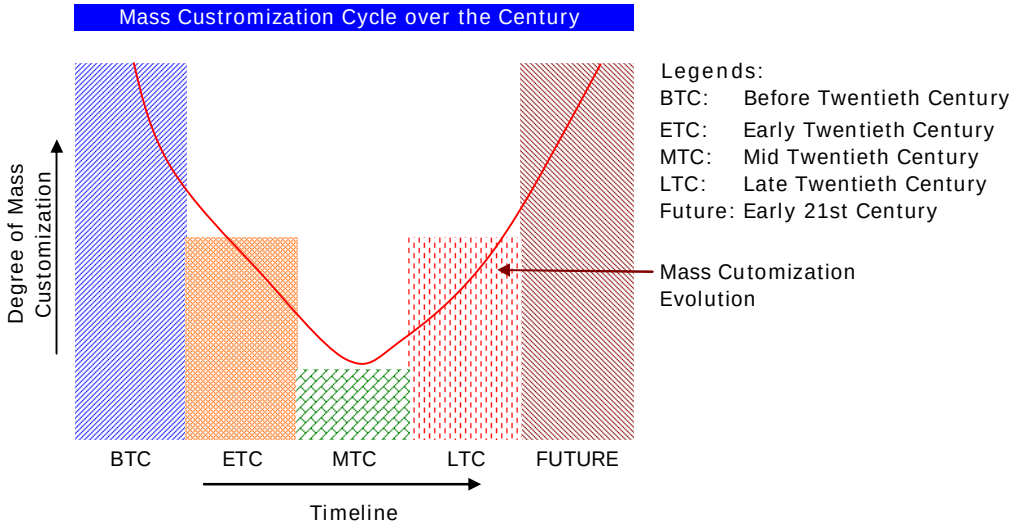


Fig 1: Evolution of Mass Customization

It can be seen clearly that, mass customization was prevalent before twentieth century. At this stage, depending on the premium paid, degree of customization could be introduced in the product. But, in early twentieth century, mass production come in vogue with the fundamental benefit of economy of scale and it was at peak in mid century. People shifted from mass customization to mass production owing to cost benefit they received from mass production activity. In late twentieth century, mass customization started picking up with more ventures coming in mass customization space. Mass customization requires manufacturers to be market-driven and customer-responsive, which means offering more product variation and allowing customization. Future looks very promising for the mass customization looking at prevalent trends consumers are exhibiting towards mass customization.

Who should do mass customization?

Mass customization is considered as the extension of mass production with an offer to customize each unit for the consumer without changing the segment of the consumer. The premium charged for mass customization shouldn't create the entire new segment of consumers who originally belong to mass production. Any retailer going for the model of mass customization has to have the underlined strategy of consumer satisfaction i.e. personal attention to consumers needs and focus on niche market segment instead of mass market.

Participants in Mass Customization Race: There is as such no size constraint or financial strength of the apparel or footwear manufacturer to go for this model. The place of an organization on the mass customization scale completely depends upon, how it positions themselves in the customer's mind share. There are instances of bigger players as well as smaller players who are going for mass customization. Shoe retailers and jeans retailers were among the first to extend customization in footwear and apparel segment. Nike had first introduced their version of customized sneakers in 1999; they are a prominent player in shoes customization along with Adidas. Levi

Strauss had introduced custom tailored jeans in 1995, but its efforts to sell merchandise online had been curtailed in late 1999. Players like Nike, Adidas, Polo, Puma, Reebok have only partial flow of revenue through mass customization. Though revenue is not the significant part of overall revenue but it is a brand building activity these players are carrying out. But, at other end, there are companies like IC3D, Thredless, Euro-shoe which are pure play mass customization companies and 100% revenue generation is happening through this concept.

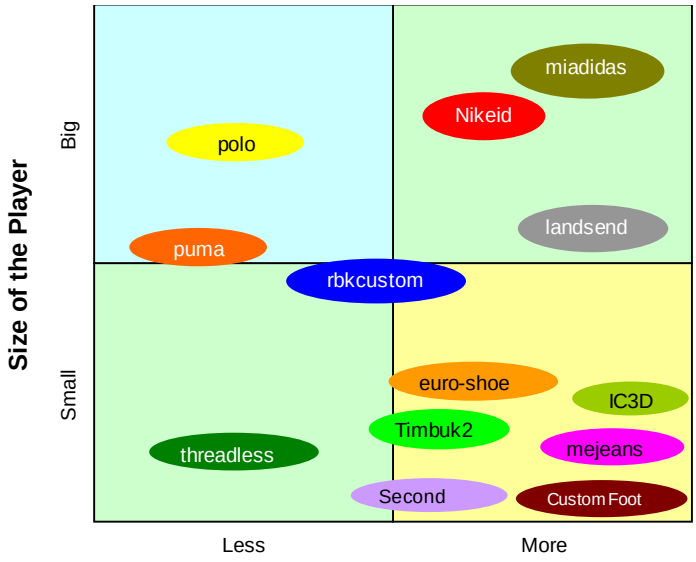
Strategic Approach by Global Players: To run this business model of mass customization successfully, manufacturers have positioned themselves with changes done in supply chain, manufacturing processes, organization structure etc. There are numerous initiatives taken by retailers in their offerings in terms of options of customizations from basic to advanced features. Some firms are going for basic form of mass customization which involves customizing garments by color, fabric, and design. There are proactive initiatives taken by some of the players in mass customization space, which are technology driven and enables customers to offer specifications by body scanning. Extension to this is offered by Land's End which involves visual fitness of the customized apparel on their body.

