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Factors Determining the Consumers Behavior of Branded Milk and Milk Products in Tirupati City of Andhra Pradesh

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The study was conducted with an objective to is analyze the factors determining the consumers behavior of branded milk and milk products in Tirupati City of Andhra Pradesh during 2020-21. Tirupati city was purposively selected for the study being an important Tier-II city in Rayalaseema region of Andhra Pradesh with metro population accounting to 3,73,000 in 2021 (census2011.co.in)Twelve wards were selected based on the criteria of highest population recorded during 2021 in descending order. 10 consumers were selected from each ward that constituteda sample size of 120 consumers. The factors determining the consumers behavior of branded milk and milk products was collected using a well-defined schedule through personal interview method during the year 2020-21. The empirical findings of the study revealed that Heritage is most preferred brand both in milk and milk products among the consumers. The statistical tools employed Principal Component Analysis (Analysis of data using SPSS software). The results of Principal Component Analysis inferred that the consumer behavior of branded milk and milk products was influenced by five factors namely Consumer preference factor (Family, Advertisement, Quality,

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Offers, Package Design, Hygiene in production and Fat content), Product attributes factor (Price, Flavor, brand Image) Perishable factor (Freshness, appearance), Referral factor (Friends and Relatives , Wide Product Range and Product Availability) and Convenience factor (Packs in suitable quantities and Texture).

Keywords: Consumers behavior; brand image; advertisement; price; quality; principal component analysis.

1. INTRODUCTION

Consumers buying behavior is the decision processes and their acts involved in buying the products. The consumers choice of the branded products is associated to their needs, lifestyles, and preferences. The study was conducted with an objective to is analyze the factors influencing the consumers behavior of branded milk and milk products in Tirupati City of Andhra Pradesh during 2020-21. Factors such as freshness, family and friends influence, retailer's advice, quality, availability of products in requiredquantities, price, offers, texture, package design, wide product range, appearance, hygiene in production, fat content, family monthly income, age, education level, and so on. These elements play an important role in decision-making and consumer behavior. Though Heritage was the preferred brand among the various milk and milk products it faced tough competition with its competitor brands.

1.1 Review of literature

Shih et al. [1] employed conjoint analysis to study the consumer preferences on instant coffee in Taiwan. The findings of the study revealed that the price was the most important factor followed by brand, packaging material and taste.

Koutroulou and Tsourgiannis [2] conducted a study on factors affecting consumers' purchasing behaviour towards local foods in Greece. The results indicated that the factors which influenced purchasing behaviorwere topicality of the products, quality and health issues, appearance, freshness and taste issues, curiosity and prestige.

Selvarajn [3] in his study opined that the factors influencing the consumers choice of ready to eat food were flavour, texture, appearance, advertising, reduction in traditional cooking, fragmentation of family.

Olgha and Mary [4] in their study on determinants of consumer's choice of milk brands in selected residential estates owned by Nairobi City Country, Kenya found that factors such as store's cleanliness, quality, taste, price, availability, family size, income, smell, thickness and quantity played significant role in determining the choice of brand.

Somasekhar and Kumar [5] conducted a study on factors influencing buying behaviour of soft drink products viz., Coco-cola, Thumps up, Limca, Sprite and Maaza in Chittoor district of Rayalaseema region, Andhra Pradesh. Majority of the respondents were influenced by taste, quality and friends circle and these three were the most significant factors towards buying of soft drinks [6].

2. MATERIALS AND METHODS

Tirupati city was purposively selected for the study being an important Tier-II city in Rayalaseema region of Andhra Pradesh 12 wards of the existing 50 wards were selected based on the criteria of highest population recorded during 2020 in descending order. 10 consumers were selected from each ward thus constitutes of sample size of 120 consumers the study was conducted in Tirupati city of Andhra Pradesh. Simple random sampling method was adopted to select the sample size of 120 respondents. Data was collected through personal interview using well- structured questionnaire. The consumers were asked to indicate their responses on a 1-5-point scale, whether they strongly disagree, disagree, moderate, agree and strongly agree. The responses of the consumers were recorded and score was given for each factor, then scores were added to obtain the total score. The data was subjected to Principal Component Analysis usingSPSS software after the assumptions were satisfied.

Assumptions 1: Measurement of Multiple ordinal variables.

