

Mass Customization in Real Estate Industry

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Abstract— The customization of products and services— characterized by a customer-integrated process for product design, manufacturing, marketing, and support services— now represents an important competitive strategy in business environments. This trend has given birth to a new concept in the operations management field, called mass customization, which refers to the ability to provide individually designed products and services to every customer through high process flexibility and integration. Once we understand the needs of the customers we will be able to synchronize their needs with standardization. The result of this is Mass Customization which will find a fit between the standard products and the customer's needs. In this research hypothesis was formulated that the builders will provide the amenities demanded by customer at no extra cost and the data was collected through mails and personal meetings by formulating questionnaire. The data collected was tested by Reliability test, Z-test and Annova test.

Key Words – risk management, real estate risk management, Earthquake resistant Designs

I. INTRODUCTION

A. What is mass customization?

Mass customization, in marketing, manufacturing, call center and management, is the use of flexible computer-aided manufacturing systems to produce custom output. Those systems combine the low unit costs of mass production processes with the flexibility of individual customization.

Mass customization is the new frontier in business competition for both manufacturing and service industries. At its core is a tremendous increase in variety and customization without a corresponding increase in costs. At its limit, it is the mass production of individually customized goods and services. At its best, it provides strategic advantage and economic value.

Mass customization is the method of "effectively postponing the task of differentiating a product for a specific customer until the latest possible point in the supply network." (Chase, 2006). Kamis, Koufaris and Stern (2008) conducted experiments to test the impacts of mass customization when postponed to the stage of retail, online shopping. They found that users perceive greater usefulness and enjoyment with a mass customization interface vs. a more typical shopping interface, particularly in a task of moderate complexity.

It is the process of delivering wide-market goods and services that are modified to satisfy a specific customer need. Mass customization is a marketing and manufacturing technique that combines the flexibility and personalization of "custom-made" with the low unit costs associated with mass production. In the same line we have thought to implement the mass customization concept for the real estate housing sector in India. Many applications of mass

customization include software-based product configurations that allow end-users to add and/or change certain functionalities of a core product. Sometime it's called "made to order" or "built to order." In today's scenario the trend is changing from sellers' market to buyers' market.

Today's homebuilders are encountering a production gap between the need for product standardization (or mass production) that helps reduce construction costs and the need for product customizability that satisfies diverse demands of contemporary consumers (Noguchi, 2004). (Ref: Dr. Masa Noguchi ZEMCH Network, Mackintosh School of Architecture, The Glasgow School of Art).

It is very important that Indian market should gradually shift from sellers to a buyers' market. In order to satisfy the customer's needs, builders' developers shift from mass housing to mass customization.

II. TYPICAL MODEL OF MASS CUSTOMIZATION OF HOUSES

This is the whole model onto how the process of Mass customization takes place in the different countries around the world. By studying the model we can try to implement the same model for mass customization in India.

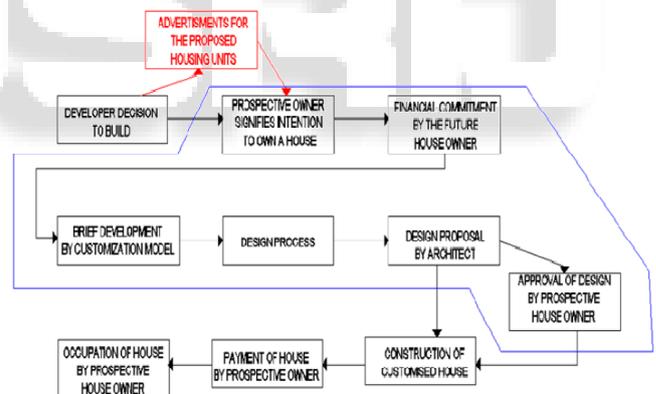


Fig 1: Process of mass customization in home building process.

Source: Adedayo, 2011a (Civil and Environmental Research www.iiste.org ISSN 2222-1719 (Paper) ISSN 2222-2863 (Online) Vol. 2, No.4, 2012

Literature review was done from 16 research papers, some articles, interviews and different case studies of different industries who have tried mass customization was studied. First case study was about Automobile industry who failed in mass customization practices, second case study was about computer industry (Dell) who succeeded in mass customization practices, third case study was about housing in Kuwait where they achieved success to good extent and the last case study was live case taken from India about lucknow resort city where due to customer demand they provided different options to the customers.