Moreover, most of the mass customization retailer who are undertaking Technology Adoption initiatives like installation of IT driven service for customization, need to be open to share the internal data with IT vendor. IT-driven strategy does indeed provide a competitive advantage. Some retailers have undertaken the initiative of taking details from customer on phone which is not cost effective.

Size Constraints toward Mass Customization Feasibility: There is as such no constraint like financial muscle power of the company (size of the company) related to ability to go for mass customization, where there are giants in apparel and footwear space like Adidas group ($ 10 bn), Nike ($ 15 bn) and at the same time, pigmies like web-based IC3D.com are also prospering. Bigger companies can use economies of scale in terms of raw material procurement and operations facility whereas smaller companies can use their multitasking ability and flexibility of workforce to ensure faster delivery of the mass customized goods. A small player can surely set up the base for atleast basic form of mass customization wherein customization in terms of personalization, style, or design could be offered without having large investments in advanced technologies like body scanning, digital printing, singly ply cutting etc.

Mapping below in Fig 2, tells about the tentative segmentation of apparel and footwear players in mass customization area. It also explains about the degree of mass customization different players have undergone and the size of the player in terms of revenue. We intend to map the players which we come across during our research in apparel and footwear space. We can clearly see that, some big players are exploiting the advantage of their size and using economies of scale to lower down the cost of customized product.
From the present segmentation, we'd recommend that players in right bottom must have their strategies in place to increase their size and try moving in to top right corner. This corner is the ideal one where in the players have good customer base and thereby they can also have wider offerings for customers. Similarly, players in top left corner need to get in to depth of this concept and they need to improve on different options in for customization. They have advantage of being big in size, and

offering better customization would put them in to Golden top right corner. There is a recommendation which goes to players in bottom left corner. Threadless in this corner though offer good options in terms of designing, in long term, this single option of offering design may pose a difficult situation to this player as other players have multitude of offerings. The players in this space need to improve on offering in customization.



Legend:

1. Threadless : Offers custom design on T-Shirts
2. Euro-shoe : Offers customization of shoes (Europe)
3. Ic3d : Pure play customization player for jeans
4. Mejeans : Custom jeans maker in the US, offers varied possibilities for customization
5. Land's End : Offers customization in Chinos, Jeans and Jacket for men and women
6. Timbuk2 : Offers bags and accessories in custom color, through well built online site
7. Rbkcustom : Offers customization of shoes, based in USA
8. Miadidas : Customization in shoes for running, soccer, tennis, indoor, basketball
9. Nikeid : Offers customization of shoes, based in USA
10. Polo : Offers customization in shirts for men, bikini for women in basic color and monogram choice via straightforward web page
11. Puma : Offers customization of shoes at select Puma locations
12. Custom Foot Inc : Offers customization of shoes enabled with digital environment
13. Second Skin Swimwear : Offers customizaaion in swimwear from Florida

Fig 2: Mapping of Players in Mass Customization

Feasibility of Mass Customization

Experts acknowledge that a revolution in the apparel industry is taking place, reshaping how the fashion industry measures bodies and develops clothing patterns. The feasibility of mass customization is possible only because of these kinds of technological advancement at each and every stage of the value chain. In the apparel industry, several new technologies have helped mass customization operations. Let us look at the complete “concept to customer” process for apparel industry and how various technologies have evolved at these stages.

The product evolution process starts with conceptualization, where a designer visualizes various themes and hundreds of designs under those specific themes. The visualization of these themes and styles takes place by using different tools and techniques such as demand forecasting data analytics software, production planning softwares, design development softwares and styles tracking across the globe by using web-based services.

