" Factors Affecting the Buying Behaviour of Customers – A Case Study Of New Generation Bikes In Indian Market"

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Introduction

Motorcycle manufacturing companies today are facing new challenges to serve the ever-changing customer attitude towards the purchase of new generation bike. New bike buyers may be grouped or categorized on the basis of relative emphasis they place on economy, comfort, performance, convenience and luxury. This might result in creating different segmentation of the target markets. In the market there are various types of bikes available with different specifications to cater the needs of customers. Factor analysis allows us to look at these groups of customers that tend to be related to each other and estimate what underlying reasons might cause these variables to be more highly correlated with each other.

Objective : The objectives of the study are to :

i) make a correlation analysis of the responses of customers regarding various attribute ratings of a new generation bike.

ii) determine the underlying benefits consumers seek from a new generation bike by classifying them according to their relative importance they put in the attribute ratings by the method of Principal Component Analysis.

Methodology

The sample data consists of 75 respondents (those having a bike). The data has been collected from the respondents at different locations in the city of Dehradun, in the state of Uttaranchal. The respondents were asked to indicate their degree of agreeness with the following statements (V1 to V6) using seven point Likert scale (strongly disagree=1,strongly agree=7) .

- V1- A new generation bike should be fuel efficient and should have resale value,
- V2- A new generation bike should be comfortable to drive,
- V3- A new generation bike should be available with easy finance scheme,
- V4- A new generation bike should enhance the prestige of the owner,
- V5-Price is not an important consideration for having a new generation bike,
- V6-A new generation bike should be eco-friendly and should have better safety features..

The data collected (Appendix-I) were analyzed using SPSS-10.0 package under Window-XP environment to meet the desired objectives. A detail statistical analysis and discussion of the results are presented through Table-1 to Table-7

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Hypothesis

Here we set our null hypothesis that the population correlation matrix is an identity matrix or in other words the different variables (V1 to V6) are uncorrelated in the population.

Analysis and Discussion :

KMO and Bartlett's Test (Table-1)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.593
Bartlett's Test of Sphericity	Approx. Chi-Square	304.417
	Df	15
	Sig	.000

Table-1 above represents the values of approximate chi-square by Bartlett's test of Sphericity with 15 degree of freedom, which is found to be 304.417. Since this value is significant at the 0.05, so we reject the null hypothesis that the population correlation matrix is an identity matrix. This means that there exist correlations among the variables V1,V2,.....V6. The value of KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) is found to be 0.593 which is more than 0.5. So, factor analysis is an appropriate technique to analyze the data. The correlation matrix as below (Table-2) presents the extent of relationship among different variables.

Correlation Matrix (Table-2)

	V1	V2	V3	V4	V5	V6
V1	1.000	-.024	.879	-.088	-.871	-.058
V2	-.024	1.000	-.106	.479	-.098	.600
V3	.879	-.106	1.000	-.216	-.755	-.031
V4	-.088	.479	-.216	1.000	.010	.647
V5	-.871	-.098	-.755	.010	1.000	-.092
V6	-.058	.600	-.031	.647	-.092	1.000

Table-2 reveals that there exists high correlations among variable V1(A new generation bike should be fuel efficient and having resale value), V3(A new generation bike should be available with easy finance scheme) and V5(Price is not a important consideration for having a new generation bike) with the correlation coefficients $r_{v1,v3}$ =0.879, $r_{v1,v5}$ = -0.871 and $r_{v3,v5}$ = -0.755. It is to be noted that the negative coefficient of a negative variable leads to positive interpretation that price is an important factor. We would expect these variables to be correlated with the same set of factors. Like wise, there is relatively high degree of correlation among variables V2 (A new generation bike should be comfortable to drive), V4 (A new generation bike should enhance the prestige of the owner) and V6(A new generation bike should be eco-friendly and should have better safety features) with correlation coefficients $r_{v2,v4}$ =0.479, $r_{v2,v6}$ = 0.600 and $r_{v4,v6}$ = 0.647. Thus we expect these variables to be correlated with the same set of factors. A Principal Component Analysis method is employed to determine the necessary factor extraction.

