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MARKETING-MIX MODIFICATION ANALYSIS BY USING MULTIDIMENSIONAL SCALING: THE CASE OF INDIAN TELECOM SERVICE PROVIDERS

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ABSTRACT
The application of multidimensional scaling is introduced in this research work for setting the right marketing mix strategies for telecom service providers based on 4 P's in the present competitive era. The proposed methodology adopts the multidimensional scaling and translated the response of customers into the influence and satisfaction level and placing them into BCG matrix to know the impact and to find out the appropriate strategies for each buying stimuli. Based on the findings of this research the strategic directions for each telecom service provider under the investigation are proposed by the authors. Indian telecom service providers are taken to provide a case example. The ultimate goal of this research is to help the telecom service providers in analyzing the buying stimuli for their products, services and accordingly the satisfaction level of customers based on the responses provided by them.

Key words: Multidimensional Scaling, Marketing-mix, BCG Matrix, Telecom service

INTRODUCTION

In product life cycle phases the maturity phase possesses most challenges. The sales slowdown creates overcapacity in the industry; this ultimately results in stepping up the competition. The competitors scramble to find niches. They engage in frequent markdowns. They increase the advertising and consumer and trade promotion. To develop the new products, improvements in the existing ones and for line extensions they also increase the research and development budgets. The deals are also made for supplying private brands. The scenario now is the survival for the fittest. The industry eventually consists of well-encroached competitors, gaining or maintaining the market share is the basic drive for them. This situation warrants the companies to react more quickly and effectively to changes in their customer's and market's needs (Cho et al., 2007), which is the basic requirement for sustainability in today's competitive marketplace. The main task of marketing management is in balancing the elements of marketing-mix so as to meet the demand situation in a more effective manner (Foxall, 1981). According to Kotler and Keller (2009), companies which are trying to expand their market share for their mature brands have to work on two factors which ultimately help in making-up the sales volume:

Volume = Number of Brand Users × Usage Rate per User

For expanding number of brand users the basic strategies are targeting and entering new market segment, converting non-users into users and attracting customers of competitors. Whereas for increasing the usage rate among users the most effective strategies that can be used are to redesigning the product to be used by consumers on more and more occasions and in new ways.

Status of Indian Telecom Sector

The Indian telecommunications sector was governed by the telegraph act of 1885. With the creation of Center for Department of Telematics (C-DOT) in 1984 for developing aboriginal technologies and manufacturing of customer premise equipment by private manufacturers was the initiation for reforming the Indian telecom sector. Videsh Sanchar Nigam Limited (VSNL) and Mahanagar Telephone Nigam Limited (MTNL) were set up soon after that in 1986. Setting up of an independent regulatory body in 1997, the Telecom Regulatory Authority of India (TRAI), for assuring the investors that the sector will be regulated in a fair and balanced manner was an essential aspect of the Indian telecom sector institutional reforms. A lot of powers have given to TRAI to ensure itself as a separate and independent authority from the government. TRAI Act of 2000 was introduced for changes in the regulatory system with the main aim of restoring functional clarity and improving regulatory quality. TRAI has the authority for framing regulations and levying fees and charges for telecom services as deemed appropriate. The number of Indian telecom subscribers has touched 300 million mark at the end of March 2008, out of of which 39.42 million were fixed/landline subscribers and the other major proportion consisting of 261.07 million were mobile subscribers (Cygnus Research, 2008). With 32.16% GSM market share, adding 6.82 million subscribers during the first financial quarter of the year 2008. Airtel remained the market leader in Indian telecom sector. Vodafone was the second runner up with 22.09% GSM market share, adding 4.27 million subscribers in the first financial quarter of the year 2008. The third place was achieved by BSNL with 18.79% market share. Idea was at the fourth place with 12.45% market share. Meanwhile, the wire-line segment is still led by public sector organizations. BSNL dominance in the fixed line remained intact with a market share of 82%, followed by MTNL at 9%. BSNL, with a share of 50.82% was the leading internet service provider

followed by MTNL at 17.12% in the first financial quarter of the year 2008 (Cygnus Research, 2008).

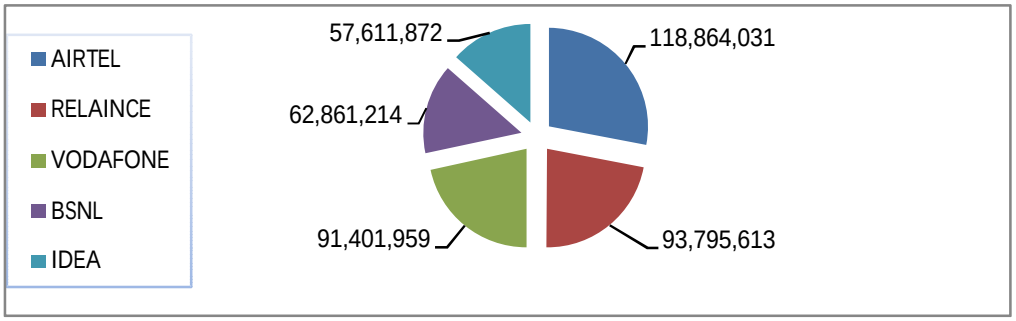

Fig. 1: Subscribers of different Indian telecom service providers under study
Source: Information note to the Press (Press Release No 73/2009) **TRAI**