The second stage is one of most difficult and critical stage, known as product development. Broadly we can classify this stage into 3 sub stages known as Designing, Pattern making and product development. Luckily, there have been many advancements happening in these stages to make right kind of designs in right fit at optimum costs involved. The body scanner, Digitizer and CAD can be placed under pattern development stage, CAD and web based configurators under design development. Under the right fitment process, the precise measurements of individual consumers are required to customize apparel products. In response to hassles associated with shopping for clothes that are inconsistently sized and unrealistically fitted, the technology is quickly replacing tape measures and outdated sizing paradigms. There have been major misconceptions about customer sizing and based on different kinds of anthropometric studies and surveys, finally industry is getting closer to true picture. One of the examples of such surveys is a two-year USA National Sizing Survey found that the women's fashion industry was shifting from its hourglass-figure paradigm. The research – sponsored in part by J.C. Penney, Target and Jockey – showed that the hourglass figure is the least dominate shape of women, making up only 8.4 percent of the 6,318 women scanned.

A potential enabling technology for creating right fit-individualized products is body scanning. Through body scanning, a three-dimensional image of person's body is captured electronically. Critical measurements are then extracted from the digital image and downloaded to a pattern alteration system. The altered patterns are placed in a marker, cut, and assembled. This system is capable of collecting over 400,000 data points during the eight-second cycle time of the scanner. From the scanned data, a large number of exact measurements can be extracted. Each measurement must have a measurement extraction rule that details the way in which a measurement is to be captured. For example, the waist could be measured as the smallest horizontal point of circumference between the hips and the bust, or it could be the smallest circumference at any angle. Likewise, the hip measurement could be defined as the circumference at the widest point below the waist as viewed from the front. Or it could be the maximum circumference below the waist. For each measurement that is desired, a definition of that measurement must be created. This measurement information can then be used to drive pattern alterations.

Digital printing is another arena, where technology has reshaped the process. The selection of fabric color at the individual garment level (which includes fabric print specification) offers little opportunity for mass customization. The primary reason is that to do so require the production of 1 to 1 ½ yards of individualized fabric. This requirement is dramatically different from the way in which current textile production technologies have been developed. The most promising digital printing technology for the apparel industry is ink jet printing. This is because it is a non-contact printing technology and is less sensitive to variations in the substrate.

On the knitting front, the technologies of knitting seamless garments on V–bed machines have gained momentum. Apart from high comfort and better fit, the

technology can make entire garment with minimal intervention of cutting and sewing processes, which leads to saving in cost and time, higher productivity and just–in-time production. For a woven product, digitally designed, pattern development, marker development and fabric printing is done. After these stages, fabric has to be cut and sewn as per the style specifications. On the other hand, knitting a complete garment on these new seamless machines allows the product completely in digital form until it reaches to the manufacturing plant. The ability to postpone the knitted garments production till last possible stage has been achieved due to technology and led to mass customization at rapid pace.

Similarly single ply cutting machines, advancement in computer enabled sewing machines can be traced under assembly section and various supply chain optimization software and warehouse management systems can be tracked in distribution space.

Supply Chain Restructuring

Traditional View: Mass customization business model requires the supply chain to be very flexible and responsive to consumer demand. Traditionally, we have supply chain attributes like supplier, manufacturer, distributor and retailer. However, there is increased product variety coming in today's scenario and to address this complexity we need to have very agile supply chain network. The dynamic demands happening across web based portal and are creating pressures on supply chain.

Consumers want to express their personality through customized individual products and this is well supported by their higher purchasing power. There are wide assortments of products available because of this increasing individualization of demands, causing multiple variants of the products. Apart from this, in this fashion driven industry of apparel and footwear, there are unstable and unpredictable demand levels, heterogeneous desires of products among people, varied style instinct, inclination to adopt differentiating factors in goods which combine the effect to go for mass customization.

Disintermediation: Traditional way of buying goods happens through the channel of wholesaler and retailer. Mass customization challenges this process and tends to eliminate these mediators in the value chain. Thus, this new concept is bringing out disintermediation and opening out the direct channels from manufacturer to consumer directly. Basic form of customization might need only 2 weeks as in case of POLO shirts which does only primary activities of customization like choosing colour of the fabric, fabric choice, monogram colour and embroidery choice. Whereas, some retailers may take up to 4 – 5 weeks of time (case of Land's End) which are in to deeper offerings of customization.

There are some crucial supply chain benefits as well in this concept. With the accurate information enabled by the web services in the mass customization environment, retailers are now able to pass this information to suppliers (garment vendors) in the form of exact requirement to match the orders; there is a clear visibility of raw material requirement among suppliers. This eliminates the information asymmetry among suppliers and reduces bullwhip effect marginally across the supply chain as there is less significant raw material movement happening in mass customization.

