Journal of Graphic Era University
Vol. 7, Issue 1, 18-28, 2019
ISSN: 0975-1416 (Print), 2456-4281 (Online)

Statistical Analysis for Packed Milk Buying Behaviour

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(Received September 15, 2018; Accepted October 3, 2018)

Abstract
Packed milk of different brands and configuration are available in the market. Normally buyer faces the problem during the selection of suitable brand according to his/her requirement. In the present study, IBM 14.5 Statistics Package for the Social Sciences (SPSS) software is used to analyse the buyer behaviour towards the purchasing packed milk based on twelve parameters. Dataset is created using IBM 14.5 SPSS software and the data were collected through questionnaire from employees around Uttarakhand. Present study uses the correlation method to ascertain the influence of parameters on buyers packed milk purchasing behaviour.

Keywords- Data Analysis, SPSS, Dairy Industry, Decision Making, Chi-square Test, Packed Milk, Toned, Double Toned.

1. Introduction

Today's global market is growing rapidly every year with high pace. The organizations mainly focused on their product quality due to the increasing and growing consumer requirements (Sharma et al., 2018; Sharma et al., 2019). One of the important food product of daily life is milk and the behaviour of buying that is mainly dependent on the quality. The process in which individuals or groups study selection, purchasing, disposal of the product, their services, ideas and experiences to satisfy the desired needs comes under the study of consumer behaviour (Gupta and Shringare, 2018 and Sharma et al., 2018). The marketer is influencing the consumer as how the buyer can use the product and services more than why and what the consumer buys. Consumer behavior is a difficult task, strongly influenced by economic, social, cultural and psychological factors (Kilic et al., 2009). Wide range of information about the varieties of products, many choices and options available in the market also influence the buyer's decision (Manan et al., 2017).

So, the decision making is different among the individuals due to various internal and external factors like family roles, perception, group and peer influence, attitude and motivation. Apart from the above factors, the behaviour also depends upon the various factors like manufacturing

Journal of Graphic Era University
Vol. 7, Issue 1, 18-28, 2019
ISSN: 0975-1416 (Print), 2456-4281 (Online)

processes and packaging procedure. So, packaging is one of the major technique to enhance the quality and protect the product (Raheem et al., 2014; Deo and Hosee, 2017; Uniyal, et al., 2018). Proper packaging increases the trust among suppliers and the buyers for the safe delivery of the product. To add more shelf life to the food products, innovative packaging techniques are required. Packaging material must satisfy the buyer needs such as (Sharma et al., 2018).

- To protect and preserve
- Appropriate distribution pattern
- Easy to open, stock and dispose
- Proper information through labelling
- Economically reliable

In the present era, packaging has become a sales elevation tool for the companies. Packaging quality, color, material and other features attract the buying behaviour of consumers (Bousbia et al., 2017). Packaging is a complete package that becomes a final selling scheme, which inspires impulse buying behaviour (Deliya et al., 2012). For the analyzing purpose of buyer's behavior of packed milk, SPSS (Statistics Package for the Social Sciences) software is used (Hawthorne et al., 2018). SPSS is a worldwide used software for statistical analysis in social science. It is mainly used by practitioners, government health researchers, survey companies, academicians, marketing organizations, data miners for the market analysis (Psomas et al., 2015; Rivas et al., 2015; Rathod et al., 2017; Ghebremariam, et al., 2018).

In the present work, a questionnaire-based survey and its corresponding analysis-based questions for specific parameters in packed milk buying was carried out. The aim of the current study is to identify the kind of similarities or differences in responses when questions related to milk buying is asked in a written form. It also targets to identify the strength of response from consumers based on the questionnaire.

2. Research Methodology

A planned questionnaire was sent to 100 respondents, but 75 responded it. The study included different age groups, different occupations. There were 50 valid participants who responded 12 questions of the structured questionnaire and it was used for data collection. Based on the survey done in, Dehradun District of Uttarakhand in which 50 respondents were agreed to give their feedback. After collecting the data, it is processed, and coded to assign numbers to each of the replied questions. Coding is necessary to convert the raw data into useful numerical data which may be tabulated and counted.