LITERATURE REVIEW

Product life cycle like the other concepts in marketing also has its share of criticism. It is never easy to predict accurately the stage of the product. The marketers may presume that the product is still enjoying the maturity stage while it may have already started declining. Hence the experts believe that the product life cycle patterns are too variable in shape and duration to be generalized. It's also said that every product not necessarily passes through all phases of product life cycle. Henceforth, Product Life Cycle pattern is the result of the marketing strategies that the marketers implement during and after the introduction of product in marketplace rather than an inevitable course that sales must follow because it is a very tedious task for marketers to tell the exact stage of product (Kotler and Keller, 2009). Thus to device strategies based on this concept will give some vague results. But still Product Life Cycle patterns are considered to be basic, and the strategies are formulated on assumptions of the stage in which the product is in.

For example if the product is in maturity stage, according to Kotler and Keller (2009) the marketers may formulate their strategies based on the following: To diversify brands and item models, to set up competitive prices, to build more intensive distribution, to stress brand differences and benefits through advertising, and to increase sales promotion to encourage brand switching under the objective of maximizing profit while defending market share. Maturity stage of product life cycle is quite important from marketer's point of view because at this juncture marketers can stimulate their sales by emphasizing on the strong points and complementing the weak points (Hyman, 2004 and Kustin, 2004). Diversification of brands and setting up competitive prices are some of the strategies to implement at maturity stage of product life cycle as suggested by previous researchers (Doyle, 1976 and Weber & Dholakia, 1998). As there have been a plenty of work done in telecom sector specifically catering to service quality and measurement (Parasuraman et al., 1988; Lehtinen and Lehtinen, 1991; Rosen and Karwan, 1994; Johnson et al., 1995; Siu and Cheung, 2001; Leisen and Vance, 2001; Johnson and Sirikit, 2002; Alzola and Robaina, 2005; Wang and Lo, 2002; Ranaweera and Neely, 2003; Kim et al., 2004 and Seth et al., 2008). There are also a lot of customer satisfaction studies in other service sectors (Anderson and Sullivan, 1993; Cronin et al., 2000; Szymanski and Henard, 2001; Krepapa et al., 2003 and Ndubisi and Wah, 2005). Cha et al. (2009) have done the similar kind of work in context of mobile purchase category in South Korea. Still there is a little attention paid regarding to 4 P's specifically in Indian telecom sector. This research work particularly caters this issue and will bridge the gap that exists in current literature.

2.1 Multidimensional Scaling

The basic purpose of multidimensional scaling is to represent the object relationships by comparing the similarities or dissimilarities in pairs among a set of n objects. (Huang et al., 2006).According to Malhotra and Dash (2009) multidimensional Scaling is the class of procedures for representing perceptions and preferences of respondents spatially by means of a visual display. Perceived or psychological relationships among stimuli are represented as geometric relationships among points in a multidimensional space. These geometric relationships are known as spatial maps, the axis of same are assumed to denote the psychological bases respondent use to form perceptions and preferences for stimuli. Multidimensional scaling has been used in marketing to identify the number and nature of dimensions consumers use to perceive different brands in the market place, the positioning of current brands on these dimensions and the positioning of consumers ideal brand on these dimensions. Information provided by multidimensional Scaling has been used for variety of marketing applications, like Image measurement, market segmentation, and new product development etc.

METHODOLOGY

The proposed methodology in this paper starts from selecting appropriate variables that describe the marketing activities perceived by consumers view. The categorized variables on marketing activities are coined to be 'buying stimuli'. The proposed methodology comprises of three steps:

Step 1: The methodology predefines the marketing variables that influence on consumers buying behaviour and the variables are named as buying stimuli. The buying stimuli consist of marketing activities in the level of marketing-mix or more detailed one and these are decided according to the characteristics of the specific market and

product category. A questionnaire survey has performed and each question was related to the buying stimuli.

Step 2: The responses were evaluated by SPSS 16.0 software to translate the individual responses into perception of the customer.

Step 3: Analysis of the buying stimuli was done by using two by two BCG-matrixes and placing them into different categories. On the basis of analysis the future marketing modification mix strategies for the telecom companies are suggested.

Step 1: Defining buying stimuli

The buying stimuli are defined taking as the base of marketing 4P's concept and Kotler's marketing mix elements. Some stimuli could be included or excluded from it as per the goal and interest of the research. The buying stimuli are summarized in Table 1.The questionnaire survey was done to ask the consumers that how much they are influenced by each of the buying stimuli while choosing the telecom operator. The buying stimuli were translated into customers language. Since the survey concerns the products in the maturity stage and the potential consumers can be assumed to be the majorities, the questionnaire sheets were distributed to randomly selected majorities (not innovators, early adopters, or laggards).