Product (Family) Architecture & Inventory Management: In mass customization model, an organization has to decide the extent to which customization can be done. Looking at the difficulties arising out of supply chain constraints because of multiple variants of the products coming up through customer design, there has to be some ground product on which further customization can be done. This ground product is called as basic product architecture. There are certain basic components, accessories which form a family for this ground product, collectively this is called as product family architecture. It is a coherent product framework to be reused and extended by modifying existing product models. product family architecture reduces the setup time and other volume-related costs drivers.

In case of footwear industry, for example, the basic product architecture is called as a 'last'. With 'last', basic architecture would be sole, insole, standard set of colors defining emotional values & cushion etc used in shoes. A footwear manufacturing company will have to maintain a library of these basic product architectures and customization has to be done from this existing library. In case of apparel manufacturer who is in to mass customization, the basic product architecture would be standard body blocks for pattern making, design library, base fabric, sewing threads, and accessories. The manufacturer has to have agreed formal relationship with suppliers for maintaining safety stock of basic product architectures to meet the customized demand from consumers. Inventory management of the basic architecture would lay the foundation for meeting delivery dates of the customized product. In case of peak seasons, manufacturers of these customized goods have to ensure that they should have enough inventories in terms of product family architecture to meet the peaks in demands.

But, as we move towards more fashionable products like designer's apparel or custom made shoes, there would be higher degree of mass customization involved like pocket type, buttons type, designing parameters and new fashion styles. Brief comparison of staple products vs. fashion products is highlighted below in the context of mass customization.

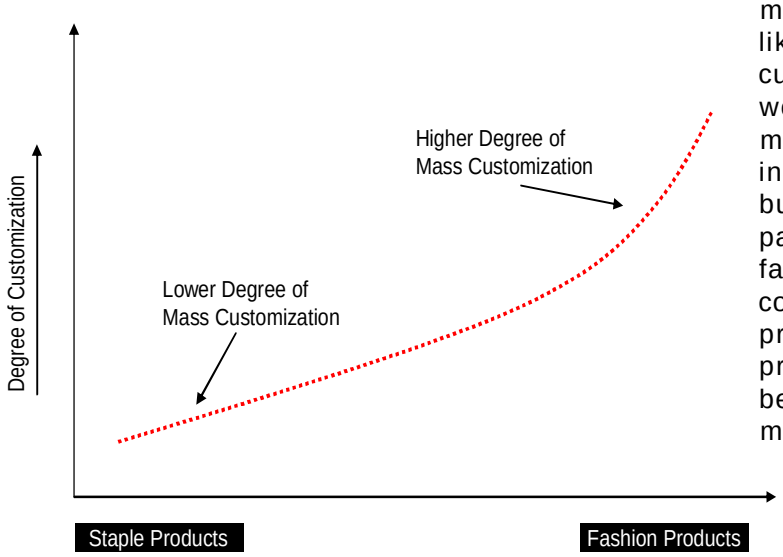


Fig. 3: Staple product vs. High Fashion Apparels

Execution of Custom Apparel Strategy: Process of manufacturing custom garments works like this: Customers enter their orders for customized apparel into an electronic web form created by IT solution partner. The content of such form is transmitted from the retailer's server to IT solution partner on daily basis in the form of pattern files. These pattern files are sent electronically to select contract

manufacturing locations like Asian contract manufacturing vendors, where IT solution partner has already installed its software.

The manufacturer processes the orders in batches based on the fabric requested. For each batch, a roll of fabric is mounted on the laser-driven cutter. Each pattern is then cut in single-ply using supplied digital pattern and automated cutter. Production order for each garment has a bill-of-materials listing necessary pieces for each garment based on customer inputs for customization. Fabrics are then stitched in to garments, they are inspected and packed for shipping, they undergo scanning and status is updated at each stage of process so that retailer would know where exactly garment is and in what stage. Garments are then shipped from factory to a third-party shipping center and are then express shipped to consumers.

Retailers don't like to be locked into one garment manufacturer for one category; there is always a choice retailer has for choosing his manufacturer. There is a mutual understanding and agreement which makes sure that contract manufacturers are aligned to retailer's policy for not sharing the designs, styles and customer data with other retailer.

There is one more concept called Flexible Manufacturing Systems (FMS) applicable in this strategy in case of garment manufacturing. It has to be flexible enough to take care of small batches of production. Because the installation of any new production line is a large investment, current production lines must be able to be reconfigured to keep up with increased frequency of new product designs. There are new designs coming up everyday in apparels, another parameter could be these have different delivery dates. With increasing customer base, the number of designs would multiply. Therefore, garment vendor has to have a flexible manufacturing system which will take care of these parameters.