Table 1 explains the data about different variables for storing information collected from 50 respondents used in SPSS. Present table is called dataset. Here each questions reply is signified in numeric format, example for brands variables 8 responses (Amul, Paras, Mother Dairy, MMilk, Aanchal, Go Milk, Ananda and Others) are coded using numbers 1-8 respectively. Likewise, remaining variables are coded. Next, performing the coding scheme and putting the

Journal of Graphic Era University
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response of 50 respondents, the variable view and data view of this information is presented in the form of dataset, which shown in the Figure 1, Figure 2 and Figure 3 respectively

Table 1. Different variables used for identifying buyer behaviour in SPSS

Ques. No.	Description	Responses	Coding
1	Sex	Male	1
		Female	2
2	Age	25-35 years	1
		35-45 years	2
		45-55 years	3
		Above 55 years	4
3	Profession	Worker	1
		Entrepreneur	2
		Others	3
4	Qualification	Higher Secondary	1
		Senior Secondary	2
		Undergraduate	3
		Postgraduate &above	4
5	Experience	1-2 years	1
		2-3 years	2
		3-4 years	3
		4-5 years	4
6	Brands	Amul	1
		Paras	2
		Mother Dairy	3
		MMilk	4
		Aanchal	5
		Go Milk	6
		Ananda	7
		Others	8
7	Quality	Low	1
		High	2
		Excellent	3
8	Types	Toned	1
		Double toned	2
		Flavored	3
		Full Cream	4
		Skimmed	5
9	Packaging	Rigid containers	1
		Flexible packaging	2
		Blow-molding	3
		High density polyethylene	4
		Sleeve packaging	5
10	Method of Awareness	Friends and relatives	1
		Social Media	2
		Television advertisement	3
		Others	4
11	Impactful factors	Proper weight	1
		Certification	2
		Proper packaging	3
12	Satisfaction	Yes	1
		No	2

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*yogesh.sav [DataSet1] - IBM SPSS Statistics Data Editor

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	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	ID	Numeric	8	0	ID	None	None	8	Right	Scale	Input
2	Sex	Numeric	8	0	Sex	{1, male}...	None	8	Right	Scale	Input
3	Age	Numeric	8	0	Age	{1, 25-35 years}...	None	8	Right	Scale	Input
4	Profession	Numeric	8	0	Profession	{1, worker}...	None	8	Right	Nominal	Input
5	Qualification	Numeric	8	0	Qualification	{1, Higher Secondary}...	None	8	Right	Nominal	Input
6	Experience	Numeric	8	0	Experience	{1, 1-2 years}...	None	8	Right	Nominal	Input
7	Brands	Numeric	8	0	Brands	{1, Amul}...	None	8	Right	Nominal	Input
8	Quality	Numeric	8	0	Quality	{1, low}...	None	8	Right	Nominal	Input
9	Types	Numeric	8	0	Types	{1, Toned}...	None	8	Right	Nominal	Input
10	Packaging	Numeric	8	0	Packaging	{1, Rigid containers}...	None	8	Right	Nominal	Input
11	Methodsofawareness	Numeric	8	0	Methodsofawareness	{1, Friends and relative...	None	8	Right	Nominal	Input
12	ImpactfulFactors	Numeric	8	0	ImpactfulFactors	{1, Proper weight}...	None	8	Right	Nominal	Input
13	Satisfaction	Numeric	8	0	Satisfaction	{1, Yes}...	None	8	Right	Nominal	Input
14											