TABLE 1: Buying stimuli definition:

Kotler's marketing mix	Buying stimuli
Product	Network Quality
	Call Quality
	Convenience
	Coverage
	Voice Quality
Price	Economic Value of Prices
	Competitive Prices
	Variety of Price Plan
	Price performance
Distribution	Multiple Channels of Customers interaction
	Easy availability at outlets
	Delivery Speed
Advertisement	Advertising Media
	Advertising Campaign
	Impact of Advertisements
Sales Promotion	Promotional offers
	Other value-added services
	Special offerings

Step 2: Evaluation of buying stimuli

In this step the authors have applied multidimensional preference analysis to the buying stimuli analysis by transforming the characteristics of data collected by the questionnaire survey. The buying stimuli plotted where the preference vectors are still denser can be interpreted that they are more influentially perceived by consumers. The buying stimuli obtain after spatial mapping can be translated into the form perceived by the consumers. The proximity between buying stimuli helped placing each buying stimuli on influence satisfaction matrix. The marketers should understand the more favourable buying stimuli and satisfy the current consumer in terms of the marketing strategies of the product.

Step 3: Analyzing buying stimuli

Based on the results of Multidimensional preference modelling buying stimuli as per the level of influence and satisfaction were analyzed. The influence satisfaction analysis adopts two by two BCG-matrix having X-axis of representing the level of influence of given buying stimulus within a product category and Y-axis of representing the level of current consumers satisfaction of given buying stimulus on a specific brand. The matrix places the (X, Y) position of each buying stimuli and prepares the portfolio analysis.

3.1 Strategy for Marketing –mix Modification Scenarios:

Each buying stimuli is placed into different quadrants of BCG matrix based on the customers influence level obtained. Each buying stimuli is placed among four cells of BCG matrix which have their own direction to go forward in next marketing activities. The four cells were defined as below (fig.2):

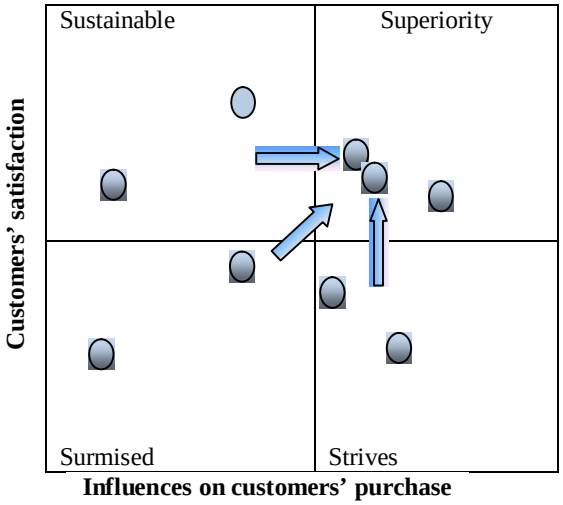

Fig. 2: Future directions of influence satisfaction analysis

1. The buying stimulus that comes under the cell Superiority are those that has high level of sway on customers buying deeds in the product category and higher satisfaction on the current marketing performance of the brand. Thus these stimuli will have greater sway in the customers decision to choose one service provider over the others. Thus the service providers need to have a continuous improved performance in these stimuli so as to have a distinct image in the minds of consumer.

2. The buying stimulus that comes under the cell Strives are those that have high level of sway on customers' buying deeds in the product category but lower satisfaction on the current marketing performance of the brand. Thus these stimuli though have potential of influencing the customer, yet they believe that these stimuli of the service providers are lagging. Thus these stimuli's performance needs to be improved to reach the Superiority cell.

3. The buying stimuli that come under the cell Sustainable are those that have low level of sway on customers buying deeds in the product category but higher satisfaction on the current marketing performance of the brand. These stimuli are less influential but highly satisfactory for the customer and need to break through to utilize the surplus capabilities of the product. If the company starts their marketing efforts in the direction of public awareness it can take the advantage of pushing the product features into the superiority segment.

4. The buying stimuli that come under the cell Surmised are those that have low level of sway on customers buying deeds in the product category as well as lower level of satisfaction on the current marketing performance of the brand. These are least powerful and are not successful from the customers point of view. Therefore the marketers should think about spending money to strengthen these least powerful stimuli. Henceforth the labor can also be proven to be meaningless investment without any returns.

ANALYSIS AND FINDINGS

The case study is concerned about the telecom service providers in Indian mobile phone market and of five different brands (Airtel, BSNL, Idea, Reliance and Vodafone). In this study there are total 5 parameters Product, Price, Distribution, Advertisement, and Sales Promotion on which we have evaluated the above mentioned brands of telecom companies. For Multidimensional Scaling analysis each of the respondents was asked to rate the dissimilarity between each of the brand by rating all these on a numerical scale. The distance matrix of all respondents was averaged and a single distance matrix was constructed. For the sake of simplicity, integers were used as a distance measure. In the symmetrical 5x5 distance matrix the column and rows both denote the brands. The data used was ordinal in nature and as per the requirement of multidimensional scaling method these data were fitting into the framework of requirement for that. The input data used was ordinal in nature in form of a 5x5 distance matrix. The respondents were asked to do a pair wise comparison on a scale of 1-5 between the brands. Where 1 denotes a less distance and more similarity and 5 denote more distance or less similarity between the brands. There were total five 5x5 distance matrix used as an input data for Product, Price, Advertisement, Distribution and Sales promotion respectively. The input data was analyzed through SPSS 16.0 by using multidimensional scaling method. During the analysis it was observed that the maximum number of dimensions in all the five cases could be two because we have only five brands to compare and in that case the number of dimensions can't be exceeded beyond two. The outputs and the interpretations are mentioned below for all the five mentioned categories on the basis of which we can position the brands.