Assumptions 2: Existence of linear relationship among the variables

Assumptions 3: Sampling Adequacy with regard to recommended minimum sample size

Assumptions 4: Suitability of variables for data reduction

Assumptions 5: Absence of significant outliers

H_0=0, The selected factors or variables have no influence on the consumers behaviour of branded milk and milk products

The Principal Component Analysis can be expressed as:

$$X_1 = \lambda\ 11\ F_1 + \lambda\ 12\ F_2 + \ldots + \lambda\ 1m\ F_m + e_1$$

$$X_2 = \lambda\ 21\ F_2 + \lambda\ 22\ F_2 + \ldots + \lambda\ 2m\ F_m + e_2$$

$$Xn = \lambda\ n_1\ F_1 + \lambda\ n_2\ F_2 + \ldots + \lambda_{nm}\ F_m + e_n$$

where,

$X_1, X_{2\ ,\ldots..,} X_n$: Standardized scores
$F_1, F_{2,\ldots\ldots,} F_n$ Standardized factor scores
$\lambda_{11} – \lambda_{mn}$: Factor loadings
e_1-$e_{2\ldots,}$ $e_{n\ ,}$: Error variance

The maximum number of factors possible is equal to the number of variables. However, small number of factors by themselves may be sufficient for retaining most of the information on the original variables.

3. RESULTS AND DISCUSSION

To identify the underlying factors and to investigate the relationship among the variables that influence the consumers behaviour of branded milk and milk products.Principal Component Analysis was applied using SPSS. for the selected 18 variables after satisfying the conditions of KMO and Bartlett's test of sphericity. The Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and Bartlett's test of sphericity are presented in the Table 1.

KMO value was 0.832 which specifiedadequacy of the sample to proceed with Principal Component Analysis. The Chi-square value for Bartlett's test was significant, thus, rejected the null hypothesis indicating that the factors considered for the study have a significant influence on the consumers behaviour of branded milk and milk products. The approximate chi square value is 1429.565 with 153 degrees of freedom, is significant at 0.000 level.

3.1 Principal Component Analysis

The factors extracted from Principal Component Analysis obtained from the selected 18 variables was presented in the Table 2.

SPSS extracted five factors were whose eigen values was greater than one. The extraction sum of square loading column indicated that the cumulative variance accounted by all the five factors was 66.563.

The rotation sums of the square loading columns represent the distribution of the variance after the varimax rotation with Kaiser Normalisation 22.516 per cent of variance was accounted by factor one and it has the corresponding eigen value of 6.867, 13.551 per cent of variance was accounted by second factor with the eigen value of 1.633, 12.547 per cent of the variance accounted by third factor with the eigen value of 1.287, 10.911 per cent of the variance was accounted by fourth factor with the eigen value of 1.165, 7.037 per cent of the variance accounted by fifth factor and it has eigen value of 1.029.

Table 1. Kaiser-Meyer-Olkin & Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.832
Bartlett's Test of Sphericity	Approx. Chi-Square	1429.565
	Df	153
	Significance	0.000

Significant at 1 per cent level

Table 2. Principal component analysis of variables

Component	Initial Eigenvalues			Extraction sums of squared Loadings			Rotations sums of Squared Loadings		
	Total	%Variance	Cumulative%	Total	%Variance	Cumulative%	Total	%Varience	Cumulative%
1	6.867	38.148	38.148	6.867	38.148	38.148	4.053	22.516	22.516
2	1.633	9.070	47.218	1.633	9.070	9.070	2.439	13.551	36.068
3	1.287	7.152	54.370	1.287	7.152	7.152	2.258	12.547	48.615
4	1.165	6.474	60.844	1.165	6.474	6.474	1.964	10.911	59.526
5	1.029	5.719	66.563	1.029	5.719	5.719	1.267	7.037	66.563
6	0.893	4.961	71.524						
7	0.842	4.676	76.200						
8	0.717	3.982	80.182						
9	0.652	3.621	83.804						
10	0.568	3.158	86.961						
11	0.528	2.933	89.894						
12	0.455	2.530	92.425						
13	0.365	2.028	94.453						
14	0.295	1.640	96.094						
15	0.270	1.499	97.593						
16	0.248	1.378	98.972						
17	0.182	1.014	99.985						
18	0.003	0.015	100.000						

Scree plot:

The scree plot was used to ascertain retained factors. The scree plot is a graph of the eigen values against the all factors. The point of interest is where the curve starts to flatten in the plotted graph.

It was clear from the Fig. 1 that as the curve begins to flatten after fifth factor, five factors were extracted from the 18 variables analyzed for the research.