Communalities (Table-3)

Variables	Initial	Extraction
V1	1.000	.942
V2	1.000	.663
V3	1.000	.879
V4	1.000	.708
V5	1.000	.876
V6	1.000	.791

(Extraction Method: Principal Component Analysis)

The *Table-3* (Communalities) represents the application of principal component analysis to the attribute ratings of new generation bike by different respondents. "Communality" is the amount of variance a variable shares with all other variables being considered. This is also the proportion of variance explained by the common factors. Under "communalities", "Initial" column it can be seen that communality for each variable V1 to V6 is 1.0 as

unities were inserted in the diagonals of the correlation matrix.

Total Variance Explained for Initial Eigen values (Table-4)

Factors	Initial Eigen values		
	Total	% of Variance	Cumulative %
1	2.705	45.081	45.081
2	2.155	35.909	80.990
3	0.520	8.673	89.664
4	0.355	5.920	95.584
5	0.201	3.347	98.931
6	6.414E-02	1.069	100.000

(Extraction Method: Principal Component Analysis)

Table-4 represents the table for initial Eigen values. An Eigen value represents the total variance explained by each factor. Principal component analysis is recommended as we are interested to determine the minimum number of factors that will account maximum variance in the data. From the above table Factor-1 account for variance of 2.705 which is (2.705/6)*100 i.e. 45.081 %. Similarly factor-2 accounts for variance of 2.155, which is (2.155/6)*100 i.e. 35.909% and so on. The next step is to determine the number of factor to be extracted through Eigen value approach. In this approach only factor with Eigen values greater that 1.0 are retained which is presented in Table –5.

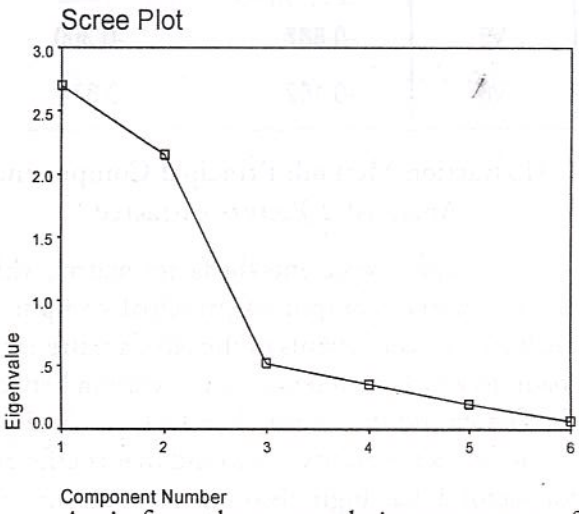
Total Variance Explained (Table-5)

Factors	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Varian cee %	Cumu lativ	Total	% of Varian cee %	Cumu lativ
1	2.705	45.081	45.081	2.680	44.669	44.669
2	2.155	35.909	80.990	2.179	36.321	80.990
3						
4						
5						

(Extraction Method: Principal Component Analysis)

From Table-5 we found that the Eigen values greater than 1.0 (default option) resulted two factors being extracted. This is also depicted through the Scree plot (a plot of the Eigen values against the number of factors in order of extraction) in figure-1 where a distinct break occurs at three factors.

Figure-1(Scree Plot)



Again from the accumulative percentage of variable accounted for, we found that the first two factors account for 80.990 percentage of the variance, and that the gain achieved in going to three factors is marginal. Thus two factors appear to be reasonable in this situation. The second column "Extraction" of table-3 gives the amount of variance explained by each variable (V1 to V6) after the desired numbers of factor have been extracted. The communalities for the variables under "Extration" are different from that under "Initial" because all the variances associated with variables are not explained unless all the factors are retained.

The total variances explained by the two factors retained are presented in Table-5. The "extraction sums of squared loading" give the variable associated with the factors that are retained. Thus factor-1 accounts for (2.705/6)*100 or 45.081% of the variance of the six variables.

Likewise the second factor accounts for (2.155/6)*100 or 35.909% of the variance

Factor Matrix (Table-6)

Variables	Factors	
	1	2
V1	0.957	0.161
V2	-0.156	0.799
V3	0.935	7.268E-02
V4	-0.279	0.794
V5	-0.887	-0.300
V6	-0.162	0.874

(Extraction Method: Principal Component Analysis) 2 Factors extracted.