III. REAL ESTATE RESEARCH SIGNIFICANCE

The objective of this research is to expand the concept of mass customization in India for better development of real estate industry, to create a best possible way of achieving mass customization in real estate industry by involving buyer in design phase itself and to test the hypothesis that the demand of the customer will get fulfilled and they will get variety of choices leading to customer satisfaction. And to show up to how much extent it is possible that customer demand will be fulfilled or it will not in India.

IV. METHODOLOGY

A. Hypotheses:

- Null Hypothesis: - An amenity demanded by a customer will be provided by the developer at no extra cost.
- Alternate Hypothesis: - An amenity demanded by the customer will not be provided by the developer at no extra cost.

B. Exploratory Research:

To provide significant insight into a given situation of the extent of standardization versus customization, keeping extra costs constant to arrive at the points of agreement between the two parties' viz. developer and customer, in residential project, exploratory research is useful method.

C. Primary Data Collection:

The research is conducted in mini-metro cities of Ahmedabad and Pune. Pune is a cosmopolitan city having a large segment of IT people while Ahmedabad is one of the largest trade centre of India. This allows for significant mix with a variety of house preferences of the cities in the western region of the country. The Private housing projects (mainly of 3 Bedroom, Hall, Kitchen) in these two cities were targeted based on the list of the amenities provided in these projects were categorized.

The data was collected from 206 Customers, who have recently moved into 3 Bedroom, Hall, Kitchen homes in these projects. 43 developers who built the houses were also interviewed to gather data for further comparison.

A questionnaire was developed based on the amenities which the customer might require and/or the developer might provide at no extra cost. A 5 point scale was developed to rank the amenities from 1 to 5 where 1 being the lowest and 5 being the highest. This questionnaire was used for the survey for both the developers and the customers.

D. Secondary Data Collection:

The secondary data collected was through Research papers, magazines, newspapers, articles, web search etc.

1) Analysis of Survey data:

- The Reliability Test: Reliability analysis allows the researcher to determine the extent to which a scale produces consistent results if the measurements are repeated. Reliability analysis is conducted when you have 2 or more questions that will be summed to determine a specific variable.

- Z-test: When we know the mean and standard deviation in a single population, we can use the one-independent sample z test.
- ANOVA: An ANOVA tests whether one or more samples means are significantly different from each other.

V. DATA ANALYSIS RESULT

A. Reliability Analysis: Cronbach's Alpha

Reliability analysis allows the researcher to determine the extent to which a scale produces consistent results if the measurements are repeated. Reliability analysis is conducted when you have 2 or more questions that will be summed to determine a specific variable.

B. Interpreting Alpha

Similar to correlation analysis and the measure of R and R sq, the higher the alpha, the more reliable the instrument you are testing. A general rule for measuring reliability is Alpha above .70 is considered reliable.

Alpha above .60 is probably reliable, but you should consider evaluating each question to determine if you could raise the alpha level by eliminating it from the analysis.

Alpha below .59 is considered not reliable. You should either consider eliminating some elements from the instrument to raise reliability or revise the instrument to increase its reliability.

Cronbach's Reliability Test			
Customers		Builders	
k	18	k	18
Σ var	26.21	Σ var	25.75
var	153.50	var	76.90
α	0.88	α	0.70

Table 1: reliability test result

As the values of α for the Customer's as well as the Developers are more than 0.7, we can say that the data obtained is reliable

C. Testing the Hypothesis using Z-test

The test statistic we use depends largely on what we know about the population. When we know the mean and standard deviation in a single population, we can use the one-independent sample z test.

The one-independent sample z test is a statistical procedure used to test hypotheses concerning the mean in a single population with a known variance.

The rejection region is the region beyond a critical value in a hypothesis test. When the value of a test statistic is in the rejection region, we decide to reject the null hypothesis; otherwise, we retain the null hypothesis.