At the end, we would like to put Supply Chain Comparison between Traditional & Mass Customization Model. The value chain as shown in Fig. 4 explains about the comparison between supply chain of mass production and mass customization model. The major differentiating factor in the figure as can be seen is the lead time taken by two models.

Mass production supply chain starts from sourcing of yarn, other components and ingredients required for manufacturing of fabric which is then converted in to garments by a garment vendor. Logistics, garment movement from manufacturer to Western countries, takes a major time. This is because the quantities are huge in mass production owing to economies of scale and hence are routed through sea transport. The striking point here is that, in case of mass customization model, retailer deals only with the garment vendor i.e. the sourcing and manufacturing time of fabric in typical textile industry is eliminated. The service agreements between a retailers and garment vendor ensure that, latter is keeping particular fabric varieties (basic product architecture) in stock all the time. Thus, there is effectively no time getting wasted in fabric manufacturing as required in mass production.

There are distinct challenges and opportunities in each of the model in entire value chain. As in case of mass customization, sourcing challenges would be sourcing of basic product architectures i.e. fabrics, accessories and other components required for stitching and packing of the garments. A contract manufacturer has to ensure

that he is meeting the customized goods delivery taking in to account the challenges of sourcing. At the same time, there are benefits as well in the same model.

Challenges pose disadvantages as well like higher set up time but these are counter balanced by opportunities. A brief comparison between them in the above diagram gives a better idea about key benefits and major hurdles.