Figure 1. Variable view

*yogesh1.sav [DataSet1] - IBM SPSS Statistics Data Editor

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Visible: 13 of 13 Variables

	ID	Sex	Age	Profession	Qualification	Experience	Brands	Quality	Types	Packaging	Methodsofawareness	Impactful Factors	Satisfaction	var	var	var
1	1	1	1	1	4	1	1	3	2	1	1	3	1			
2	2	2	1	1	4	2	3	2	3	2	1	2	1			
3	3	1	1	1	3	3	7	2	1	3	3	3	1			
4	4	1	2	1	3	2	5	2	5	5	4	1	1			
5	5	1	2	1	2	2	6	2	4	4	2	2	1			
6	6	1	2	1	4	2	1	3	1	2	3	3	1			
7	7	2	3	1	4	2	4	3	3	3	1	1	1			
8	8	2	3	1	4	3	3	1	2	4	3	3	1			
9	9	1	2	1	3	3	1	3	5	1	2	2	1			
10	10	1	2	1	2	1	5	2	4	2	2	3	1			
11	11	2	1	1	1	1	6	2	2	5	3	2	1			
12	12	1	1	1	3	1	7	2	3	3	1	1	1			
13	13	2	1	1	4	1	8	3	5	4	1	1	1			
14	14	1	2	1	3	3	8	3	4	1	1	2	1			
15	15	1	2	1	2	3	6	2	2	5	3	3	1			
16	16	1	1	1	4	2	1	3	5	2	4	3	1			
17	17	2	1	1	4	2	1	3	1	3	2	1	1			
18	18	1	2	1	4	2	3	3	3	5	1	2	1			
19	19	2	1	1	3	3	5	2	3	4	3	2	1			
20	20	1	3	1	2	1	7	1	4	2	2	2	1			
21	21	1	5	1	4	2	1	3	5	1	1	3	1			
22	22	1	3	1	2	3	3	1	2	2	3	3	1			

Figure 2. Data view

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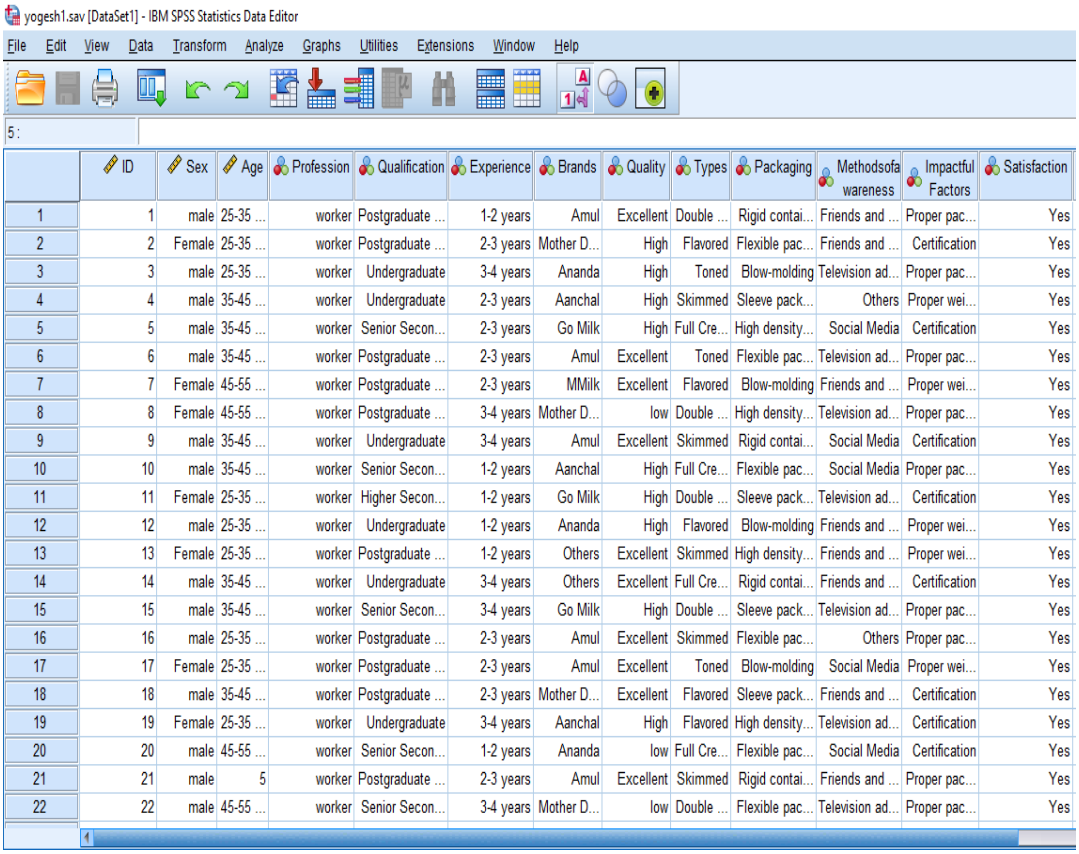
Vol. 7, Issue 1, 18-28, 2019
ISSN: 0975-1416 (Print), 2456-4281 (Online)



