Assessing Customer Requirements and Preferences for a Perishable Product: A Case of an Indian Cooperative Dairy

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Abstract—Customer requirement is a key point for every product in current competitive market. This study compared the preferences of different categories of customers, Male/ Female Students and Male/ Female Staff, with respect to milk and milk products provided by a cooperative dairy, in relation to several parameters (milk characteristics, packaging, delivery, brand, storage and awareness). 200 respondents (50 Male Students, 50 Female Students, 50 Male Staff and 50 Female Staff) of Banaras Hindu University, India, were participated in the survey. Preferences of consumers with respect to milk and milk products were evaluated with the ‘Preferences for Milk and Milk Products Questionnaire’. Significant differences were observed between the 4 groups’ respondents on a number of variables. These findings have important implications to modify the market strategies related to the product development, distribution and promotion of the cooperative dairy. Additionally, it suggests that such survey for customer requirements can be very impactful input to House of Quality (HoQ).

Keywords— Customers’ requirements; Statistical Analysis; Perishable Product;

I. INTRODUCTION

Understanding customers’ requirements is a robust, emerging theme. It promotes a user-centered perspective early in the product development process [1]. The advantages of individual marketing-based approaches over segmentation have been greatly exaggerated. Firms must carefully consider a variety of consumer individual differences such as the customer’s knowledge and the stability of their preferences, as well as the type of purchase and presentation format [2]. An effective marketing policy is based on the principles of total quality management (TQM). By focusing on TQM, the marketing policy can continually emphasize, “Meeting Customers needs and reasonable expectations” [3]. Marketing policy investigation is defined as a process of data collection consisting of an analysis of existing marketing practices and measurement of customer satisfaction [4]. By developing and implementing a system that focuses on both customer expectations and product specification, the company becomes more competitive[5].

Marketing policies for perishable products have to be unique. Since perishable products have less shelf life, it is necessary to know the customer preferences from the core so that the product is accepted by the market and consumers. Additionally, the product has to be reachable to the majority of the customers. There has been substantial research on perishable products in relation to marketing, procurement, distribution, quality, manufacturing, and socio-economic aspects. Costa et.al conducted a market survey regarding the quality of tomato ketchup. The targeted market segment was
the Dutch student population, aged between 20-26 years. From the survey customer requirements (Voice of Customer) were found and used for quality improvement of the product (ketchup) with QFD (Quality Function Deployment) tool [6]. A similar study was carried out in Bangkok by Vatthanakul and co-workers, in which customer preferences were studied for product development of gold kiwifruit [7] Furthermore in recent work it is specified that the purchase of a product can be influenced by the brand name and the way and manner in which the product has been packaged. The work also revealed that there is strong relationship between the branding and packaging of the product and the marketing of the product. This intuitively means that a well branded and packaged product serves the dual purpose of attractiveness and marketability[8].

As it is known that the customers perceived values are very important for any product and service and Ryu et al. shows that quality of the physical environment, food, and services were significant determinants of restaurant image[9]. In present competitive scenario, where more products are in market, many factors can affect the customers’ buying behavior and analyzing customers’ behavior can bridge the gap between customer and seller[10]. Visual representation of product can also be a major parameter for consumer buying behavior and the attitudes toward visual packaging directly influence consumer-perceived food product quality and brand preference. Perceived food product quality also directly and indirectly (through product value) affects brand preference [11]. Although visualization affect the buying behavior of customers’ but potential of packaging systems to reduce the overall environmental impact via reducing food waste are desirable. Generating a standardized method to estimate food waste is challenging, however the results indicate that the inclusion of food waste in life cycle assessment (LCA) packaging studies dramatically alters the results. The connection between packaging design and food waste must be acknowledged and valued by all involved stakeholders, including food producers, manufacturers, brand owners, retailers and consumers, and also in packaging regulations[12]. J. Voordouw et al. work relates that how much product information can affect consumers, it suggested that the food allergic consumers preferred clear and unambiguous labeling on product packaging. Whilst the use of allergen labeling of food products remains an important consumer priority, additional information provision through the application of novel ICT technologies seems highly relevant (not the least from the retailer perspective of potentially delivering competitive advantages in terms of facilitating consumer choice)[13]. As customers’ inclination towards food quality is always higher and benefits of food quality management system (FQMS) are reduction in cost of production and increased productivity.