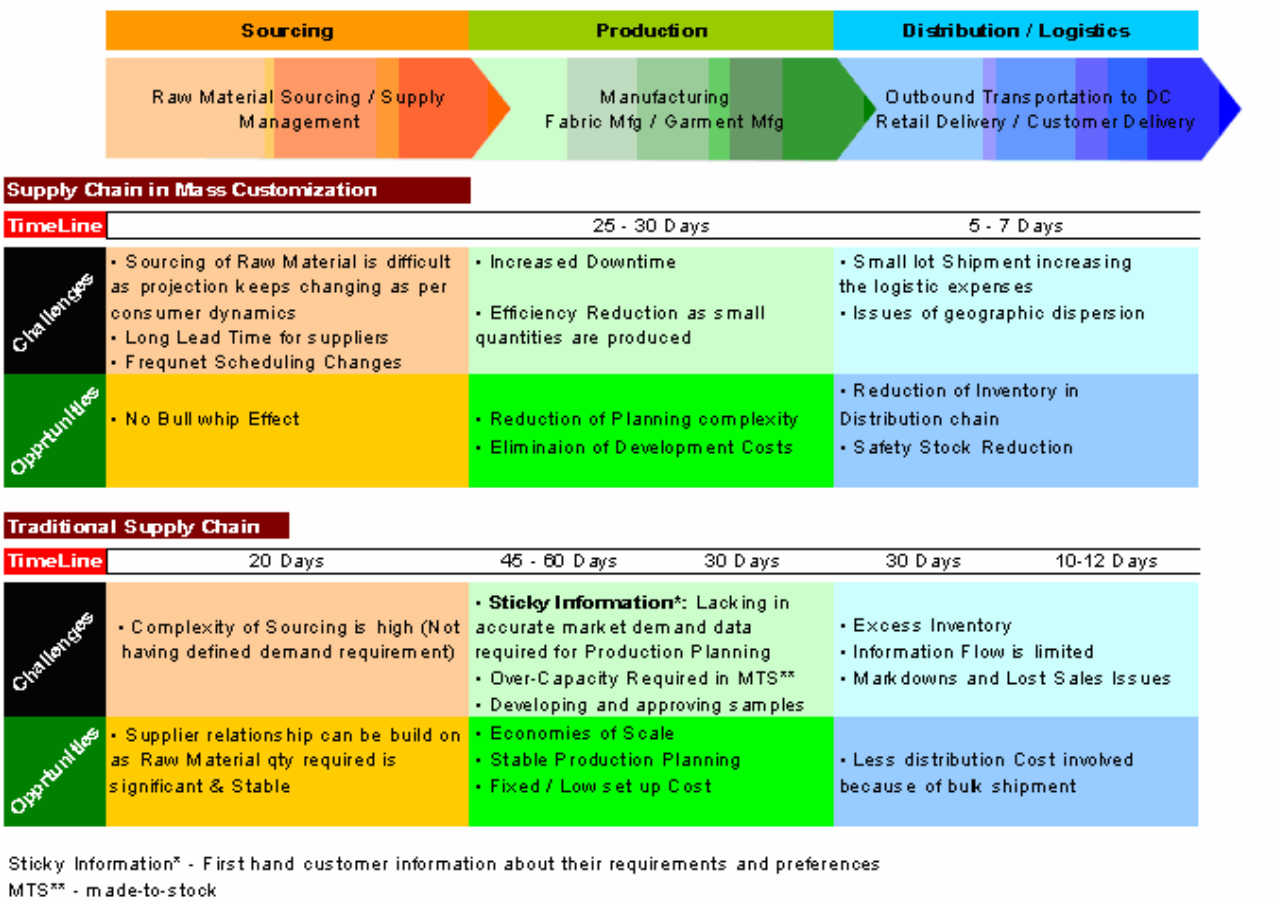


Fig. 4: Supply chain comparison between mass production & mass customization

Cost Drivers & Cost Savers in Mass Customization:

Offering mass customized product at the price of industrially produced and tailored products is going to be the key challenge. Customization calls for premium prices because of the added value of a customized apparel or footwear meeting the specific needs of a customer than the best standard product available. In mass customization domain of apparel and footwear, it is seen that customization for size entails higher premium than customization done in design or style.

Cost Drivers in Mass Customization: There are elements which are responsible for additional cost incurred during mass customization. Below are some of the cost drivers in mass customization.

1) Costs incurs in sales and customer interaction during the process of receiving specification from the consumers, the process called as elicitation. This includes heavy investment in technology like body scanning or Information Technology.

2) Flexible manufacturing system also adds cost to manufacturing as a garment vendor always need to maintain inventory in his warehouse, thus higher would be the capital investment.
3) There might be requirement of new machineries to meet flexible manufacturing system.
4) Cost further increases as there is no economy of scale in mass customization. Every time, there is going to be a set up cost for each custom apparel.
5) Production planning for the intricate requirements of the custom products would increase the cost and it will require better qualified people to carry out planning, in turn higher cost going in wages.
6) From organizational change point, workers need to be cross trained to carry out multiple small activities. The training for the same would add to cost.
7) This business model demands investment in customer service centres, highly qualified staff, or trust-building promotion activities – a source of cost.
8) Retailer has to distribute each unit individually which again adds to cost.

Cost Savers - Ways to counteract Cost Drivers: There are ways to counterbalance cost drivers. These cost savers are basically resulting from integration with customers through web services and removal of intermediaries, which offers cost saving potentials. This is called as Economies of Integration (EOI). It also generates customer loyalty by directly interacting with them. Cost savers are-

1) Postponement Strategies: Postponing production activities helps garment vendor in preventing costs of misplacement of activities due to imprecise planning information.
2) Through EOI, retailer is in position to get access to first hand customer information about their requirements and preferences. This is called as 'sticky information'. This information at large, gives a retailer an edge in formulating Demand Forecasting.
3) Relationship Management: EOI increases switching costs for the customer, retailer builds stable relationships with its clients &'re-using' existing customers for additional sales.
4) Thus, costs for marketing activities and customer acquisition decreases.
5) With the use of made–to-stock approach in mass customization, there is an elimination of inventory in distribution chain.
6) Retailer also witnesses reduction of safety stock as all orders are pertinent to customer requirement for customization.
7) With defined flow of orders, there is more planning accuracy with correct planning decisions in place.
8) Reduced fashion risk as customers put their custom orders taking in to account the current fashion.
9) There is no more experiment related to new product development and cost incurred in product flops can be avoided.
10) There is no bullwhip-effect with accuracy coming with orders and sourcing can be done on that basis from garment vendors.
11) There are stable processes at garment vendors and elimination of the over-capacity required in made-to-stock systems to adapt to short-term changes of trends.
12) Avoidance of lost sales in retail due to out-of stock items, prevention of markdowns at the end of a season.

13) Apart from these, a retailer can have better product line planning which will ensure that the contract garment vendor he is working with will have no difficulty for capital investment for new product lines.

These account for huge savings for apparel retailer, to the tune of 30% from the prevention of markdowns and overstocks and reduction of the forecasting (fashion) risk. Fig. 5 gives a brief account of cost drivers and cost saving potential factors.