	ID	Sex	Age	Profession	Qualification	Experience	Brands	Quality	Types	Packaging	Methodsofawareness	Impactful Factors	Satisfaction
1	1	male	25-35 ...	worker	Postgraduate ...	1-2 years	Amul	Excellent	Double ...	Rigid contai...	Friends and ...	Proper pac...	Yes
2	2	Female	25-35 ...	worker	Postgraduate ...	2-3 years	Mother D...	High	Flavored	Flexible pac...	Friends and ...	Certification	Yes
3	3	male	25-35 ...	worker	Undergraduate	3-4 years	Ananda	High	Toned	Blow-molding	Television ad...	Proper pac...	Yes
4	4	male	35-45 ...	worker	Undergraduate	2-3 years	Aanchal	High	Skimmed	Sleeve pack...	Others	Proper wei...	Yes
5	5	male	35-45 ...	worker	Senior Secon...	2-3 years	Go Milk	High	Full Cre...	High density...	Social Media	Certification	Yes
6	6	male	35-45 ...	worker	Postgraduate ...	2-3 years	Amul	Excellent	Toned	Flexible pac...	Television ad...	Proper pac...	Yes
7	7	Female	45-55 ...	worker	Postgraduate ...	2-3 years	MMilk	Excellent	Flavored	Blow-molding	Friends and ...	Proper wei...	Yes
8	8	Female	45-55 ...	worker	Postgraduate ...	3-4 years	Mother D...	low	Double ...	High density...	Television ad...	Proper pac...	Yes
9	9	male	35-45 ...	worker	Undergraduate	3-4 years	Amul	Excellent	Skimmed	Rigid contai...	Social Media	Certification	Yes
10	10	male	35-45 ...	worker	Senior Secon...	1-2 years	Aanchal	High	Full Cre...	Flexible pac...	Social Media	Proper pac...	Yes
11	11	Female	25-35 ...	worker	Higher Secon...	1-2 years	Go Milk	High	Double ...	Sleeve pack...	Television ad...	Certification	Yes
12	12	male	25-35 ...	worker	Undergraduate	1-2 years	Ananda	High	Flavored	Blow-molding	Friends and ...	Proper wei...	Yes
13	13	Female	25-35 ...	worker	Postgraduate ...	1-2 years	Others	Excellent	Skimmed	High density...	Friends and ...	Proper wei...	Yes
14	14	male	35-45 ...	worker	Undergraduate	3-4 years	Others	Excellent	Full Cre...	Rigid contai...	Friends and ...	Certification	Yes
15	15	male	35-45 ...	worker	Senior Secon...	3-4 years	Go Milk	High	Double ...	Sleeve pack...	Television ad...	Proper pac...	Yes
16	16	male	25-35 ...	worker	Postgraduate ...	2-3 years	Amul	Excellent	Skimmed	Flexible pac...	Others	Proper pac...	Yes
17	17	Female	25-35 ...	worker	Postgraduate ...	2-3 years	Amul	Excellent	Toned	Blow-molding	Social Media	Proper wei...	Yes
18	18	male	35-45 ...	worker	Postgraduate ...	2-3 years	Mother D...	Excellent	Flavored	Sleeve pack...	Friends and ...	Certification	Yes
19	19	Female	25-35 ...	worker	Undergraduate	3-4 years	Aanchal	High	Flavored	High density...	Television ad...	Certification	Yes
20	20	male	45-55 ...	worker	Senior Secon...	1-2 years	Ananda	low	Full Cre...	Flexible pac...	Social Media	Certification	Yes
21	21	male	5	worker	Postgraduate ...	2-3 years	Amul	Excellent	Skimmed	Rigid contai...	Friends and ...	Proper pac...	Yes
22	22	male	45-55 ...	worker	Senior Secon...	3-4 years	Mother D...	low	Double ...	Flexible pac...	Television ad...	Proper pac...	Yes