Phase I: Defining Buying stimuli

The buying stimuli are largely adopted from buying stimuli definition (as shown in Table-1) and based on that the questionnaire is prepared. Each question in the questionnaire is translated into customer's language.

The questions were asked about their preference for one service provider over other for various attributes. They had to mention one name as per their perceptions for answering the question about each attribute. A detailed questionnaire was sent to 300 people of Madhya Pradesh region in India, out of which we got 147 filled questionnaires. The sampling method used was convenience sampling. The demographic profiles of the respondents are given in the table below. The rating data for buying stimuli was analyzed using SPSS 16.0 and a visual representation was aided by Microsoft excel.

TABLE 2: Demographical Characteristics of Respondents

Total Number of Respondents		147	
Gender	Male	103	70 %
	Female	44	30 %
Age	18-30 years	80	54 %
	31-45 years	43	29 %
	Above 45 years	24	17 %
Education Level	Undergraduate	67	46 %
	Graduate	41	28 %
	Postgraduate and above	39	26 %
Monthly Income	0-5K	87	59 %
	5K-10K	38	26 %
	Above 10K	22	15 %
Area	Urban	104	71 %
	Rural	43	29 %
Profession	Student	77	52 %
	Salaried	37	25 %
	Self-employed	33	23 %

Phase II: Evaluation of buying stimuli

While executing the data, the authors got a three dimensional graph showing the weightage of all buying stimuli, spatially arranged in three dimensional space. The figure shows all the dissimilarities among predefined buying stimuli. All the figures indicates the influence of buying stimuli more significantly by plotting points where the score of any attribute is compared to others. The

marketing mix is arranged in five different categories and each category is having different buying stimuli. Based on the responses obtained for the scores of each buying stimuli the total score for all the service providers were calculated. The maximum score represents the strong buying influence of that particular buying stimulus for the service provider. The three dimensional visual representation was prepared showing the spatial arrangement of the strength for all the buying stimuli for every service provider. The visual representation is shown (in fig. 3, 5, 7, 9 & 11).

Product

Table 3.1 (a) and 3.1 (b) contains the two-dimensional solution.
Table 3.2 (a) and 3.2 (b) contains the one-dimensional solution.
By comparing the stress value obtained in the two cases we can say that stress level of two-dimensional solutions is less than one-dimensional solution and thus showing the best fit. The one-dimensional solution is not a good one because the stress value clearly indicates the lack-of-fit; thereby it should be close to zero as possible. Based on the stress value of two-dimensional solution for interpretation in this case the dimensions are named first of all. The dimensions are usually the attribute offered by these brands through the judgment or knowledge of market through the survey of consumers or a combination of these two methods. This process of interpretation tends to be subjective regardless of the method used. Thus the dimensions in this case could be named as:

Dimension 1: Quality of service and
Dimension 2: Convenience for the customers.

After looking at the scores mentioned in table 3.1(b) it could be interpreted that no two brands are similar in nature and. Airtel is best among all in quality whereas Idea is best among all in terms of convenience for the customers. The fig.4 clearly shows the positioning of all the five brands on the basis of their scores and it depicts that if a competitor or the parent company itself wants to launch a product in future then where shall it position the product to achieve maximum share of the customer's mind.

Price

Table 3.3 (a) and 3.3 (b) contains the two-dimensional solution.
Table 3.4 (a) and 3.4 (b) contains the one-dimensional solution.

By comparing the stress value obtained in the two cases we can say that stress level of two-dimensional solutions is less than one-dimensional solution and thus showing the best fit. The one-dimensional solution is not a good one because the stress value clearly indicates the lack-of-fit, thereby it should be close to zero as possible. The dimensions could be named as:

Dimension 1: Economic pricing and
Dimension 2: Competitive pricing.

After looking at the scores mentioned in table 3.3 (b) it could be interpreted that Airtel and Reliance are similar in nature and they focus on the economic value of pricing more whereas BSNL is good in terms of both economic pricing and competitive pricing. The fig. 6 clearly shows the positioning of all the five brands on the basis of their scores. It also depicts that if a competitor or the parent company itself wants to do pricing in future then it could position its pricing to achieve maximum share of the customer's mind.

Distribution

Table 3.5 (a) and 3.5 (b) contains the two-dimensional solutions.
Table 3.6 (a) and 3.6 (b) contains the one-dimensional solution.

By comparing the stress value obtained in the two cases we can say that stress level of two-dimensional solution is less than one-dimensional solution and thus showing the best fit. The one-dimensional solution is not a good one because the stress value clearly indicates the lack-of-fit; thereby it should be close to zero as possible. The dimensions could be named as:

Dimension 1: Strong Distribution channel and
Dimension 2: High delivery speed.

After looking at the scores mentioned in table 3.5 (b) it could be interpreted that Reliance is the best in case of both strong distribution channel as well as high delivery speed whereas Vodafone is not good in either of two. The fig. 8 clearly shows the positioning of all the five brands on the basis of their scores and it depicts that if a competitor or the parent company itself wants to plan for a distribution strategy in future then where shall It position the distribution plans to achieve maximum share of the customer's mind.

Advertisement

Table 3.7 (a) and 3.7 (b) contains the two-dimensional solution.
Table 3.8 (a) and 3.8 (b) contains the one-dimensional solution.