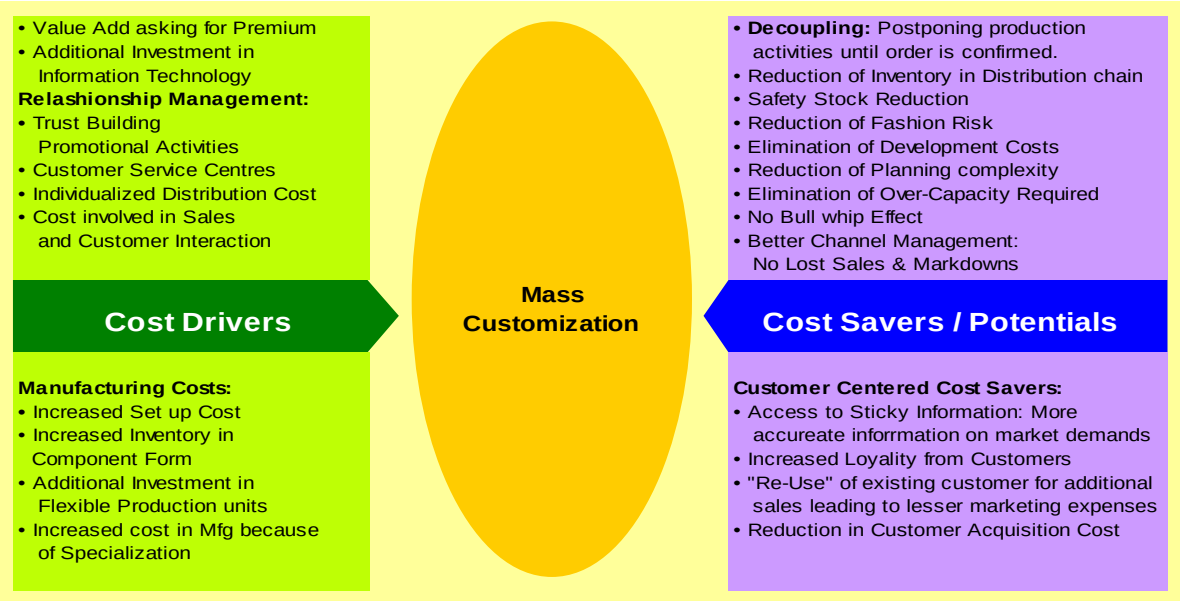


Fig. 5: Cost drivers and cost savers in mass customization

Challenges to Mass Customization

Objective of Mass Customization: One of the most obvious but equally difficult to achieve objective of mass customization is profit realization and especially when we compare traditional manufacturing cost with mass customized cost. The purpose of mass customization is to keep cost low to match those of standardized items, conceptualized, and manufactured and delivered under traditional mass production approach.

Another important objective of mass customization is to achieve higher level of consumer satisfaction. Any new concept, technique or facility takes its own time to achieve the breakeven point and same is true here also. Assuming an organization, who is already into apparel manufacturing and selling them through retail outlet and company owned stores also, may want to adopt mass customization by putting dedicated resources. In the initial years of operation the prime purpose of company should be to achieve consumer satisfaction rather than profit realization because once decent level of awareness among customers regarding this initiative is achieved, there will be rapid pace on the path of breakeven and then profit realization.

For mass customization, one of the most common assumption is that customer is well educated with right mix of creativity and clarity. The clarity in the product conceptualization is required to make his / her style in tune with the creativity. In a traditional buying, consumers perceive the product; they can feel it, touch it before

they make buying decision. On the other hand, success of mass customized product is up to the right judgment of an individual who can visualize the end product correctly. So when we look at the challenges in the mass customization space, apart from business processes realignment, technological upgradation across the value chain, organizational restructuring and business partner's synergies, consumer's knowledge can also be one of the crucial challenges. Among the many challenges for MC, broadly we can classify them into two categories:

Direct Challenges: In the direct challenges, we can again segment them into technological front, restructuring supply chain and partial or full conversion from traditional production system to flexible manufacturing system.

The future of mass customization seems to be in upfront position and this is possible only because of technology. There are plenty of techniques and tools coming, where not only costing and quality is taken care of but also short lived timelines are also followed during processing of these activities during "Concept to Customer (CTC)" journey. The body scanning, digital printing, single ply cutting, CAD systems, CNC (computer numerical control) enabled sewing machines, POS (point of sales) data analysis are few of the examples but there are some challenges also associated with these technologies.

a) Body scanning: Body scanning brings the output of the XYZ coordinates of a physical body, so it must be modified to make its use more practical in aspects of the application of apparel design and pattern.
b) Single-ply cutting: In mass customization, manufacturers cut one garment exactly according to consumer preferences. The problem is that this single-ply cutting is highly expensive than general cutting systems, and it must be improved in order to accommodate automatic continuous cutting for mass customization.
c) CAD system: Despite the AAMA's (American Apparel Manufacturers Association) new CAD standards, compatibility problems between hardware and software systems from vendor to vendor mar the spread of mass customization through the industry.
d) Pattern design: Because commodity patterns must be modified for individual customers, the means by which the pattern is altered is an issue of concern.

In the supply chain restructuring, the apparel companies can either go for near shore manufacturing facility such as a North American or European based apparel company can source manufacturing from Brazil, Mexico or South America.