Figure 3. Data view

After performing all the operations in the dataset, the result of descriptive statics of brand and its purpose of buying is calculated using SPSS software and shown in the Table 2.

Table 2. Milk brand statistics result

Frequencies			
Statistics			
		Brands	Types
N	Valid	22	22
	Missing	1	1
Mean		4.18	3.14
Median		4.50	3.00
Mode		1	2[a]
Std. Deviation		2.500	1.390
Variance		6.251	1.933
Range		7	4
Minimum		1	1
Maximum		8	5
a. Multiple modes exist. The smallest value is shown			

Performing data analysis manually, first we must count all the responses from the respondents and then get the frequency distribution of each table questions. But with the help of SPSS software it is very easy to get frequency distribution of any variable. In SPSS first create the

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Vol. 7, Issue 1, 18-28, 2019
ISSN: 0975-1416 (Print), 2456-4281 (Online)

dataset in the form of data view and variable view based on the respondent response. Table 3 explains the frequency distribution of Milk brand and its types.

Table 3. Frequency distribution of milk brand and types

Frequency Table					
Brands					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Amul	6	26.1	27.3	27.3
	Mother Dairy	4	17.4	18.2	45.5
	MMilk	1	4.3	4.5	50.0
	Aanchal	3	13.0	13.6	63.6
	Go Milk	3	13.0	13.6	77.3
	Ananda	3	13.0	13.6	90.9
	Others	2	8.7	9.1	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

Types					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Toned	3	13.0	13.6	13.6
	Double toned	5	21.7	22.7	36.4
	Flavored	5	21.7	22.7	59.1
	Full Cream	4	17.4	18.2	77.3
	Skimmed	5	21.7	22.7	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

Here for the studying purpose of data analysis it is necessary to set one hypothesis and that hypothesis is explained below
D0: Brand of Milk and its Types (i.e. purpose of buying milk) are independent.
D1: Brand of Milk and its Types (i.e. purpose of buying milk) are dependent.

Test applied are:
- Chi square test
- Cross table of brand of milk and its types

3. Results

Chi-square test is performed, and the calculated value is 26.583 with degree of freedom is 24, are accepting the substitute hypothesis and rejecting the null hypothesis i.e. brand of milk and its types (i.e. purpose of buying milk) are dependent is true. Table 4 explains the cross tabulation between brands of milk and its types and Table 5 explains the chi-square test. Figure 4 explains the bar chart between Brands and Types.

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Table 4. Cross tabulation of brand of milk and its types

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Brands * Types	22	95.7%	1	4.3%	23	100.0%

Brands * Types Crosstabulation

Count

		Types					Total
		Toned	Double Toned	Flavored	Full Cream	Skimmed	
Brands	Amul	2	1	0	0	3	6
	Mother Dairy	0	2	2	0	0	4
	MMilk	0	0	1	0	0	1
	Aanchal	0	0	1	1	1	3
	Go Milk	0	2	0	1	0	3
	Ananda	1	0	1	1	0	3
	Others	0	0	0	1	1	2
Total		3	5	5	4	5	22

Table 5. Result of Chi-Square test

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.583[a]	24	.324
Likelihood Ratio	32.584	24	.113
Linear-by-Linear Association	.282	1	.596
N of Valid Cases	22		

a. 35 cells (100.0%) have expected count less than 5. The minimum expected count is .14.