By comparing the stress value obtained in the two cases we can say that stress level of two- dimensional solutions is less than one-dimensional solution and thus showing the best fit. The one- dimensional solution is not a good one because the stress value clearly indicates the lack-of-fit; thereby it should be close to zero as possible. The dimensions could be named as:

Dimension 1: Advertisement campaign and
Dimension 2: Advertisement impact.

After looking at the scores mentioned in table 3.7 (b) it could be interpreted that Airtel and Idea are similar in nature and they are best in case of both advertisement media as well as advertisement impact whereas BSNL is good in terms of advertisement impact but not as well as Airtel. The fig. 10 clearly shows the positioning of all the

five brands on the basis of their scores and it depicts that if a competitor or the parent company itself wants to plan an advertisement in future then where shall it position the advertisement to achieve maximum share of the customer's mind.

Sales Promotion

Table 3.9 (a) and 3.9 (b) contains the two-dimensional solution.

Table 3.10 (a) and 3.10 (b) contains the one-dimensional solution.

By comparing the stress value obtained in the two cases we can say that stress level of two- dimensional solution is less than one-dimensional solution and thus showing the best fit. The one- dimensional solution is not a good one because the stress value clearly indicates the lack-of-fit; thereby it should be close to zero as possible. The dimensions could be named as:

Dimension 1: Promotional offers and
Dimension 2: Other Value added services.

After looking at the scores mentioned in table 3.9 (b) it could be interpreted that Airtel is the best in case of both Promotional offers as well as other value added services. The fig. 12 clearly shows the positioning of all the five brands on the basis of their scores and it depicts that if a competitor or the parent company itself wants to launch a promotional plan in future then where shall it position the promotional plans to achieve maximum share of the customer's mind.

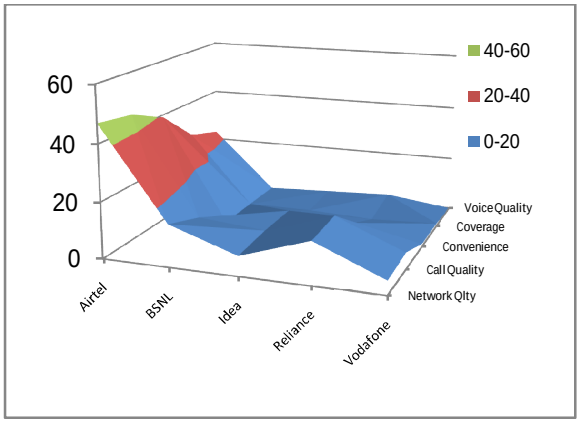

Fig. 3: Product

Output: Iteration history for the two-dimensional solutions (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.08472	
2.	.08100	.00372
3.	.07797	.00303
4.	.07527	.00270
5.	.07274	.00253
6.	.07029	.00245
7.	.06787	.00241
8.	.06548	.00239
9.	.06311	.00237
10.	.06077	.00234
11.	.05847	.00231
12.	.05620	.00227
13.	.05399	.00222
14.	.05183	.00216
15.	.04972	.00210
16.	.04769	.00203
17.	.04572	.00197
18.	.04383	.00190
19.	.04200	.00182
20.	.04025	.00175
21.	.03858	.00168
22.	.03697	.00160
23.	.03544	.00153
24.	.03398	.00146
25.	.03259	.00139
26.	.03126	.00133
27.	.03000	.00126
28.	.02880	.00120
29.	.02765	.00114
30.	.02657	.00108

Iterations were stopped because of the Number of iterations reached 30. For Matrix,

Table: 3.1(a)

Stress	.06806
RSQ	.97221

Configuration derived in 2 dimensions:

Table: 3.1(b)

Stimulus Number	Stimulus Name	1	2
1	Airtel	1.2328	-.8824
2	BSNL	.0697	1.1480
3	Idea	-.0016	1.2014
4	Reliance	.5303	-1.0691
5	Vodafone	-1.8312	-.3978

Iteration history for the one-dimensional solution (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1	.18093	
2	.16485	.01608
3	.16465	.00020

Iterations stopped because S-stress improvement is less than .001000. For matrix,

Table: 3.2(a)

Stress	.22933
RSQ	.83453

Configuration derived in 1 dimension:

Table: 3.2(b)

Stimulus Number	Stimulus Name	1
1	Airtel	1.4086
2	BSNL	.2368
3	Idea	-.1881
4	Reliance	.2363
5	Vodafone	-1.6937

