Case Study

CONSUMER PREFERENCE FOR DAIRY PRODUCTS ATTRIBUTES IN KOLKATA: A CONJOINT ANALYSIS APPROACH

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ABSTRACT
Milk and milk products have an important place in the dietary regimen of human beings due to health benefits. The adoption of milk processing is highly determined by the market demand for dairy products. It discussed the role of conjoint analysis in the determination of buyers' responses to a product during concept testing and test marketing and also for the modifications of existing products. The fulfillment of customers' needs and wants in a profitable way requires that companies understand the attributes of their product(s) that are most valued by the customers. In this paper the conjoint analysis of ghee has be estimated and their path worth utilities also has been calculated. In case of ghee the most important attribute to the consumers was found to be packaging which contributes 1.764 to the consumer's total utility of 3.582 while the consumer's least preferred attributes level is local brand ghee. Ghee prepared from cow milk (U=0.434) were found to have more utility to the consumers than buffalo ghee(U=0.125). Relative importance attributes of ghee to consumers were found to be: packaging (41.25%), types of ghee (27.10%), brand (23.14%) and quantity (8.51%). The computed expenditure elasticity of liquid milk, curd and buttermilk were found to be lesser than unity reflecting that consumers have considered these products as necessary goods.

INTRODUCTION

Ghee is a highly priced dairy product of Indian sub-continent, prepared by clarification of cow/buffalo/ mixed milk fat. In this study, an attempt was made to determine the factors influencing the consumption pattern of ghee in Kolkata metropolitan of West Bengal State, India. For this purpose, the data from three hundred sample respondents was collected using multistage stratified random sampling technique. Sustaining this demand, however, rests on livestock producers and market agents, whose expected responses to the price premium these desired attributes may command in the marketplace could lead to higher and more stable incomes for smallholder producers and be a pathway to the development of the livestock sector in many developing countries. To assess the market potential for sweet prepared from milk and other milk products, a conjoint analysis is conducted in Kolkata metropolitan to examine consumer evaluation of major product attributes and their tradeoffs. Over the period, there is a rising significance of dairy products in the food basket of the people of India (Kumar *et al.,* 2014).The municipality town households consume more milk, sweetmeats and dahi than Rural and Metropolitan city.

Jain *et al.* (1970) estimated the income and price elasticity of demand of milk and eggs for Rudrapur and Haldwani in Uttar Pradesh found that with the increase in price of milk at different levels, small income group with high elasticity reduced consumption of milk at a little higher rate than the low elasticity stricken medium and large income groups. On the other hand, Metropolitan households consume more powder milk, condensed milk, ghee and ice cream. Milk and some milk products consumption and expenditure on it increased substantially, with the increase of income in all the areas.

METHODOLOGY

To reach these objectives, this study designed a conjoint choice experiment survey and collected primary data in Kolkata metropolitan. Decisions about product attributes including price play a significant role in the success or failure of new products. Developing the "right" new product is critical to a company's success and is often cited as a key competitive dimension (Chao and Kavadias, 2008). Companies often spend a lot of resources developing new products only to find that consumer adoption is much lesser or much slower than

expected. Sometimes the problem is that the final product fails to deliver on its promises.

This study provides useful information to different stakeholders including milk producers and importers. The milk industry and its marketers may benefit from this information by using it to strategically market their milk to different groups. However, the problem is that the company has not properly estimated the product's market potential. Product research enables management to select more effective, more efficient, less risky and more profitable alternatives that can maximize sales (Cooper and Schindler, 2006). Product research is a component of marketing research that provides information and intelligence on the attributes of agood or service that could satisfy a recognized need or want of consumers. It involves concept testing, determination n of optimal product design, package tests, test marketing, product modification, brand positioning and repositioning (Kotler and Keller, 2006).

The approach of conjoint analysis

Green and Srinivasan (1978) defined Conjoint analysis as any decomposition method that estimates the structure of preferences given overall evaluation of a set of alternatives that are pre-specified in terms of levels of different attributes. In this study, it is defined as a survey method of data collection and analysis for eliciting preferences for a product. Since then, it has become an important marketing research tool that is being used extensively in marketing to analyze consumer trade-offs, understand how customers make purchase decisions and predict consumer behaviour as well as determine how people value different features that make up an individual product for the purpose of providing products that better meet customers' needs (Green and Srinivasan, 1978; Green, 1981; Green and Srinivasan, 1990, and Green and Wind, 2001).

Conjoint analysis methodology

Conjoint analysis has become a popular marketing research tool for designing new products. Conjoint analysis allows for a buyer's overall product preferences to be disaggregated among the product's features. This requires knowledge of the buyer's overall evaluations of a set of alternative products that are prespecified in terms of levels of different features(Green and Srinivasan, 1978). Using conjoint analysis, a researcher can analyze a heterogeneous product market and obtain results that can be highly disaggregated to homogeneous groups of buyers. Alternatively, aggregating results for buyers who have similar preference or utility functions can be useful in modifying current products or services and in designing new ones for selected market segments (Green and Wind, 1975). Since the introduction of conjoint analysis, three principal approaches have emerged, the full profile conjoint, adaptive or hybrid conjoint and choice-based conjoint (Bakken and Frazier, 2006).

