

A Survey on Mass Customisation in Engineering Organisations

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Abstract: Mass customisation aims to make customized product for individual customers with approximately the same efficiency as mass production. It provides customized product which satisfies increased customer demands of quality, functionality and aesthetic with low cost and short lead time. The dominance of mass production era is reducing because each customer demands extra functions, aesthetic etc. In the past, the customers used to buy what organisations offered. In today's scenario the organisations are to improvise regularly to stay in this competitive environment because changes are taking place very frequently. Organisations adopting mass customisation not only increase its sales but also reduce competition by providing variety in their products. This paper presents the findings of a survey carried out in Indian organisations to gauge the trends in mass customisation, aspects related to it, advantages derived and the difficulties encountered in its implementation. Data has been collected from 18 organisations.

1. INTRODUCTION

Tseng and Jiao (2001) define mass customization as "Producing goods and services to meet individual customer's needs with near mass production efficiency". In today's market of increasingly demanding customers; organisations are compelled to focus on smaller and specific market segments of customer oriented products. The new age of the so called "mass customisation" is now growing. In order to survive in competitive market and meet customers' demands, organizations are developing technologies in the fields of manufacturing processes, production planning and supply chain management, to reduce the development time of the product and its cost, while improving products quality. During the last two decades, organisations have moved from the model of mass-production to the model of mass-customisation of products as a way to maintain their competitiveness. Mass customisation has increased the capabilities of organisations to satisfy customer needs. The costs for mass customisation are considerably higher than those for mass production due to complexity. Hence, organizations adopt a particular type of

customisation which suits its needs. Types of customisation as mentioned by Pine (1993) are: Collaborative, Adaptive, Cosmetic and Transparent. Collaborative customisation helps customers articulate their needs and then develop customized outputs to meet these needs. Adaptive customisation helps customers buy a standard product but they can to modify it by themselves based on their needs. Cosmetic customisation enables organisations produce a standard product but present it differently to different customers and in transparent customisation organisations provide custom products without the customers knowing that a product has been customized for them.

2. LITERATURE REVIEW

Various aspects of mass customisation have been identified in the literature. Foliate and Da Silveira (2007) proposed a method for designing choice menu for mass customisation with two main contributions. First one is to define preference model and choice menu for different market segment and second is to combine well known stated preferences and multivariate statistical rules. NIBC (National Industrial Bicycle Company) adopted the concept of mass customisation and mass production simultaneously and produces customized bicycle. With the help a case study Suresh (1996) highlighted firm level conditions that are necessary for successfully exploiting mass customisation. Watcharapanyawong, Sirisoponsilp and Sophatsathit (2011) presented a framework, aiming to develop the mass customisation for textile and apparel industries in Thailand and concluded that Mass customisation is a new trend to make advantages in the world's business competition in the future. An aspect of mass customisation is product architecture. Products can be made modular and these modules are produced in volume and assembled according to customers choices. DONG et. al (2012) described how to implement Mass customisation in

Garment Industries. It combines the advantages of both Mass production and Mass customisation. Peterson et. al (2011) concluded that the future of Mass customisation on Knitted Garment Industries is very bright and one day it would be possible to offer client the opportunity to design a product that is then knitted directly in the store and delivered to the customer within hours. Helo et. al (2010) proposed an Integrated Vehicle Configuration System to facilitate customer order processing based on information from multiple domains in a mass customisation environment. Configuration for vehicle customisation necessitates rapid response to diverse customer requirements and rational decisions for planning products, production processes and logistics networks.

