New Production Technology for Manufacturing Industries

Kailash Rai
kailashjbp@yahoo.co.in
(Research Scholar, Mewar University, Chittorgarh, Rajasthan)
Dr. Rahul Lodha
rahullodha@mewaruniversity.co.in
(Mewar University, Chittorgarh, Rajasthan)

Abstract

The purpose of this research is to examine apparel merchandising issues associated with mass customization. A questionnaire is developed to explore preferences for mass customization product, process, and place that have the potential of affecting success of a mass customization program. The questionnaire is administered to a convenience sample of 116 respondents of textile and apparel industries. Data were analyzed using descriptive statistics, factor analysis, regression, correlation and reliability analysis by SPSS. Successful mass customization of apparel at retail is dependent on identification of appropriate dimensions of product, process, and place. Our implications address merchandising issues associated with customer involvement in customizing design and fit of apparel products in retail store settings. We use some hypothesis for analysing few factors affected mass customization or mass customization affected these factors.

1. Introduction

Mass customization is a futuristic concept for the fashion industry, there are already some initiators companies, which have started customized fashion but have not combined all the existing components. This is due to very high price implementations of this new technological equipment (Vignali C., Vrontis D., Vronti P.D., 2004).Mass customization is a broadly based term encompassing vast changes in manufacturing, distribution and delivery of products. First identified in Future Perfect, Davis (1987) based the oxymoron on the mass production of customized goods (Anderson L.J., Brannon E.L., and Ulrich P.V., 2001).Mass Customization is the large-scale production of personalized goods and services. To succeed at it, companies must harness technologies that revamp their speed, flexibility and efficiency at minimum expense.

1.1 The Definitions of Mass Customization

➢ The term "mass customization" was first popularized by Joseph Pine, who defined it as "developing, producing, marketing and delivering affordable goods and services with enough variety and customization that nearly everyone finds exactly what they want." In other words, the goal is to provide customers what they want when they want it (Pine B.J. II, 1999).

➢ Mass Customization is the customization and personalization of products and services for individual customers at a mass production price (Dean P.R., Tu Y.L., and Xue D., 2007).

➢ Mass Customization is the ability to design and manufacture customized products tried to meet a customer needs at mass production costs and speed (Kotha S., 1995).

2. Literature Review

The history of mass customization started over forty years ago. In the mass customization management system, the goal is to develop, produce, market, and deliver affordable goods and services with enough variety and customization that nearly everyone finds exactly what they want. The reason why customized products are superior compared to standard products is the following. The company that better satisfies its customers' individual wants and needs will have greater sales. With higher profits as well as a better understanding of the customers' requirements, the company can provide even more variety and customization, which further fragments the market. Because it is outdistancing its competitors in variety and customization, market fragmentation allows it's once again to better satisfy its customers' individual wants and needs, and so on.

2.1 Concept of Mass Customization

The concept of MC was first fully expounded by Pine (1993) who implied a view of MC as in some sense of a historically inevitable successor to mass production, the principal in which to complete in the future. It is essentially an oxymoron since it puts together seemingly contradictory notions of the production and the distribution of customized goods and service on a mass basis (Chen J. and Hao Y., 2010).

2.2 Approaches to Mass Customization

- ➢ Collaborative customizers: these organizations establish a dialogue to help customers articulate their needs and then develop customized outputs to meet these needs. Levi's is an example of this approach.
- ➢ Adaptive customizers: customers buy a standard product but they can modify it by themselves based on their needs. For example,

Microsoft offers a package of software designed to run all activities of small businesses. But if a buyer (a small business) wants, for instance, to add more accounting functions into the package.

- ➢ Cosmetic customizers: these companies produce a standard product but present it differently to different customers. For example, Planters packages it peanuts and mixed nuts in a variety of containers on the basis of specific needs of its retailing customers such as Wal-Mart, 7-Eleven, and Safeway.
- ➢ Transparent customizers: These companies provide custom products without the customers' knowing that a product has been customized for them. For example, an online computer might track how each customer uses its service and then suggest additional features that the customer may find useful. In a similar fashion, Amazon.com provides book recommendations based on information about past purchase (Pollard D., Chuo S. and Lee B., 2008).

3. Problem Formulation

3.1 Problem Statement

Mass customization is new to the apparel industry, and in its processes, following problems need to be resolved for the full implementation of mass customization toward consumers:

- ➢ Indian companies has more hesitations to adopt mass customization in practice.
- ➢ Companies and stores have no proper way for mass customization.

4. Research Methodology

4.1 Questionnaire Design

The questionnaire consisted in the main of self-rated, non-comparative single-item rating scales used to assess respondents' level of agreement or disagreement with statements relating to the benefits and disadvantages of customised apparel, to their satisfaction with standard features and to the difficulty of choice between many alternative models. All items in the questionnaire are extracted from previous literature. We also include three control variables in our analysis – city, industry type, and plant size. This questionnaire is based on 5 points Likert scale. Questionnaire is designed on the bases of previous literature and study related to mass customization; through these questions we also find unpredictable demand of products and how fashion and style influence consumer's buying behavior.

