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Analysis of consumers' preference for guava using the conjoint method

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ABSTRACT

Guava (*Psidium guajava* L.) is considered poor man's fruit or 'apple of tropics'. Guava fruits are used for both, fresh consumption and processing. An attempt has been made in this paper to analyze the consumer preference for different varieties of guava in *Karnataka*. The primary data consisting of 30 consumers from Bengaluru (R) and 30 consumers from Koppal district were collected from the respondents in the study area. To find out consumers' preferences for guava variety, the conjoint analysis method was used. The findings of the study revealed that both consumers in Bengaluru (R) and Koppal region preferred guava varieties with soft seed, sweet taste, pink flesh, thin skin and fruit having shelf life of 1-5 days. Meanwhile, Bengaluru (R) preferred fruit varieties with a large size, medium price and prefer to purchase from super markets. Whereas, Koppal region consumers preferred fruit varieties with medium size, low price and prefer to purchase from street vendors. The relative importance of the part-worth functions was compared across different attributes within segments in order to arrive at the relative importance of each attribute. Among all the attributes of guava studied for Bengaluru (R), seed type was found to be the most important and first consideration for consumers, accounting for 36.69 per cent relative importance followed by place of purchase, price, skin, flesh, shelf life and taste respectively. Koppal region had a relative importance order of seed type, skin, taste, place of purchase, flesh, price, size and shelf life of the fruit. These results show that there is a scope for development of seedless varieties with sweet taste by seed developers or guava researchers.

Keywords: Conjoint method, Guava, Consumer preference

Introduction

Guava (*Psidium guajava*), native to Central America and northern South America, has a rich history that spans centuries. Indigenous peoples in these regions were among the first to cultivate guava, recognizing its nutritional benefits and adaptability. By the early 17th century, Spanish and Portuguese explorers introduced guava to tropical and subtropical areas, including the Caribbean, Africa and Asia. It quickly adapted to new climates, becoming integral to agriculture and cuisine in India, Southeast Asia and Africa. By the 19th and 20th centuries, guava spread to the Pacific Islands and Mediterranean regions. Today, it is widely grown across the globe, with numerous varieties developed to suit different climates and tastes. Guava holds cultural significance in many countries and plays a crucial economic role, being a valuable crop for both small-holder farmers and commercial enterprises due to its low production costs and high yield. In India and other parts of Asia, it is often featured in traditional festivals and culinary practices. Its role in local cuisine is matched by its use in traditional medicine for its health benefits. Therefore, analysis of consumer preferences was essential to study the consumer behavior in buying guava fruits, analysis was done by using conjoint analysis. The conjoint analysis perspective is effective in revealing realistic decisions made by consumers regarding the attributes of a product and allows consumers to evaluate a series of alternative combinations of a product's attributes.

Methodology

The main guava growing districts in *Karnataka* are Bangalore (R), Bangalore (U), Koppal, Chikkaballapura and Kolar. The present study was conducted in Bengaluru (R) and Koppal district. To study the consumer preference for guava, 30 consumers were selected from each selected district randomly.

Conjoint analysis

Conjoint analysis is a versatile marketing research technique that can provide valuable information for new product development, forecasting, market segmentation and pricing decisions, advertising and distribution, competitive analysis and repositioning. It is a technique used in assessing consumer's value judgments. Hence, in the present study, it was used to measure the consumer's preference for different varieties of guava. Of late, conjoint analysis is finding increasing application in the field of market research and wider management decision-making.

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Conjoint analysis is a multivariate technique that is commonly used to determine the relative importance of a product's multidimensional features, and it is particularly well suited for measuring human perceptions and preferences. The analysis refers to any decomposition method that estimates the structure of buyers' preference for a product's features, given the buyers' overall evaluation of a set of products described by levels of specific features.

The additive conjoint model was used in this study. The model has been formulated as:

$$Y = \sum_{i=1}^n \sum_{j=1}^m V_{ij} X_{ij} \quad (1)$$

Where,

Y = Consumers' overall evaluation of the guava fruit.