Table 1. Steps in conducting a conjoint analysis

Sl. No	Step	Details
1.	Problem definition	Selection of attributes and levels
2.	Design of profiles and survey	Preparation of orthogonal design Preparation of questionnaire a profile cards Administration of survey
3.	Analysis	Estimation of part-worths and attribute importances
4.	Simulation and optimization	Optimization of single products or product line
5.	Report	Preparation of report, presentation

Selection of attributes and attributes Level

The first stage is related to the selection of the most important attributes in the milk and milk products which were selected based on a focus group input and an extensive literature review. In the second stage, the range of each attribute is determined by literature reviews and market survey. The attributes and its level for milk, ghee are given in Table 2.

Generation of orthogonal design

The generation of Orthogonal Design is typically the starting point of a conjoint analysis. It also allows generating factor-level combinations, known as holdout cases, which are rated by the subjects but are not used to build the preference model. Instead, they are used as a check on the validity of the model. If there is four attributes (Fat level, Availability, Quantity and price) associated with (3 x 3 x 4 x 3) levels respectively, there were 108 possible product combinations. Large no of choice set in design could affect respondent decisions, so these number of choices are minimized using an orthogonal fractional factorial design by using SPSS software. These orthogonal array combinations of attributes of milk, ghee and rasogolla are given in Table 3, Table 4 respectively.

The conjoint model

The model used for this conjoint analysis is a linear additive model and is applicable where data has been collected according to an orthogonal array. Conjoint analysis is based on a linear compensatory assumption expressed as follows, and is, with the use of the OLS algorithm, parallel to regression with dummy. Also, the model can be applied where no interaction between the variables can be assumed (Rao, 2014). The linear additive model can be described as:

$$Y = \beta + U_1(X_{j1}) + U_2(X_{j2}) + \cdots + U_t(X_{jt})$$

Where Y is the overall utility gained from the model, β is a constant, U_t is the component utility function specific to the t-th attribute and X_{jt} is the level of the j-th profile for the t-th attribute. Approximate decomposition of original rating also provide by conjoint analysis. The predicted utility for dairy product is sum of the intercept and the

Table 2. Milk products attributes and their levels

Product	Attribute	Levels
Ghee	Type	Buffalo, Cow
	Brand	Amul, Motton, Local
	Quantity	100 ml, 200 ml, 500 ml
	Packaging	Poly pack, Tin, Pet jar

Calculation of the relative importance of dairy products attributes
Part-worth utility values can be used to calculate the relative utility of the dairy product attributes. The relative utility weights are calculated as the highest and the

path-worth utilities. Conjoint analysis model for the preference for ithtype of first attributes, jth types of second attributes and kth type of third attributes is

$$Y_{ijk} = \mu + \beta_{1i} + \beta_{2j} + \beta_{3k} + \varepsilon_{ijk}$$

The predicted utility for the ijk combination is

$$\hat{Y}_{ijk} = \hat{\mu} + \hat{\beta}_{1i} + \hat{\beta}_{2j} + \hat{\beta}_{3k}$$

lowest part-worth utilities are determined for each attribute. The utility range for the attribute will be derive by taking the difference between the highest and lowest part-worth. Once a range for each attribute has been determined, the relative importance of the attribute is calculated as follows:

$$RI = \frac{UR}{\sum_{j=1}^{n} UR\,j} \times 100$$

Where,
UR= Difference between highest and lowest path-worth utility values for each attribute
RI= Relative importance (*RI*) of the *I*th attribute, expressed in percentage weight

Table 3. Orthogonal array combination of attributes of ghee

Card ID	Type	Brand	Quantity	Packaging
1	Buffalo ghee	Motton	100 ml	Tin
2	Cow ghee	Amul	100 ml	Pouch
3	Cow ghee	Local	100 ml	Pet Jar
4	Buffalo ghee	Amul	500 ml	Pouch
5	Buffalo ghee	Amul	200 ml	Tin
6	Cow ghee	Motton	1000 ml	Poly Pack
7	Buffalo ghee	Local	1000 ml	Pouch
8	Buffalo ghee	Local	200 ml	Poly Pack
9	Buffalo ghee	Motton	500 ml	Pet Jar
10	Buffalo ghee	Amul	1000 ml	Pet Jar
11	Cow ghee	Amul	500 ml	Poly Pack
12	Buffalo ghee	Amul	100 ml	Poly Pack
13	Cow ghee	Local	500 ml	Tin
14	Cow ghee	Amul	1000 ml	Tin
15	Cow ghee	Motton	200 ml	Pouch
16	Cow ghee	Amul	200 ml	Pet Jar