4.2 Analysis Methods

4.2.1 Factor Analysis: - Basically, factor analysis tells us what variables group or goes together. We assume that observed variables are correlated or go together because they share one or more underlying causes. The underlying causes are called factors.

4.2.2 Reliability: - The correlation between the observed variable and the true score when the variable is an inexact or imprecise indicator of the true score.

4.2.3 Regression: - when the focus is on the relationship between a dependent variable and one or more independent variables.

4.2.4 Correlation: - correlations serve as empirical indications of possible relationships between variables.

4.2.5 KMO and Bartlett Test: - Measure calculated both for the entire correlation matrix and each individual variable evaluating the appropriateness of applying factor analysis value above 0.50 for either

the entire matrix or an individual variable indicate appropriateness.

A statistical test for the presence of correlations among the variable is one such measure. It provides the statistical probability that the correlation among at least some of the variables.

4.2.6 Scree Test: - Plotting the eigenvalues against the corresponding factor numbers gives insight into the maximum number of factors to extract.

4.3 Research Hypotheses

According to Kurt Salmon Associates' 1997 Annual Consumer Outlook Survey, 36% of consumers are willing to pay up to 15% more for customized apparel and footwear, and will wait up to three weeks to receive their customized product (Lee and Dr. Chen, 1999). From the marketing perspective companies that offer their customers the possibility of adapting the product to fit their own desires and needs are perceived as leaders in innovation and cantered on consumer needs. These facts have an undeniably positive impact on the organization image and strengthen the brand.

H1: Mass customization has a positively direct impact on market capabilities.

Information technology and automation are a vital part of mass customization because they constitute the connection between the consumer's wants and needs and the ability of a manufacturer to create the products accordingly. Therefore the efficiency and reliability in information transfer from customers to manufactures determined largely the success of mass customization system. Mass Customization might be an expensive proposition but to add more experience with the manufacturing technology and to develop good management, these costs will decline. Today's in mass customisation practices,

the apparel industry limits the customised extent of the product market to reduce costs.

H2: Technological input has positive relationship with changing customer's needs and preferences.

Pioneering applications of mass customization have suggested three major inconveniences that customers are likely to face: mass-customised products are more expensive than standardised products; a customised product cannot be delivered to the customer at the time of purchase; and, since the customer initiates the design process, the customer is required to invest time in 'designing' the product. The company that better satisfies its customers' individual wants and needs will have greater sales.

H3: Company and customers has positive effect on mass customization.

A customized product is designed specifically to meet the needs of a particular customer. There are several technologies available for mass customization for example 3D body scanning, direct communication with customers etc. The using 3D scanning technologies for anthropometry is becoming commonplace. Some anthropometric technologies are also available, which use traditional anthropometric instrument includes tape measures and callipers to obtain the measurements of the bodies.

H4: Technological capabilities have direct impact on mass customization.

A best example for mass customization effect on customer's needs and wants; The National Bicycle Industrial Co., a subsidiary of Matsushita in Japan, provides individually customized bicycles through cut-to-fit and component-sharing

modularity combined. Its factory, as Fortune relates, "is ready to produce any of 11, 231, 862 variations on 18 models of racing, road, and mountain bikes in 199 colour patterns and about as many sizes as there are people". The process starts with a shopkeeper who determines a customer's model, colour, and design preferences, which define the sharable components to use, then precisely measure him /her on a special frame for the cut-to-fit components. All the specifications are faxed to the factory, where a computer creates custom blueprints for both craftsmen and robots. The latter measure and cut each piece of the frame to fit the individual's measurements, weld the pieces together, and apply the base coat of paint.
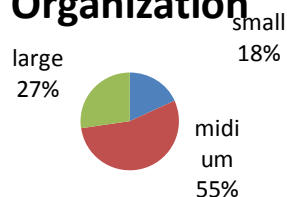
H5: Mass customization has positive effect on customer's need and preferences.
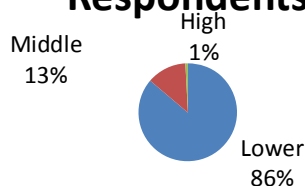
5. Data Collection

Research provides a framework to understand the impact of time based manufacturing practices and way to attain mass customization and value to the customer. Data were collected from small, medium and large manufacturing firms of various sizes and location to test the relationships in the framework. The study indicates that firms with high levels of time based manufacturing practices have high level of mass customization and value to customer. For the study of mass customization in apparel and textile industries data was collected from different apparel and textile industries locate at different cities (Indore, Dewas, Bhopal, Nagpur, Janjgir, etc.) of India. I have conduct some personal meetings and interviews with managers, engineers and other workers for knowing about plant, manufacturing processes, machines, technologies, etc. About 150 copies of questionnaire I sent to respondents 40