The key barrier to implementation of FQMS was “lack of knowledge and training” among food SMEs[14].

Milk is an essential product for most people. In rural areas cattle rearing is widespread so pure milk is available to most people at their doorsteps. However, in cities as most people do not rear cattle, pure milk is not easily available to the vast majority. Thus in such areas people depend on purchased milk. In modern times, with increasing awareness about health, adulteration of milk/ milk products, knowledge about the available options for purchasing milk, people now also prefer to buy ‘not the usual milk’. In addition, there is great attention to specific characteristics of milk, delivery methods, availability, convenience etc. Apart from these preferences of people from different communities may vary. The information regarding the customer requirements would help in the production and delivery of milk. This would not only boost the economy, but also satisfy the consumers.

It is important to mention about an Indian cooperative dairy under the state government, which is more than half a century old. From table 1 it can be seen that even after being in the market from so long duration the data computed for monthly sales over the past 5 years show a steady decline*.

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Table 1. Sales data of 5 years from 2010 to 2015 in liters per month

* From the data given by the cooperative dairy authorities. (Sales are in liters per month)
** The target was discussed via DELPHI method from the expert opinion of dairy industries.
Figure 1 shows the comparison chart in between the cooperative dairy product and the competitor product**. These findings are significant as the main aim of the cooperative dairy was to support the farmers in the dairy trade but now in this competitive environment it became hard to sustain in the market.

Thus the present investigation was carried out to study and compare the preferences of different categories of customers (University staff, teaching and non-teaching; and University students of both sexes), with respect milk and milk products provided by a cooperative dairy, in relation qualitative characteristics, packaging and delivery of milk.

II. METHODOLOGY

A. Sample
The sample was obtained from the Banaras Hindu University, India. University staff and undergraduate students were approached at their work place or classrooms respectively. They were given preliminary information about the study and requested to participate in the same. 100 University staff and 100 University students (50 boys and 50 girls), who consented to participate were recruited into the study.

B. Tools
The main tool was the „Preferences for Milk and Milk Products Questionnaire“. The questionnaire was designed to meet the needs of present study. Inputs were obtained from multiple sources, students, and staff of BHU and their spouses. 25 questions were listed. The questioner tried on 15 students to test its feasibility. It took about 10-12 minutes for a respondent to fill it. In its final form it has 24 questions covering various areas relating to milk/milk products: Characteristics 4; Delivery 5; Packing 9; Brand 2; Storage 2; and Awareness 2.

C. Methods
The participants were approached directly at their work place or in class rooms. First, each respondent was given some information about the broad areas covered in the „Preferences for Milk and Milk Products Questionnaire“, and then he/she were requested to fill the questionnaire. They were permitted to seek any clarification on any specific topic.

Parametric (F test) and non-parametric statistics (chi square analysis) were used to analyze the data. Parametric statistics serve as estimates of the corresponding population parameters. Their computation requires the use of pre-computed statistics as estimates of parameter. Moreover, they are interpreted with reference to specific population distribution of the variables. Non-parametric or distribution free statistics, in contrast, requires very few assumptions about the distribution of the
variables, do not require normal distribution of variables in the population, do not use any pre-computed statistics in the computation as an estimate of parameter, and can be used for even very small samples.

Non-parametric chi square test explores the significance of deviation of an experimentally observed frequency distribution from a proposed frequency distribution and, therefore, constitute the analysis of frequencies. It requires no assumption for normality of the population distribution of variables. Chi square may be defined as the sum of the ratios of squared deviations of observed frequencies from the corresponding frequencies expected from a given distribution[15].

### III. RESULTS

#### A. Characteristics of the sample

200 respondents participated in the survey. The mean age of male students were 19.53 and for female students, it was 18.62. The mean expenditure per month was 2832.1 INR and 1818.6 INR, for male students and female students respectively. Same for the male and female staff the mean age was 36.21 and 33.50 respectively. The 4 categories of respondents did not differ significantly with respect to family domicile.