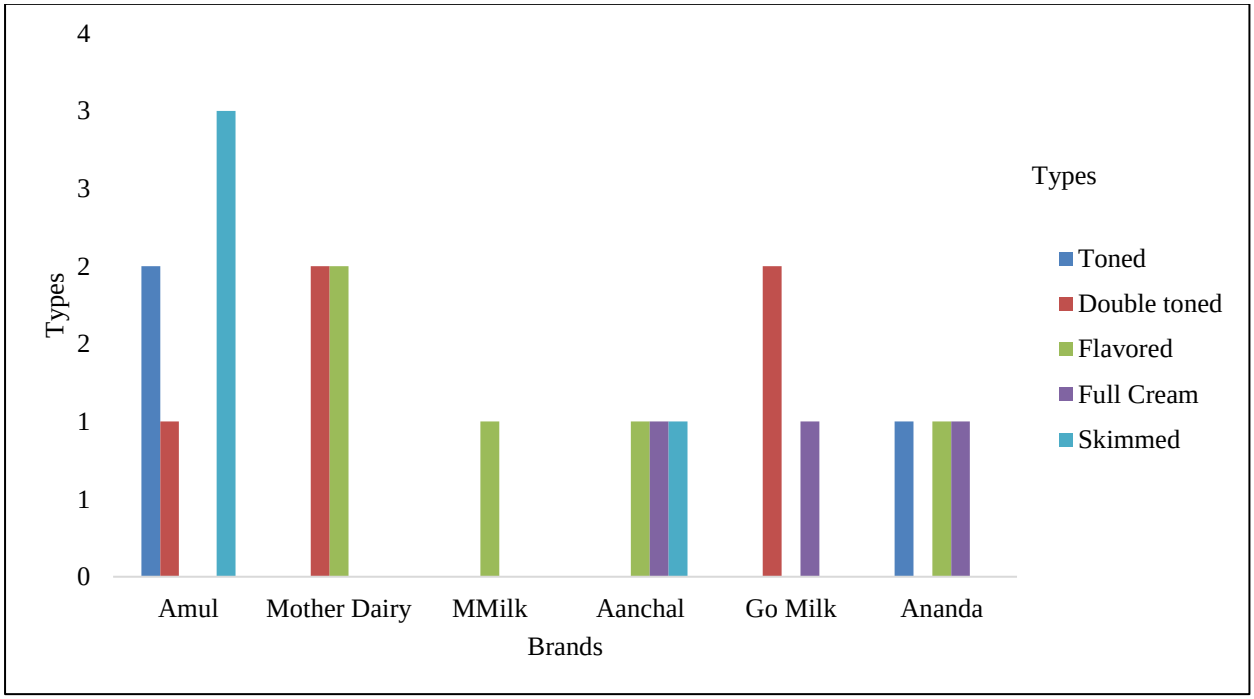

Figure 4. Brands versus types

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Vol. 7, Issue 1, 18-28, 2019
ISSN: 0975-1416 (Print), 2456-4281 (Online)

Now, setting another hypothesis 2
D0: Types and packaging of milk (i.e. purpose of buying milk) are independent.
D1: Types and packaging of milk (i.e. purpose of buying milk) are dependent.

Test applied are:
- Chi square test
- Cross table of types and packaging of milk

4. Result

Chi-square test is performed, and the calculated value is 14.972 with degree of freedom is 16, are accepting the null hypothesis and rejecting the alternative hypothesis i.e. types and packaging of milk (i.e. purpose of buying milk) are independent is true. Table 6 explains the cross tabulation between types and packaging of milk; Table 7 explains the chi-square test. Figure 5 explains the bar chart between types and packaging.

Table 6. Cross tabulation between types and packaging of milk

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Types * Packaging	22	95.7%	1	4.3%	23	100.0%

Types * Packaging Crosstabulation

Count

		Packaging					Total
		Rigid containers	Flexible packaging	Blow-molding	High density polyethylene	Sleeve packaging	
Types	Toned	0	1	2	0	0	3
	Double Toned	1	1	0	1	2	5
	Flavored	0	1	2	1	1	5
	Full Cream	1	2	0	1	0	4
	Skimmed	2	1	0	1	1	5
Total		4	6	4	4	4	22

Table 7. Result of Chi-Square test

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.972[a]	16	.527
Likelihood Ratio	18.041	16	.321
Linear-by-Linear Association	.560	1	.454
N of Valid Cases	22		

a. 25 cells (100.0%) have expected count less than 5. The minimum expected count is .55.