V_{ij} = Part worth associated with 'j' (1,2,3, ...m) of attributes, 'i' (1,2, ...n), the attributes are given in Table 3.3 for consumers.

X_{ij} = Dummy variable representing the preference of the jth level of ith attribute.

For this study, profile describing alternatives was constructed by combining levels of six attributes. The attributes and their levels were identified through discussions with the consumers during the survey are presented in Table 1.

Table 1. Attributes and attribute levels of guava varieties for conjoint analysis

Sl. No	Attributes	Attribute level
1	Taste	a. Good b. Average
2	Flesh colour	a. Pink b. White
3	Fruit skin	a. Thin b. Thick
4	Seed	a. Soft seeded b. Hard seeded
5	Shelf life	a. 1-5 days b. 6-10 days
6	Size of fruit	a. Small b. Medium c. Big
7	Price per kg (Rs)	a. Low (<Rs.30) b. Medium (Rs.31-60) c. High (>Rs.60)
8	Place of purchase	a. Street vendors b. Wholesale market c. Super markets

Results and discussion

In both the markets of Bengaluru (R) and Koppal districts, the key characteristics of guava that influenced consumer preference were seed type, place of purchase, taste, flesh, skin, shelf life, size, and price. The cards developed for conjoint analysis were administered to

sample respondents of the study area and OLS regression analysis was utilized to estimate the part-worth for every respondent.

To determine the relative importance of every attribute, the part-worth functions were compared across different attributes within segments. The relative importance and utility of the attribute for Bengaluru (R) and Koppal districts is presented in Table 2. The most influential and important factor for consumers among all the guava characteristics examined for the Bengaluru (R) consumers was the seed type, which accounted for 36.69 percent of the relative importance with soft seed having utility of 4.177 compared to hard seed (-4.177). Place of purchase was an important variable influencing consumer preference in Bengaluru (R) which accounted for 22.5 per cent, with super markets having the highest utility 2.721, followed by price, which had a strong influence with relative importance of 16.10 per cent with medium price (Rs.31-60) having utility of 1.785.

Skin of the fruit was found to be the fourth importance attribute with relative importance of 9.42 per cent, the individual utilities for thin and thick skin were -1.072 and 1.072, respectively. Size of the fruit had the relative importance of 5.49 per cent, with big size fruit having utility of 0.679. Followed by flesh of the fruit which had relative importance of 5.12 per cent was found to be the sixth attribute with pink flesh having utility of 0.583. Shelf life of fruit was one of another significant attributes having importance of 3.93 per cent with 1-5 days having utility of 0.447. Taste was found to be the least important attribute having importance of 0.73 per cent.

Similarly, seed type was found to be the top and decisive attribute in Koppal district accounting 29.85 per cent, with soft seed utility having utility of 2.547. Skin of the fruit had more influence on buyer's preference after seed type with a relative importance of 13.40 per cent, thin skin having utility of 1.438 compared thick skin (-1.438). Taste of the fruit was found to be the third important attribute having relative importance of 13.27 per cent with normal taste possessing utility of 1.656. Followed by place of purchase exhibited importance of 13.12 per cent with purchasing from street vendors having utility of 0.646.

Flesh was another significant attribute which had importance of 9.71 per cent, pink flesh possessing utility of 0.937. Followed by price of fruit accounting 7.54 per cent importance, with low price (<Rs.30) utility of 0.597. Size and Shelf life were the least important attributes for consumer preference in Koppal district with relative importance of 6.68 per cent and 6.39 per cent respectively.

For Bengaluru (R) and Koppal districts, the Pearson's rank correlation test scores were 0.879 and 0.959, respectively and they were significant at the one per cent level of significance which indicated suitability of the model.

Consumers of Bengaluru (R) district preferred guava with the soft seed, sweet taste, pink flesh, thick skin, big size, with medium price (Rs.31-60), 1-5 days of shelf life and preferred to buy from super market. Meanwhile, Koppal district consumers preferred guava varieties with soft seed, normal taste, pink flesh, thin skin, 1-5 days shelf life, medium size fruit, low price (<Rs.30) and preferred to buy from street vendors. In both Bengaluru (R) and Koppal region, the consumers preferred soft seed, pink flesh and fruit having shelf life of 1-5 days. These findings suggested that researchers and seed companies have opportunity for developing seedless and pink flesh varieties in order to fully satisfy the consumer demand in both Bengaluru (R) and Koppal districts.