Table-6 represents the factor matrix, which is an important output of principal component analysis. The coefficients in the table are the factor loadings which represents the correlation between the factors and the six variables (V1 to V6). From the above factor matrix it is found that coefficients for factor-1 has high absolute correlations with variable V1, V3 and V5 i.e. 0.957, 0.935 and 0.887 respectively. Similarly factor-2 has high absolute correlation with variable V2, V4 and V6 i.e. 0.799, 0.794 and 0.874 respectively.

Although the factor matrix indicates the relationship between the factors and individual variables, it seldom results in factors that can be interpreted, because the factor are correlated with many variables. For example in our study, factor-2 is at least somewhat correlated with four of the six variables with absolute value of factor loading greater than or equal to 0.3. In such a complex matrix it is difficult to interpret the factor. So we proceed to compute the rotated factor matrix .

By rotating the factor, we would like each factor to have non zero or significant loadings for only some variables. Likewise, we would like each variable to have non zero or significant loadings with only few factors. Rotation does not affect the communalities and the percentage of total variance explained. Table-7 represents the rotated factor matrix .

Rotated Factor Matrix (Table-7)

Variables	Factors	
	1	2
V1	0.970	-4.571E-02
V2	1.681E-02	0.814
V3	0.929	-0.127
V4	-0.104	0.835
V5	-0.930	-0.105
V6	2.706E-02	0.889

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.

Interpretation

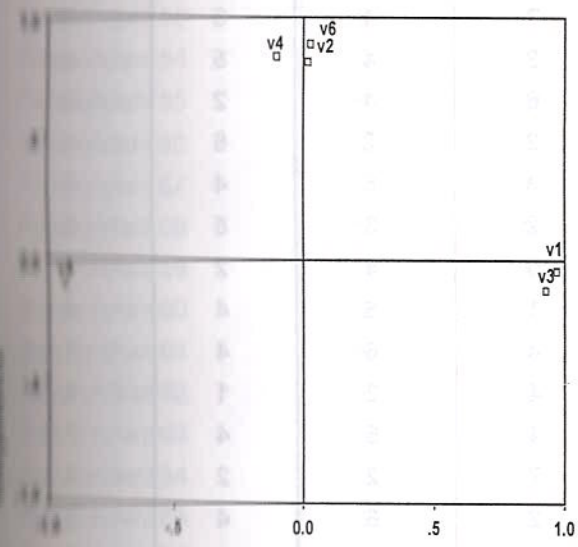
Interpretation is facilitated by identifying the variables that have large loadings in the same factor. The factor can then be interpreted in terms of the variables that load high on it. In the rotated factor matrix of Table-7, factor-1 has high coefficients for variable V1(Fuel Efficiency & resale value), V3(Easy Finance Scheme) and V5(Price Consideration). Therefore these factors may be labeled as one factor i.e. **Economic benefit factor**. It is to be noted that the negative coefficient of a negative variable leads to positive interpretation in case of variable V5 i.e Price is an important consideration for the purchase of a new generation bike for the economic class customers. Thus the Economic benefit factor affects customers of economic class who seek benefits of fuel efficiency and having more resale value, easy finance scheme and the Price consideration which they can afford.

Factor-2 is highly correlated with variable V2(comfortable and easy drive), V4(Enhancement

of prestige) and V6(Safety measures and Eco-friendliness). Thus these variables may be grouped into one factor and can be labeled as **Social benefit factor**. So we can say that the Social benefit factor affects customers of heigher income group. They intend to seek benefit from a new generation bike that can provide them more comfort, better safety features and which can enhance their prestige for being the owner of a costly bike.

Another useful aid in the interpretation is to plot the variables using the factor loadings as co-ordinates. Variables at the end of an axis are those that have high loadings on only that factor and hence describe the factor

Component Plot in Rotated Space



Component 1

A plot of the factor loading given in figure-1 shows V1, V3 lies at the extreme ends with V5 at the opposite end of factor-1. Similarly V2, V4 and V6 lie at the upper end of factor-2 which confirms our factor extraction.

Conclusion

From the above study it can be concluded that customers are purchasing new generation bike because of several considerations and these considerations can be attributed into two major factors which may be labeled as:

- Economic benefit factor and
- Social benefit factor.