Today the main problems for organisations in adopting mass customisation are, what is mass customisation, and why mass customize, what is the need for customisation and how to customize? McCarthy (2004) describe that there is a relative dearth of research on how to design and operate a manufacturing system capable of mass customizing. Ettkin, Helms and Ahmadi (2008) explore in their paper, two major interdisciplinary techniques facilitating mass customisation strategies— e-commerce and knowledge management. The linkages between the two serve to validate the strategic shift toward mass customization. Based on the variety in possible choices, customer satisfaction becomes a subjective affair. Ultimate success will be based on how satisfied consumers are in any organisation. Lee and Chen (2000) show that every step of the mass customisation process will depend on the consumer’s satisfaction. Dietrich, Kirn and Sugumaran (2007) discussed how service-oriented architectures can be used for implementing mass customisation scenarios. The role of Information Technology is necessary for implementing mass customisation in an organisation. Chung et. al (2005) describe in their paper that IT infrastructure flexibility is an important part for information exchange and emphasized on the importance of sequential relationship between IT infrastructure flexibility, mass customisation, and business performance.

3. RESEARCH METHODOLOGY

This paper reports the findings of a questionnaire based survey which has been carried out in various organisations across India. The questions were designed to find out trends in mass customization, approach towards mass customisation, problems faced in mass customization and benefits achieved etc. with the help Google doc online survey. The questionnaires were sent to different organisations across India from which only 18 responses could be collected. 4 responses were incomplete and were not included in the analysis.

4. RESULTS

Table 1 gives the characteristics of the organisations surveyed. From Table 1 it can be seen that most of the respondents are

from the private sector, followed by the public sector. 83% of the respondents are from large-scale organisations, nearly 11.11% of the respondents are from medium-scale organisations. Small-scale organisations did not contribute in this survey. Nearly three-fourths of the respondent firms are from automobile segment, and remaining from manufacturing and other segment. About four-fifths of the organisations reported to have more than 1000 employees. Similarly, about two-thirds of the organisations have a sales turnover of more than 500 crores rupees (Rs.) and the remaining have a scattered range as given in Table 1.

Table 1 Demographic profile of the organizations

Participation by ownership	Public sector 16.67%	Private sector 83.33%	Government sector 0%	Others 0%	-
Participation by size	Large scale 88.89%	Medium scale 11.11%	Small scale 0%	-	-
Participation by segment	Manufacturing 11.11%	Automobile 77.78%	Electronics & Telecommunication 0%	FMCG 0%	Others 11.11%
No. of employees (% of organisations)	<50 5.55%	51-100 5.55%	101-500 5.55%	501-1000 0%	>1000 83.33%
Annual sales turnover (Rs. crores) (% of organisations)	<5 Cr 5.55%	5-50 Cr 5.55%	50-100 Cr 0%	100-500 Cr 11.11%	Over500 Cr 77.78%

Figure 1 schematically represents the major business objectives of the respondent organisations. To produce better quality of product and customer’s satisfaction have been given the top priority. This finding seems to be logical because only better quality products generally satisfy the customers. Other factors of priority are Maximize profit, increase earning per share, increase turnover, increase return on investment.

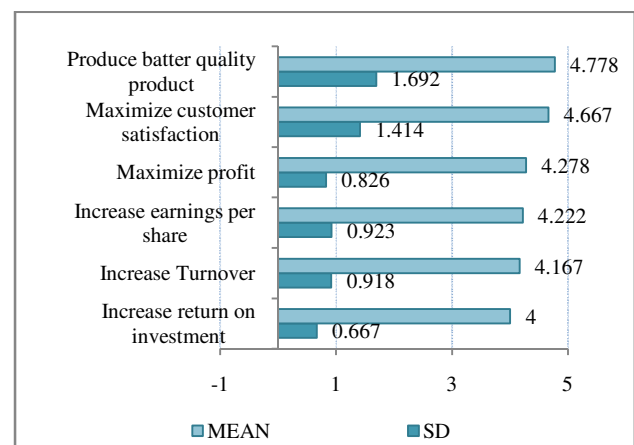


Figure 1 Business objectives of the organizations

Figure 2 shows the importance of various factors in adopting mass customization. From this figure it is clear that technology plays a major role in adopting mass customization followed by supply chain management, Information Technology and man power.