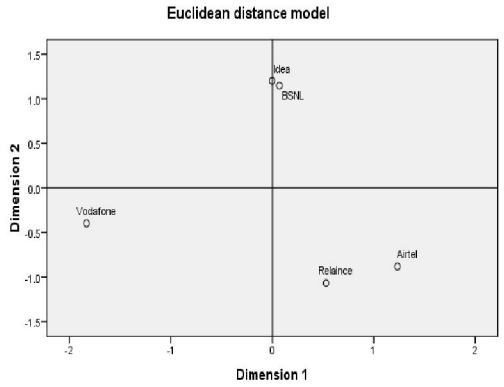

Fig. 4: Derived Stimulus Configuration

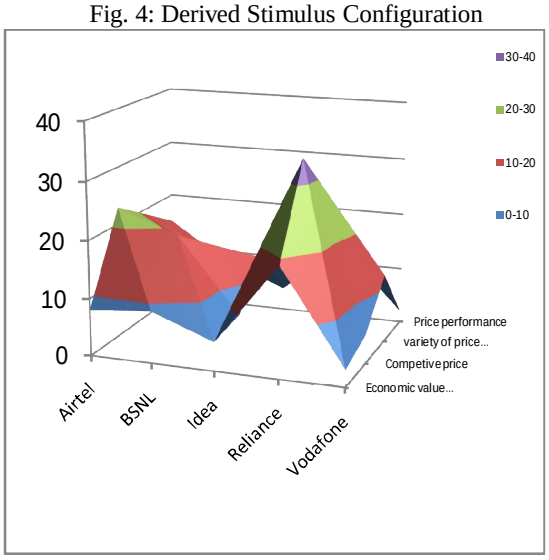

Fig. 5: Price

Output: Iteration history for the two-dimensional solutions (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.04056	
2.	.02421	.01635
3.	.01893	.00528
4.	.01641	.00252
5.	.01461	.00180
6.	.01315	.00146
7.	.01191	.00124
8.	.01085	.00106
9.	.00992	.00092

Iterations stopped because S-stress improvement is less than .001000. For matrix,

Table: 3.3(a)

Stress	.01409
RSQ	.99843

Configuration derived in 2 dimensions

Table: 3.3(b)

Stimulus Number	Stimulus Name	1	2
1	Airtel	1.5887	-.2664
2	BSNL	.4520	1.1060
3	Idea	-1.1106	.1962
4	Reliance	.8961	-.6440
5	Vodafone	-1.8261	-.3918

Iteration history for the one-dimensional solution (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.13675	
2.	.12207	.01468
3.	.10894	.01312
4.	.09817	.01077
5.	.08981	.00836
6.	.08358	.00623
7.	.07957	.00401
8.	.07754	.00203
9.	.07660	.00094

Iterations stopped because S-stress improvement is less than .001000. For matrix,

Table: 3.4(a)

Stress	.16403
RSQ	.89211

Configuration derived in 1 dimension:

Table: 3.4(b)

Stimulus Number	Stimulus Name	1
1	Airtel	1.3370
2	BSNL	.4006
3	Idea	-.6353
4	Reliance	.4589
5	Vodafone	-1.5613

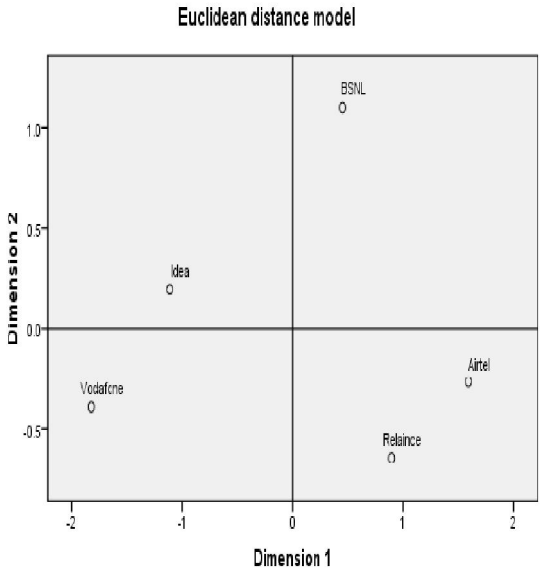

Fig. 6: Derived Stimulus Configuration

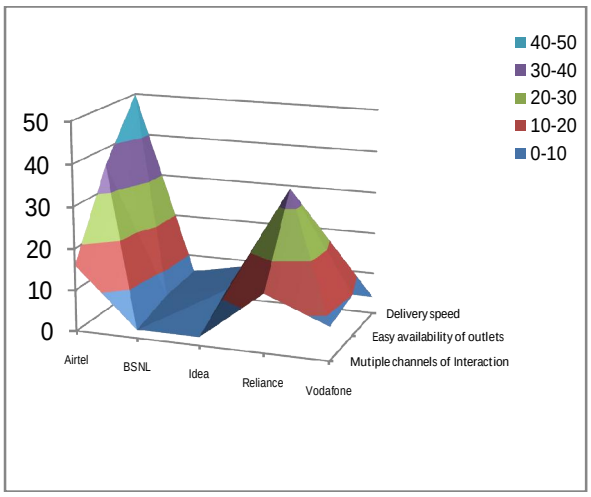

Fig. 7: Distribution

Output: Iteration history for the two-dimensional solutions (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.10949	
2.	.07952	.02997
3.	.05501	.02452
4.	.03724	.01776
5.	.02497	.01227
6.	.01667	.00830
7.	.01111	.00556
8.	.00740	.00371
9.	.00493	.00247

Iterations stopped because S-stress improvement is less than .005000. For matrix,

Table: 3.5(a)

Stress	.00246
RSQ	.99992

Configuration derived in 2 dimensions:

Table: 3.5(b)

Stimulus Number	Stimulus Name	1	2
1	Airtel	1.9427	-.2459
2	BSNL	-1.3083	.1699
3	Idea	-1.2814	.1570
4	Reliance	.8120	.9764
5	Vodafone	-.1651	-1.0575