#### B. Milk characteristics

i. Majority of the respondents preferred normal (43.9%) or little sweetened milk (35.0%). More male students, preferred thick creamy and little sweetened milk. On the other hand, more girl students and male staff preferred normal or little sweetened milk. Women teaching staffs’ preference was for normal milk. (Chi-square= 22.32; df = 9; p= 0.008).

![Percentage Milk Characteristic in Milk Type](image)

ii. Majority of the respondents preferred medium (47.1%) or low fat milk (22.9%). More male students preferred high and medium fat milk, while female students preferred low and medium fat milk. Among the staff respondents, male staff preferred medium fat milk, but female staff preferred either high or low fat milk. The difference between the groups was statistically significant. (Chi-square = 27.73; df =8; p= 0.001).

iii. Majority of the respondents preferred fresh milk (77.1%) and liquid milk (84.7%). 14.0% preferred concentrated milk or milk powder. No significant difference was observed between the 4 four groups with respect to choice for fresh milk. (Chi-square= 10.02; df= 6; p=0.08), type of milk (liquid, concentrated or milk powder) (X2 =8.19; df=6; p=0.224).

#### C. Delivery options

i. Nearly half of the respondents preferred delivery of milk at their residence. 38% did not prefer delivery at their residence. The remaining (15.9%) were not sure about their preference. More male students and male staff preferred
milk delivery at their residence. However, more female students and women staff preferred milk not to be delivered at their residence. The difference between the groups was statistically significant. (Chi-square = 32.74; df =9; p=0.000).

ii. A little over 1/3rd (36%) were not willing to pay for extra cost of delivery to residence. More female students (56.5%) and women staff (43.8%) were not willing pay compare male students and male staff. Amongst those who were willing to pay more male students boys, male staff and women staff were will to pay more than 10%, while more female students were willing to only up to 1% or up to 5%. The difference between the groups was statistically significant (Chi-square =33.45; df=9; p=0.000).

iii. More than half the sample (56.7%) preferred delivery of milk by a vending machine. There was no significant difference between the 4 groups of respondents with respect to preference for delivery by vending machine (Chi-square=5.11; df=6; p=0.530).

iv. Almost 1/4th (24.8%) of the sample preferred buying milk via online shopping. There was no significant difference between the 4 groups of respondents with respect to preference for buying milk via online shopping. (Chi-square =12.12; df=9; p=0.202).

v. Almost 2/3th (65%) of the respondents did not prefer extra cost for online shopping. Amongst those who preferred to pay extra for the same, more female students and male staff and women staff was willing to pay up to 9% of the actual cost of the milk for on-line shopping. On the other hand more male staff preferred to pay up to 10% or more of the cost of milk for online shopping.

D. Packaging types

i. The respondents preferred different types of packing of milk: loose milk 38.9%; tetra packing 33.1%; plastic packing 17.2%; and tin packaging preferred 7.0%. The 4 groups of respondents did not differ significantly with respect to the type of packing (Chi-square =22.99; df=15; p=0.08).

ii. Almost 2/3th (63.7%) of the sample preferred transparent packing of milk. Others were either preferred non-transparent packing (24.8%) or not sure (11.46%). There was no significant difference between the groups with respect to preference for transparent packing. (Chi-square =10.81; df=9; p=0.288).

iii. The vast majority of subjects (88.5%) preferred the content of milk in terms of its ingredients to be displayed on the milk packing. More female students compared to male students and staff, male female, preferred ingredients to be displayed on the milk packing. The difference was statistically significant. (Chi-square =13.31; df=6; p=0.038).

iv. Almost 3/5th (61.1%) of the sample preferred package Size of 500ml, nearly 1/5th (19.7%) preferred 250ml packaging, while the remaining (15.3%) preferred 1000ml packaging. Majority male students preferred 250ml and 500ml packing, whereas female students, male staff and female staff preferred 500ml and 1000ml packing. The difference between the 4 groups was statistically significant (Chi-square =19.88; df=9; p=0.019).

v. Majority of the respondents preferred recycling of package. There was significant difference between the 4 groups of respondents with respect to the same. (Chi-square =5.86; df=6; p=0.439).

vi. Vast majority (80.9%) of respondents were not willing to pay for extra cost of recycling packaging. There was no significant difference between the 4 groups with respect to the same (Chi-square =13.49; df=9; p=0.143).