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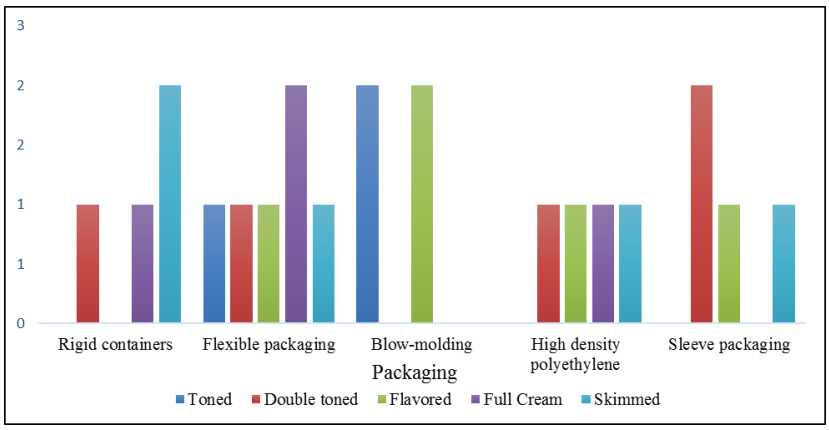

Figure 5. Types versus packaging

5. Method

To determine the relationship between the variables, a point biserial correlation was carried out. Correlation between sex and types was carried out to find out their significance. There was a negative correlation between sex and types of milk purchase, which was statistically significant (rpb = -0.21, n= 22, p= 0.343). Table 8, explains the correlations between sex and types of milk.

Table 8. Explains the correlations between sex and types of milk.

Correlations			
		Sex	Types
Sex	Pearson Correlation	1	-.212
	Sig. (2-tailed)		.343
	N	22	22
Types	Pearson Correlation	-.212	1
	Sig. (2-tailed)	.343	
	N	22	22

Correlations			
		Sex	Impactful Factors
Sex	Pearson Correlation	1	-.411
	Sig. (2-tailed)		.057
	N	22	22
Impactful Factors	Pearson Correlation	-.411	1
	Sig. (2-tailed)	.057	
	N	22	22

Correlations			
		Brands	Types
Brands	Pearson Correlation	1	.116
	Sig. (2-tailed)		.608
	N	22	22
Types	Pearson Correlation	.116	1
	Sig. (2-tailed)	.608	
	N	22	22

Correlations			
		Brands	Profession
Brands	Pearson Correlation	1	.[a]
	Sig. (2-tailed)		.
	N	22	22
Profession	Pearson Correlation	.[a]	.[a]
	Sig. (2-tailed)	.	
	N	22	22
a. Cannot be computed because at least one of the variables is constant.			

6. Conclusion

In cities and villages both among various parameters availability is important factor followed by consumer purchase milk for health which is then followed by Quality. Therefore, Amul should make available milk in rural area and should focus it as a healthy choice for family. Brand of milk and its types (i.e. purpose of buying milk) are dependent is true. Types and packaging of milk (i.e. purpose of buying milk) are independent is true (Dhanya et al., 2018). Buyers purchases packed branded milk according to their choice and purpose (Edwards et al., 2017). Sex and types are negatively corelated while brands and types are positively corelated. Buyers thinks that Amul brand is the best brand while MMilk is the worst brand in packed milk. In future aspects this research can be further carried out to create analytical model using neural networks like ANN and ANP to find out the milk buying behaviour of the buyers.

Acknowledgment

The authors acknowledge and express the gratitude for the support of the research facilities and funds provided by the Department of Mechanical, Graphic Era (Deemed to be) University, Dehradun, India.

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