The factor affecting customers who prefer to purchase a new generation bike by putting more emphasis on fuel efficiency, easy finance and whose price is within their affordable range may be labeled as Economic benefit factor. They are ready to compromise with luxury to some extent at the cost of economic benefit. On the other hand customers of second type are of aristocrat class who are least concerned with fuel efficiency and price of the bike. They seek benefits of luxury, safety and dignity from a new generation bike at any cost. Factor affecting customers of this class may be labeled as Social benefit factor.

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Appendix-I

	V1	V2	V3	V4	V5	V6
Respondent 1	6	5	5	6	2	5
Respondent 2	1	2	2	3	6	2
Respondent 3	6	3	6	4	2	4
Respondent 4	5	2	6	3	4	4
Respondent 5	6	4	7	4	1	4
Respondent 6	3	4	2	3	6	3
Respondent 7	1	4	2	6	6	6
Respondent 8	6	4	7	3	2	3
Respondent 9	2	3	1	4	5	4
Respondent 10	7	2	6	4	1	3
Respondent 11	4	6	4	5	3	6
Respondent 12	6	2	7	4	3	4
Respondent 13	1	3	2	4	5	4
Respondent 14	7	2	6	4	2	3
Respondent 15	1	3	2	2	6	4
Respondent 16	3	5	3	6	4	6
Respondent 17	1	3	2	3	5	3
Respondent 18	5	4	5	4	2	4
Respondent 19	2	2	1	5	4	4
Respondent 20	4	6	4	6	4	7
Respondent 21	6	5	4	2	1	4
Respondent 22	3	5	4	6	4	7
Respondent 23	4	4	7	2	2	5
Respondent 24	3	7	2	6	4	3
Respondent 25	4	6	3	7	2	7
Respondent 26	2	3	2	4	7	2
Respondent 27	7	4	7	3	3	4
Respondent 28	5	3	6	3	3	4
Respondent 29	7	3	7	4	1	4
Respondent 30	2	4	3	3	6	3
Respondent 31	1	4	2	6	6	6
Respondent 32	6	4	7	3	2	3
Respondent 33	2	3	1	4	5	4
Respondent 34	7	2	6	4	1	3
Respondent 35	4	6	4	5	3	6
Respondent 36	6	2	7	4	3	4
Respondent 37	1	3	2	4	5	4

Respondent 38	7	2	6	4	2	3
Respondent 39	1	3	2	2	6	4
Respondent 40	3	5	3	6	4	6
Respondent 41	1	3	2	3	5	3
Respondent 42	5	4	5	4	2	4
Respondent 43	2	2	1	5	4	4
Respondent 44	4	6	4	6	4	7
Respondent 45	6	5	4	2	1	4
Respondent 46	3	5	4	6	4	7
Respondent 47	4	4	7	2	2	5
Respondent 48	3	7	2	6	4	3
Respondent 49	4	6	3	7	2	7
Respondent 50	2	3	2	4	7	2
Respondent 51	7	4	7	3	3	4
Respondent 52	6	5	5	6	2	5
Respondent 53	1	2	2	3	6	2
Respondent 54	6	3	6	4	2	4
Respondent 55	5	2	6	3	4	4
Respondent 56	6	4	7	4	1	4
Respondent 57	3	4	2	3	6	3
Respondent 58	5	3	6	3	3	4
Respondent 59	7	3	7	4	1	4
Respondent 60	2	4	3	3	6	3
Respondent 61	1	4	2	6	6	6
Respondent 62	6	4	7	3	2	3
Respondent 63	2	3	1	4	5	4
Respondent 64	7	2	6	4	1	3
Respondent 65	4	6	4	5	3	6
Respondent 66	6	2	7	4	3	4
Respondent 67	1	3	2	4	5	4
Respondent 68	7	2	6	4	2	3
Respondent 69	1	3	2	2	6	4
Respondent 70	3	5	3	6	4	6
Respondent 71	1	3	2	3	5	3
Respondent 72	5	4	5	4	2	4
Respondent 73	2	2	1	5	4	4
Respondent 74	4	6	4	6	4	7
Respondent 75	6	5	4	2	1	4