Iteration history for the one-dimensional solution (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.20747	
2.	.19268	.01479
3.	.18409	.00858
4.	.17919	.00491
5.	.17595	.00323
6.	.17312	.00284
7.	.16987	.00325
8.	.16565	.00422
9.	.16002	.00563
10.	.15268	.00734
11.	.14350	.00918
12.	.13256	.01093
13.	.12018	.01238
14.	.10685	.01333
15.	.09315	.01370
16.	.07968	.01347
17.	.06696	.01273
18.	.05536	.01160
19.	.04510	.01025
20.	.03629	.00881
21.	.02889	.00740
22.	.02280	.00610
23.	.01785	.00494
24.	.01390	.00395
25.	.01077	.00313
26.	.00832	.00246
27.	.00640	.00191
28.	.00492	.00149

Iterations stopped because S-stress improvement is less than .005000. For matrix,

Table: 3.6(a)

Stress	.00250
RSQ	.99998

Configuration derived in 1 dimension:

Table: 3.6(b)

Stimulus Number	Stimulus Name	1
1	Airtel	-1.2325
2	BSNL	.8209
3	Idea	.8209
4	Reliance	-1.2169
5	Vodafone	.8076

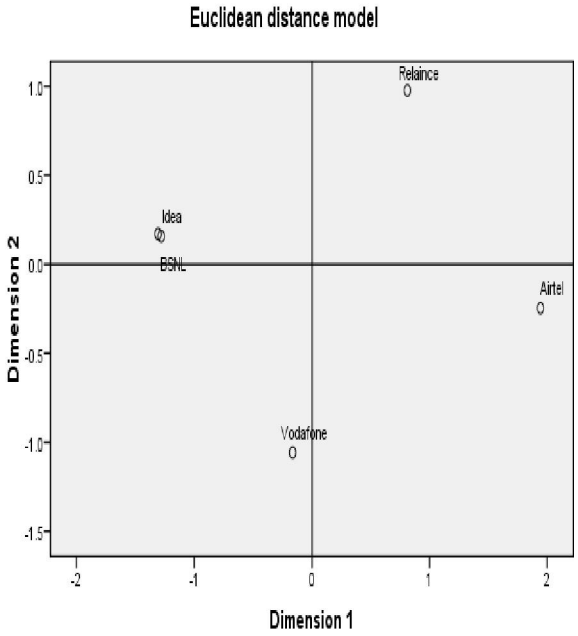

Fig. 8: Derived Stimulus Configuration

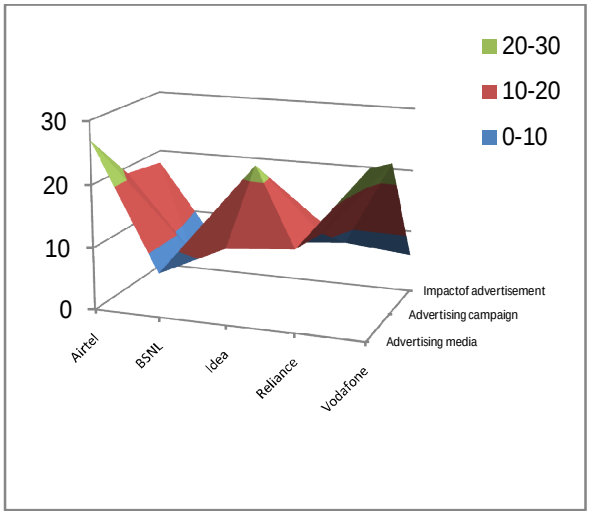

Fig. 9: Advertisement

Output: Iteration history for the two-dimensional solutions (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.02507	
2.	.01941	.00567
3.	.01576	.00365
4.	.01306	.00270
5.	.01092	.00214
6.	.00920	.00171
7.	.00782	.00139
8.	.00667	.00114
9.	.00573	.00095

Iterations stopped because S-stress improvement is less than .001000. For matrix,

Table: 3.7(a)

Stress	.00698
RSQ	.99965

Configuration derived in 2 dimensions:

Table: 3.7(b)

Stimulus Number	Stimulus Name	1	2
1	Airtel	.6805	.9967
2	BSNL	-2.2391	.2972
3	Idea	-.1899	-.3381
4	Reliance	.4022	-1.1338
5	Vodafone	1.3462	.1780

Iteration history for the one-dimensional solution (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.20170	
2.	.17462	.02708
3.	.16948	.00514
4.	.16865	.00083

Iterations stopped because S-stress improvement is less than .001000. For matrix,

Table: 3.8(a)

Stress	.23166
RSQ	.82027

Configuration derived in 1 dimension:

Table: 3.8(b)

Stimulus Number	Stimulus Name	1
1	Airtel	-.5828
2	BSNL	1.7720
3	Idea	.3537
4	Reliance	-.4513
5	Vodafone	-1.0916