Table 2. Consumer preference for different varieties of guava in the study area

Sl. No	Attributes	Attributes level	Bengaluru (R) district		Koppal district	
			Utility Estimate	Relative importance (%)	Utility Estimate	Relative importance (%)
1	Seed	Soft seed	4.177	36.69	2.547	29.85
		Hard seed	-4.177		-2.547	

(continued on next page)

Sl. No	Attributes	Attributes level	Bengaluru (R) district		Koppal district	
			Utility Estimate	Relative importance (%)	Utility Estimate	Relative importance (%)
2	Place	Street vendors	0.317	22.51	0.646	13.12
		Local market	-2.403		-0.354	
		Super market	2.721		-0.292	
3	Taste	Sweet	0.083	0.73	-1.656	13.27
		Normal	-0.083		1.656	
4	Flesh	Pink	0.583	5.12	0.937	9.75
		White	-0.583		-0.937	
5	Skin	Thin	-1.072	9.42	1.438	13.40
		Thick	1.072		-1.438	
6	Shelf life	1-5 days	0.447	3.94	0.750	6.39
		6-10 days	-0.447		-0.750	
7	Size	Small	-0.570	5.49	-0.205	6.68
		Medium	-0.109		0.307	
		Big	0.679		-0.102	
8	Price	Low (< 30)	0.096	16.10	0.597	7.54
		Medium (31-60)	1.785		-0.199	
		High (> 60)	-1.881		-0.398	
		(Constant)	8.905	100.00	9.010	100.00
		Correlations		Values		Values
		Pearson's rank correlation		0.879**		0.959**
		Kendall's rank correlation		0.740**		0.845**

Note: ** Significant at 5 per cent

Based on the preferences of consumers in Table 2, when attributes were matched with the present market varieties, it was evident that Taiwan Pink, Lucknow 49, Red flesh and Lalit varieties matched two or more than two preferred attributes for consumers in Bengaluru (R) district. Conversely, consumers in Koppal district showed a prefer-

ence matching to Allahabad Safeda, Taiwan Pink, Arka Mridula, Red flesh and Lalit varieties is presented in Table 3. These selections were aligned with consumer preferences based on the attributes outlined in the tables, indicated suitability of varieties for respective regional markets for consumers consumption.

Table 3. Suitable varieties of guava based on consumer preference

Sl. No	Varieties	Attributes							
		Bengaluru (R) district				Koppal district			
		Seed	Flesh	Taste	Size	Seed	Flesh	Taste	Size
1	Lucknow-49	Soft	Creamy white	Sweet	Large/Big	Soft	Creamy white	Sweet	Large/Big
2	Allahabad safeda	Soft	White	Normal	Medium	Soft	White	Normal	Medium
3	Taiwan pink	Soft	Pink	Sweet	Large/Big	Soft	Pink	Sweet	Large/Big
4	Arkamridula	Soft	White	Normal	Medium	Soft	White	Normal	Medium
5	Red flesh	Soft but many seeds	Pink	Sweet	Medium	Soft but many seeds	Pink	Sweet	Medium
6	Lalit	Soft	Pink	Sweet	Medium	Soft	Pink	Sweet	Medium

Conclusion

Bengaluru (R) district consumers preferred guava with the soft seed, sweet taste, pink flesh, thick skin, big size, with medium price (Rs.31-60), 1-5 days of shelf life and preferred to buy from super market. Meanwhile, consumers of Koppal preferred guava varieties with soft seed, normal taste, pink flesh, thin skin, 1-5 days shelf life, medium size fruit, low price (<Rs.30) and preferred to buy from street vendors. In both Bengaluru (R) and Koppal region consumers preferred soft seed, pink flesh and fruit having shelf life of 1-5 days. These results show that there is a scope for development of seedless varieties with sweet taste by seed developers or guava researchers.

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