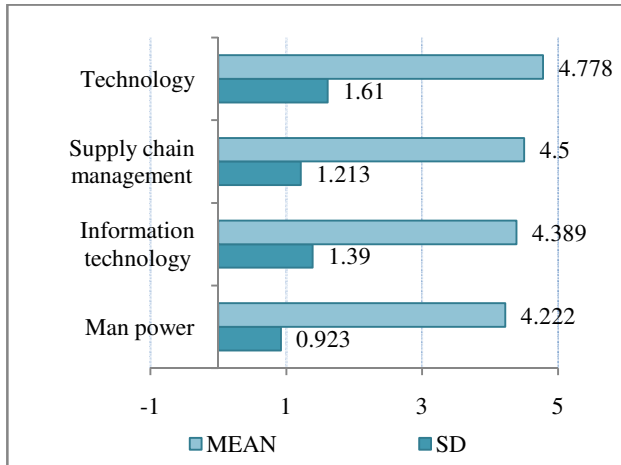


Figure 2 Importance of various factors in adopting mass customisation

Table 2 gives the trends observed in the annual sales turnover and profits of these organisations during the last three years. About 66.667% of the organisations reported that their annual sales turnover and profit increased up to 10%. About 33.33% of the respondents reported an average increase of more than 10.00% in their annual sales turnover and profit.

Table 2 Trend in annual sales turnover and profits for the last 3 years

Trend	Increased up to 10%	Increased more than 10%	Constant	Decrease
Annual sales turnover (%Organisation)	66.67%	33.33%	0%	0%
Trend in profit	66.67%	33.33%	0%	0%

Table 3 shows the details of available infrastructure in the organization to take up the work of mass customization. About 78% of the organizations have necessary flexibility in its IT links and connections to undertake customisation and 94% of the organization provided wide variety of product and information to their end user. Most organisation think that at

designer’s level mass customisation efforts would be more beneficial.

Table 3 Available Infrastructure in the organisation

	Yes	No
Organisation have the necessary flexibility in its IT links and connections	77.78%	16.67%
IT personnel work well in cross-functional teams to addressing product problems	100%	0%
Organisation’s level of investment in IT software, hardware, and telecommunication, higher than your competitors	83.33%	16.67%
Supply chain management good enough to deal with Customisation	94.44%	5.55%
Organisation offer a wide variety of products and information to its end users	94.44%	5.55%

The survey has found that organisations provide after sales service to a great extent. The responses have revealed that most of the organisations are adopting Collaborative approach for customisation and few organisations are going in for adoptive customization. Organisations do customisation with the help of Flexible and fully automated manufacturing system and mostly at designers’ level.

The responses have also revealed that mostly upper middle class and higher class demand for customisation and generally they demand for better functionality and uniqueness and for that are ready to pay around 10 % extra money. Luxuries and style influence customers in their decision to buy the product to a good extent. Most organisations are going for targeting new customer as well as lower per unit cost and inventory cost reduction. Difficulty in adopting mass customisation is due to the sheer complexity of manufacturing, pricing difficulties and lack of integrated supply chain. Most organisations are going for flexible manufacturing systems. Majority of the organisations are willing to moderately invest in creating the manufacturing facilities required for customisation. After customisation net revenue and sales has increased for most organisations.

5. CONCLUSIONS

The following conclusions can be drawn from the survey. The trend in adopting mass customisation is increasing because market is highly competitive. Now consumers are aware of what they need and want from a product, and also have a lot of options. Hence, it is the organisation which has to change according to consumers’ requirements to stay in market. Many organisations are adopting customisation slowly according to their capacity but want to invest, in future, in mass customisation. The impact of mass customisation on

organisations' performance is good. Their sales, profit, customer satisfaction and number of customers are increasing. There are also some difficulties in adopting customisation such as lack of manufacturing technology and facilities according to the complexities of customization. Also organizations feel that going in for mass customization on large scale leads to problems in providing after sales services to customers. Indian organisations are moving towards customisation slowly and steadily because today India is 2nd biggest market and organizations are looking for a greater market share by targeting different class of customers.

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