vii. A little over 1/2 of the sample (52.2%) preferred the milk package to be reusable; 26.1% preferred the milk package not to be reusable. There was no significant difference between the 4 groups with regard to preference for a usable milk package (Chi-square =15.94; df=9; p=0.068).

viii. Nearly 2/3th (63%) of the sample did not prefer to pay for the extra cost of reusable milk packaging. There was no significant difference between the 4 groups with regard to the same (Chi-square =15.74; df=9; p=0.072).

ix. The vast majority (85.2%) of respondents preferred ease of portability. More female students and male staff preferred ease of portability, while for more male students and women easy of portability was not Important (Chi-square =14.52; df=6; p= 0.021)

E. Brand

i. 3/5th of the sample preferred their favorite brand. There was no significant difference between the 4 groups with respect to the same.

ii. Only 2/3th (67.5%) of the respondents preferred to spend money on their favorite brand of milk. 27.4% preferred to spend up to 5%, 21.5% up to 1% and 19.1% up to 10% or more. More male students were willing to pay either up to 1% or up to 10% or more. More female students were willing to pay up to 1% and up to 5%. More men staff preferred to pay up to 10% or more and more women preferred to either not spend or spend up to 1%. Their differences were statistically significant (Chi-square =13.49; df=9; p=0.03).
F. Storage

i. Majority of the subjects (77.1%) preferred storage of milk at normal temperature with preservative. The 4 groups of respondents did not differ with respect to the same. (Chi-square =9.94; df=6; p=0.127)

ii. Less than 2/3 (65.6%) of the sample preferred storage of milk at low temperature. More female students preferred storage of milk at low temperature compared to staff, male and female who did not prefer the same. (Chi-square =14.73; df=6; p=0.022)

G. Product awareness

i. Products: Awareness of respondents with regard to the different products of the cooperative dairy ranged from 25.5 to 81.5% (‘Butter’ 81.5%; ‘Ghee’ 79.%; ‘Matta’ 71.3% ; ‘Khoya’ 47.8%; ‘Pera’ 39.5%, ‘Kheer’ 37.6%; ‘Rajbhog’ 33.1%; ‘GulabJamun’ 31.2%; ‘Laddo’ 30.0%, ‘Kalakand’ 25.5%). Significant differences were found between the groups with respect to ‘Khoya’ and ‘Rajbhog’. More staff, both male and female had awareness for ‘Khoya’ compared students male and female. (Chi-square =8.484; df=3; p=0.03). On the other hand more Female staff has awareness about ‘Rajbhog’ compared to male staff and students both male and female. (Chi-square =9.93; df=3; p=0.019).

ii. Less than 2/5th of the respondents were either aware (38.8%) or totally unaware (39.5%) of the process of pasteurization of milk, and about 1/5th (21%) were partially aware of the same. More staff, male and female were aware, More male students, were totally unaware and more female students were partially aware about the same. The differences were statistically significant. (Chi-square =36.46; df=9; p=0.000).

The results illustrate that there are significant differences in the preferences of respondents with respect to the milk and milk products. Additionally, the study demonstrates that people are less aware about the other milk product of the cooperative dairy. This cooperative dairy was primarily established, by the Indian State Government, for the farmers’ wellbeing but it is now facing troubles because of declining market sales. In fact most of the people do not know that the cooperative dairy performs pasteurization and homogenization, which is a negative impact on the dairy sales. The limitation of this work is that the study was conducted only in Varanasi, India, so the results may vary when the area will change (like metro cities).

IV. CONCLUSION

The primary objective of the study was to find out the customer preferences for milk and milk products, for the cooperative dairy. The declining sales of the dairy can be stabilized with the help of this technical analysis. This survey helps out to attain the customer preferences in the current market situation. Furthermore these preferences will be subjected to House of Quality (HoQ), Quality Function Deployment tool, to find out the ‘HOW’ (Technical Requirements) with these finding of ‘WHAT’ (Customer Requirements). Moreover, it is also concluded with the help of this survey that the current marketing strategies of the cooperative dairy is not effective to the extent desired. So, this work can be a good approach to modify and improve the market strategies of the cooperative dairy.

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REFERENCES


BIography

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