questionnaire sent through email but only 6 respondent give reply this is the 15%; 100 questionnaire filled by respondent in meetings and in interviews; and 10 questionnaire filled by respondent with the help of friends support. This questionnaire only for the knowing in future mass customization will adopt by industries or not, unpredictable demand of products and consumer's buying behaviour. These all companies are major integrated textile and apparel producer in India. These all produces different types of yarn, fabrics, processed fabric, clothes and many other products. We want to use sample size one ratio five (1:5) that means 100 because my questionnaire have 20 questions. According to this ratio; ratio of 20 questions are 100. It is sufficient for analysis of my objectives but I recieve 116 responces this is also enough to calculate factor analysis, reliability, regression, and correlation in SPSS. For checking readyness of companies to adapting mass customization more responces are needed.
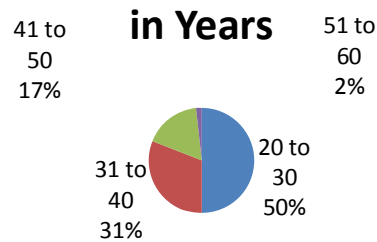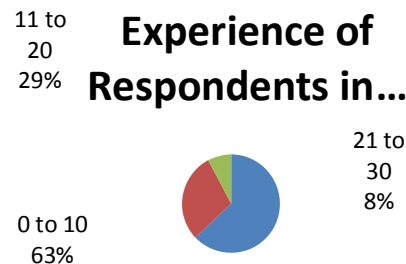
Size of Organization

large 27%
small 18%
midium 55%

Job Position of Respondents

Middle 13%
High 1%
Lower 86%

Age of Respondents in Years

41 to 50 17%
51 to 60 2%
31 to 40 31%
20 to 30 50%

Experience of Respondents in…

11 to 20 29%
21 to 30 8%
0 to 10 63%

6. Analysis of Data

1. Factor Analysis: - Questionnaire is divided in 4 groups with the help of SPSS soft ware; these groups are general information about company and customers, market capabilities, technological capabilities, customer's needs and preferences. Before using SPSS we already divide this questionnaire in same 4 groups; but few variables are different that means our factor analysis is correct.

2. Reliability Analysis: - After factor analysis check the reliability of all individual groups of variables and finally reliability of total number of variables. In reliability analysis values of Cronbach's Alpha for all 4 groups and all variables lie between 0.6 to 0.7 according to book of "Multivariate Data Analysis" (Hair and Anderson) this value is considerable.

3. Regression Analysis and Correlation: - In regression

analysis ANOVA table shows the correct regression. Correlation among all 4 groups shows the values between -1 to +1. In this test "-1" shows the perfect negative relation, "0" shows no relation and +1 shows perfect positive relation among all variables.

4. All hypotheses have perfect positive relationship on the basis of exist literature.

7. Conclusions

The present study is concluded as follows:-

1. Some large size companies are ready to adopt mass customization in near future because of they have new advance technologies, man power, capital.
2. Medium and small size companies want to adopt mass customization but they not have good machines, software, and ability to communicate with consumers.
3. Customer desire always some unique products and able to pay something extra for it.
4. The demand of products is highly unpredictable and fashion and style influence consumer's buying decisions.

References

1. Anderson L.J., Brannon E.L., and Ulrich P.V., (2001), "Discovering the Process of Mass Customization: A Paradigm Shift for Competitive Manufacturing", *Journal of Mass Customization*; Vol. 19; pp 57-61.
2. Chen J. and Hao Y., (2010), "Mass Customization in Design of Service Delivery System: a Review and Prospects", *African Journal of Business Management*, Vol. 4(6), pp 842-848.
3. David M.H., (2006), "A Consumer Perspective on Mass Customization", *Research Paper in University of Missouri-Columbia*.
4. Hair, Anderson, Tatham and Black, (2005), *"Multivariate Data Analysis",* 5th Ed., Pearson Education.
5. Kotha S., (1995), "Mass Customization: Implementing the Emerging Paradigm for Competitive Advantage", *Strategic Management Journal*, Vol. 16, pp 21-42, Special Issue: Technological Transformation and the New Competitive Landscape.
6. Kratochvil M. and Carson C., (2005), "*Growing Modular, Mass Customization of Complex Products, Services and Software*", 3rd Ed., Publisher- Berlin Heidelberg New York.
7. Pine B.J. II, (1999), "*Mass Customization the New Frontier in Business Competition*", 5th Ed., Harvard Business School Press, Boston, Massachusetts.
8. Pollard D., Chuo S. and Lee B., (2008), "Strategies for Mass Customization", *Journal of Business and Economics Research*, vol. 6, No. 7, pp 77-86.
9. Vignali C., Vrontis D., Vronti P.D., (2004), "Mass Customization and Clothing Industry", *Journal of Clothing Industry*, Vol. 55, No. 5-6, pp 502-512.
10. Tu Y.L., Xie S.Q. and Richard Y.K. Fung, (2007), "Product Development Cost Estimation in Mass Customization", *IEEE Journal on Engineering Management*, Vol. 54, No. 1, pp 29-40.