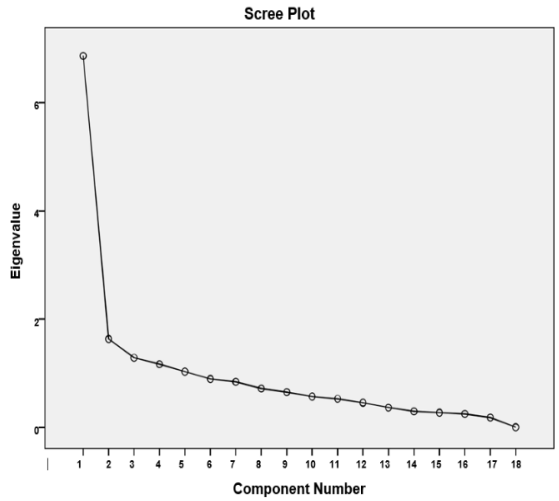

Fig. 1. Scree plot

3.2 Rotated Component Matrix

The rotated component matrix represented the factor loadings obtained against each variable and each factor extracted. The selection criterion for grouping of variables under five factors was made such that factor loading for each variable would be highest across row and should be greater than 0.5. The results of the analysis were presented in the Table 3.

From the Table 3 it was known that the variables like family, advertisement, quality, offers, package design, hygienically produced and fat content have the highest factor loadings of 0.686, 0.563, 0.857,0.712,0.706, 0.589, 0.853these variables were represented in factor one. The variables like price and flavor have the highest factor loadings of 0.654 and 0.594 respectively and these variables were represented in factor two. The variables like freshness and appearance have the highest factor loadings of 0.793 and 0.634 respectively and these variables were represented in factor three. The variables like friends and relatives, wide product range have the highest factor loadings of 0.539 and 0.850 and these variables were represented in factor four. The variables like available in required quantities and brand image have the highest factor loadings of 0.858 and 0.549 and these variables were represented in factor five.

Table 3. Rotated component matrix

Rotated component matrix						
Sl. No.	**Factors**	**Component**				
		1	**2**	**3**	**4**	**5**
1.	Freshness	0.114	0.100	0.793	0.141	0.138
2.	Family	0.686	0.488	0.223	0.133	-0.003
3.	Retailers advice	0.224	0.403	0.198	0.431	-0.127
4.	Advertisement	0.563	-0.333	0.431	0.150	0.157
5.	Friendsand relatives	0.170	0.109	0.400	0.539	-0.165
6.	Quality	0.857	0.154	0.119	0.201	-0.516
7.	Available in suitablequanitites	0.077	0.020	-0.042	0.037	0.858
8.	Price	0.263	0.654	0.416	0.219	0.019
9.	Offers	0.712	0.176	0.029	0.009	-0.114
10.	Availability	0.031	0.150	0.285	0.677	0.022
11.	Texture	0.1.08	0.401	0.371	0.014	0.549
12.	Package design	0.706	0.345	0.314	-0.43	0.107
13.	Wide product range	0.110	0.152	-0.107	0.850	0.185
14.	Appearance	0.330	0.231	0.634	0.188	-0.091
15.	Hygiene in production	0.589	0.304	0.464	0.188	-0.013
16.	Fat Content	0.853	0.149	0.106	0.104	0.146
17.	Flavor	0.133	0.594	0.191	0.200	0.142
18.	Brand image	0.365	0.745	-0.111	0.181	0.095

Table 4. Grouping of the extracted factors

Factor number	Factor name	Variables under factor	Factor loadings
1	Consumer preference factors	Family Advertisement Quality	**0.686**
		Offers	**0.563**
		Package design	**0.857**
		Hygiene in production	**0.712**
		Fat content	**0.706**
			0.589
			0.853
2	Product attributes factors	Price	**0.654**
		Flavor	**0.594**
		Brand image	**0.745**
3	Perishable factors	Freshness	**0.793**
		Appearance	**0.634**
4	Referral factors	Friends and relatives	**0.539**
		Wide product Range	
		Availability	**0.850**
			0.677
5	Convenience factor	Packs in suitable quantities	**0.858**
		Texture	
			0.549

3.3 Grouping of the Extracted Factors

The variables extracted from each factor column according to their factor loadings are grouped. A specific name was given to those variables under each group and the details were presented in the Table 4.

Table 4 showed that the variables of factor one was grouped as consumer preference factor, the variables of factor two were grouped as Product attributes factor, the variables of factor three were grouped as perishable factor, the variables of factor four were grouped as referral factor and the variables of factor five were grouped as Convenience Factor.

4. CONCLUSION

Eighteen factors that were identified to affect the consumer behavior of branded milk and milk products were subjected to Principal Component Analysis using SPSS after the data set was initially tested for its assumptions, sample adequacy by KMO and Bartlett test of sphericity for rejection of null hypothesis. Principal Component Analysis had extracted five factors which influenced the consumer behavior of branded milk and milk productsto be Consumer preference factor (Family, Advertisement, Quality, Offers, Package Design, Hygiene in production and Fat content); Product attributes factor (Price, Flavor, Brand Image); Perishable factor (Freshness & Appearance), Referral factor (Friends and Relatives, Wide Product Range and Product Availability) and Convenience factor (Packs in suitable quantities and Texture).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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