RESULTS AND DISCUSSION
The result of conjoint analysis in Table 4 revealed that in case of ghee the most important attribute to the consumers was found to be packaging which contributes 1.764 to the consumer's total utility of 3.582 while the

consumer's least preferred attributes level is local brand ghee. Ghee prepared from cow milk (U=0.434) were found to have more utility to the consumers than buffalo ghee (U=0.125)

Table 4. Part-worth or Utility Estimate of Ghee's Attributes

Attributes	Levels	Utility estimate (Std. Error)	Utility range	Average relative importance (%)
Type	Cow ghee	0.434* (0.315)	0.559	27.10
	Buffallo ghee	-0.125 (0.382)		
Brand	Motton	-0.518* (0.316)	1.002	23.14
	Amul	0.484 (0.370)		
	Local	0.034 (0.370)		
Packaging	Tin	0.418 (0.410)	1.764	41.25
	Pouch	-0.874 (0.410)		
	Pet Jar	-0.435 (0.410)		
	Poly Pack	0.890* (0.410)		
Quantity	100 ml	-0.086 (0.212)	0.257	8.51
	200 ml	-0.171 (0.424)		
	500 ml	-0.257 (0.636)		
	1000 ml	-0.343* (0.848)		
Total			3.582	

represents the most preferred level in the Attributes

Pearson's R, and Kendall's tau, association values were used to assess the validity of the conjoint analysis model. The Pearson's R (0.496) and Kendall's tau (0.283) values were moderate and indicated moderate agreement between the averaged product ratings and the predicted utilities from the conjoint analysis model.
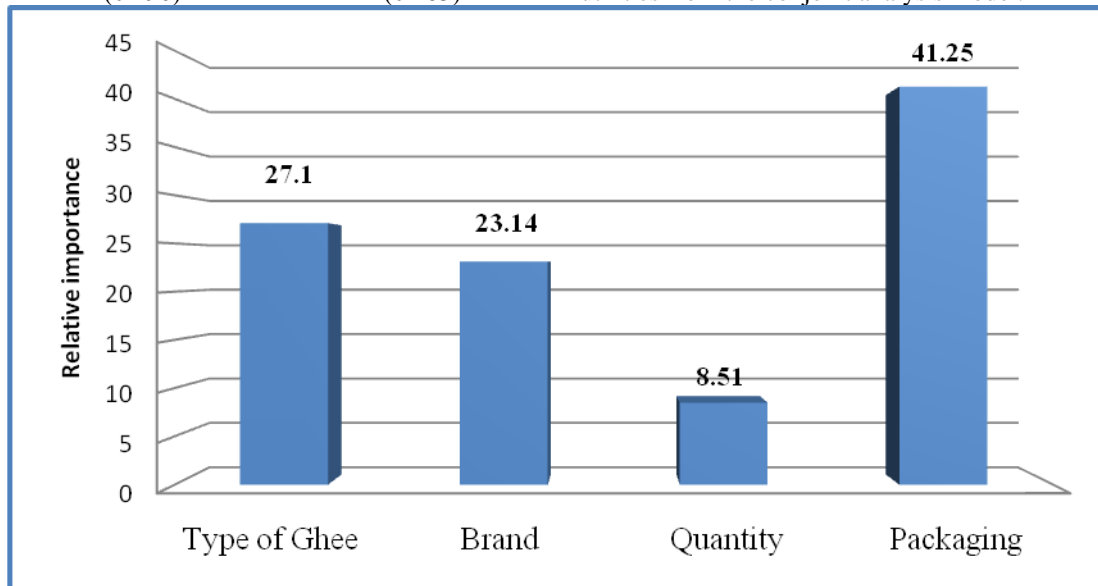

Fig. 1. Averaged Relative Importance of attributes of Ghee

Fig. 1. shows that the relative importance attributes of ghee to consumers were found to be : packaging (41.25%), types of ghee (27.10%), brand (23.14%) and quantity (8.51%).

The survey conducted by Dixit et al revealed that 32.5% consumed every day while 30.8% consumed on certain days. The monthly per capita expenditure on ghee was `33.88 which is 2.1% of the total monthly per capita expenditure on food items. The result supports the importance of attributes in determining preference for ghee is more balanced, with price (25%), hygiene (20%) and official stamp (25%) having fairly similar weight based on the full sample, followed by tenderness (18%) and fat content (11%).

CONCLUSIONS AND IMPLICATIONS

The study suggested that a producer should analyze the part-worth utilities of each of the attribute to ascertain how dairy industry can increase the consumer's utility from his product. These results have the potential to assist in the construction of a market strategy. For policy implications, considering the external factors influence, it seems that the government health educational programs should be continued, which in turn are expected to help upsurge the development of the dairy industry. Bearing in mind that consumers generally prefer purchasing dairy products at modern retailers the Government should consider ways to facilitate supply chain coordination between retailers and domestic dairy processers in order to help grow the domestic industry. Furthermore, fluid milk supplies in the supermarket consist of both pasteurized milk and UHT milk. Research on consumers' perceptions of different types of fluid milk, as well as the importance of shelf life, may give some new insight which will aid in domestic dairy industry development and motivate innovation in the dairy industry.

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