The test statistic for a one-independent sample z test is called the z statistic. The z statistic converts any sampling distribution into a standard normal distribution. The z statistic is therefore a z transformation. The solution of the formula gives the number of standard deviations, or z-scores, that a sample mean falls above or below the population mean stated in the null hypothesis. We can then compare the value of the z statistic, called the obtained value. The z statistic formula is the sample mean minus the

population mean stated in the null hypothesis, divided by the standard error of the mean:

$$\mathbf{z \text{ statistic: } } z_{obt} = \frac{M - \mu}{\sigma_M}, \text{ where } \sigma_M = \frac{\sigma}{\sqrt{n}}$$

The z statistic is an inferential statistic used to determine the number of standard deviations in a standard normal distribution that a sample mean deviates from the population mean stated in the null hypothesis.

The obtained value is the value of a test statistic. This value is compared to the critical value(s) of a hypothesis test to make a decision. When the obtained value exceeds a critical value, we decide to reject the null hypothesis; otherwise, we retain the null hypothesis.

Z test for null hypothesis	
Interested items in customer	188
Interested items in builder	37
Hypothesized Difference	0
Level of significance	0.05
Group 1 (Customer)	
Interested items in customer	184
Sample Size	207
Group 2 (Developer)	
Interested items in builder	30
Sample Size	43
Intermediate calculation	
Group 1 proportion	0.888889
Group 2 proportion	0.697674
Difference in 2 proportion	0.191214
Average in proportion	0.856
Z test statistics	3.249765
Two tail statistics	
Lower critical value	-1.95996
Upper critical value	1.959964
p-value	0.001155
Reject null hypothesis	

Table 2: Z- test result

D. Analysis of Hypothesis by Z-test:

Here the p-value (i.e. 0.001155) is less than the level of significance (i.e. 0.5).

Therefore according to the test we need to reject the null hypothesis i.e. there is a need to pay extra cost by the customer for getting the amenities.

E. Testing of Hypothesis using Analysis of Variance: ANOVA

F. One-way ANOVA:

- used to test for significant differences among sample means
- differs from *t-test* since more than 2 groups are tested, simultaneously
- One factor (independent variable) is analyzed, also called the “grouping” variable
- Dependent variable should be interval or ratio but independent variable is usually nominal

1) Factorial Design:

Groups must be independent (i.e., subjects in each group are different and unrelated)

2) Assumptions

- Data must be normally distributed or nearly

- Variances must be equal (i.e., homogeneity of variance)

The value of “F” (i.e. the ratio of the explained to the unexplained variation) is compared with the value of “F-critical”. If the value of “F” is greater than we reject the null hypothesis.

Anova: Single Factor						
SUMMARY						
Groups	Count	Sum	Average	Variance		
Column 1	206	706.4215686	3.429230916	0.474035447		
Column 2	43	132.7222222	3.086563307	0.24298976		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	4.177172741	1	4.177172741	9.608254924	0.002161488	3.879382065
Within Groups	107.3828364	247	0.434748326			
Total	111.5600092	248				
Reject null hypotheses						

Table 3: annova test result

Analysis of ANOVA: Here the value of “F” (i.e. 9.6082) is greater than the value of “F critical” (i.e. 3.879). Therefore, according to ANOVA we should reject the null hypothesis i.e. There is a need to pay extra cost by the customer for getting the amenities.

VI. CONCLUSION

- From the study it has been observed that customer will have to bear the extra cost of many amenities that the developer provides.
- Customization in real estate is possible only in selective amenities which the customer feels is necessary and the builder is ready to provide within the budget of the flat without any extra cost.
- According to the findings of the research, there is a scope of only cosmetic customization (Pine and Gilmore, 1999) in real estate industry i.e. a product can be presented differently to various customers.
- Mass customization will also ensure reduction of the production gap between the product standardization and product customizability.
- Mass customization popularly known as “Build to Order” is held true only when the developer provides the amenity after the customer asks about a specific amenity. For e.g. Change in size of bathroom.
- For the optimal customization, it is necessary to involve the customer in the design phase of the building. Doing so will help the developer to forecast his requirements and accordingly decisions can be made by the purchase department.
- For the private housing projects (mainly 3BHK) in two cities, Pune and Ahmedabad the builders are willing to provide the following amenities without extra charges:
 - Intercom facility
 - Inverter backup inside the house.
 - Chimney with gas stove.
 - Changes in bathroom with respect to size.
 - Changes in room with respect to shape.

- Geysers (solar/ electric).
- Changes in kitchen with respect to shape.(
Refer to Chart 8)

To expand the concept of mass customization in India for better development of real estate industry this study will be helpful in addressing more research in this field.

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