Another direct challenge during adoption of mass customization is that how apparel industry can effectively use its existing manufacturing facilities and product development structures. Flexible manufacturing systems are required in mass customization environments; at the same time, these advanced manufacturing systems have been in demand to achieve a better mass production environment.

Indirect Challenges: Among the soft challenges, one of the critical tasks is organizational structure realignment. With advanced manufacturing technology, mass customization requires a different organizational structure, rather than the normative bureaucratic structure, for mass production. For more highly customized products, the industry must consider that manufacturing modules must be flexible

and diverse; therefore, the various capabilities of employees contributing to this system must be recognized and utilized to the fullest extent possible.

Another implicit challenge here would be to understand the nerve of the customer. With right insights about customer preferences, the challenge of offering the best options in terms of design, style can be overcome. In line with this, product innovation at the manufacturing level would further refine the offers, a retailer can make to consumers. This is supported by collaboration happening among retailer, apparel branding and manufacturer since last one decade to better understand customer's tastes preferences and anthropometric data analysis.

Conclusion

Prevailing trends in apparel and footwear is high fashion value products and mass customization is the right solution to tap these customer insights. Players already in to mass customization would reap the benefits of first mover advantage and are expected to gain strong foothold in customization business. In coming 5 – 10 years, pure play mass customization players are found to be smaller companies and are recommended to capture the consumer insights and subsequently increase their offerings in customization so that they can increase their revenues. At the same time, biggies who are partially into mass customization are required to concentrate more on this business as a part of brand building activity. The shift of focus towards consumer preference sets the right platform for mass customization and future belongs to this strategy with many companies entering in this space offering multitude of options in customization at comparable prizes. If we glance at the increasing purchasing power and personalization of the end users, it will be imperative for retailers to involve in mass customization directly or indirectly.

References

1) Mass Production to Mass Customization by Michael T. Fralix; Journal of Textile and Apparel, Technology and Management, 2001
2) Mass-customization Methodology for an Apparel Industry with a Future by Ms. Seung-Eun Lee & Dr. Joseph C. Chen; Journal of Industrial Technology
3) "Technology Review of Mass Customization"; Karthik Ramani, Robert Cunningham, Srikanth Devanathan, Jayanti Subramaniam, Harshal Patwardhan.
4) Rapid Prototyping in the Textile & Apparel Industry: A Pilot Project by Cynthia L. Istook, North Carolina State University; Technology and Management, Journal of Textile and Apparel.
5) http://www.techexchange.com
6) http://instruct1.cit.cornell.edu
7) Does mass customization pay? An economic approach to evaluate customer integration; by Frank T. Piller, Kathrin Moeslein and Christof M. Stotko; Production Planning & Control, Vol. 15, No. 4, June 2004, 435–444.
8) The false promise of mass customization; Mani Agrawal, T. V. Kumaresh, and Glenn A. Mercer; 2001 Number 3.
9) The Agile Supply Chain: Competing in Volatile Markets; Martin Christopher; Industrial Marketing Management, 29 , 37–44 (2000).
10) Mass Customization News: A Newsletter on Mass Customization, Personalization and Customer Integration; by Frank T. Piller, TUM; Vol.7, No.1 (February 2004).
11) Reducing the risk of new product development; Susumu Ogawa & Frank T. Piller; MIT Sloan Management Review; Winter 2006, Volume-47, No.-2.

12) Flexible Manufacturing System for Mass Customization Manufacturing; Guixiu Qiao and Charles McLean from National Institute of Standards and Technology, MD, USA; Roberto Lu from The Boeing Company.

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Wipro (NYSE: WIT) is the first SEI CMM Level 5 certified IT Services Company operating in the global market. Wipro provides software solutions and services to global corporate enterprises and Research and Development services to Telecom and Electronic product companies. In the Indian market, Wipro is a leader in providing IT solutions and services for the corporate segment offering system integration, network integration and IT services.

Wipro in Apparel and Footwear Domain

Wipro Technologies combines years of technical experience and domain knowledge in providing solutions to apparel and footwear companies across the globe. Wipro provides end-to-end business process consulting, e-business, data warehousing and business intelligence, CRM, SCM and technology infrastructure solutions and helps retailers improve service, convenience and personalization. Collaborative commerce, point of sales solutions, category management and warehouse management systems are some of the key solutions offered by Wipro. Well established Centers of Excellence (CoEs) in the areas of supply chain planning and execution, merchandizing and pricing, RFID, pharmacy in retail, Business Analytics, TPM, In Store, Manufacturing solutions and multi-channel retailing help Wipro provide best-in-class solutions to the retail, consumer packaged goods and distribution industry.

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