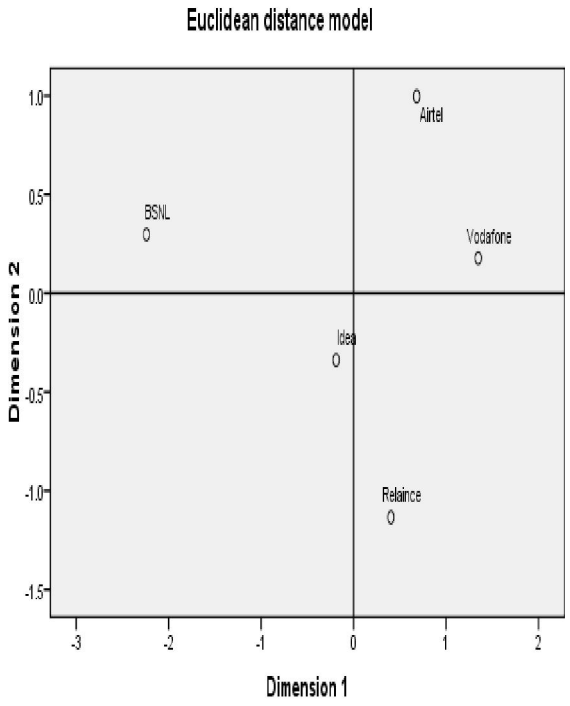

Fig. 10: Derived Stimulus Configuration

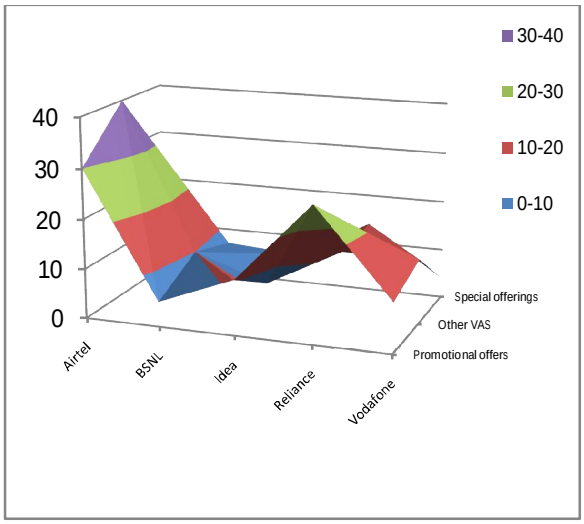

Fig. 11: Sales Promotion

Output: Iteration history for the two-dimensional solutions (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.00134	

Iterations stopped because S-stress improvement is less than .005000. For matrix,

Table: 3.9(a)

Stress	.00183
RSQ	.99999

Configuration derived in 2 dimensions:

Table: 3.9(b)

Stimulus Number	Stimulus Name	1	2
1	Airtel	1.6192	.5151
2	BSNL	-1.4282	.0000
3	Idea	-1.4282	.0000
4	Reliance	1.6192	-.5151
5	Vodafone	-.3821	.0000

Iteration history for the one-dimensional solution (in squared distances). Young's S-stress formula 1 is used.

Iteration	S-stress	Improvement
1.	.04586	
2.	.04254	.00332
3.	.03964	.00290
4.	.03711	.00253
5.	.03489	.00222
6.	.03293	.00196
7.	.03118	.00175
8.	.02962	.00156
9.	.02821	.00141
10.	.02693	.00128
11.	.02577	.00116
12.	.02471	.00106
13.	.02373	.00098

4.1 Strategic Marketing-mix Decisions:

Iterations stopped because S-stress improvement is less than .001000.

Table: 3.10(a)

Stress	.09309
RSQ	.97398

Configuration derived in 1 dimension:

Table: 3.10(b)

Stimulus Number	Stimulus Name	1
1	Airtel	-1.1991
2	BSNL	.9820
3	Idea	.9820
4	Reliance	-1.2013
5	Vodafone	.4363

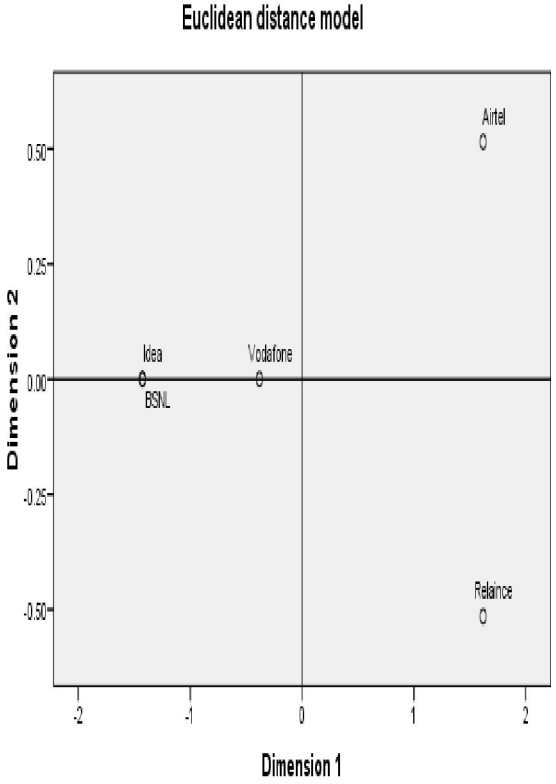

Fig. 12: Derived Stimulus Configuration

Phase III: Analysis of buying stimuli

The final phase produces a two by two matrix with different buying stimuli positioned into different quadrants for all the five different service providers. The matrix will describe the influence on customer's purchase on X axis and their satisfaction of Y axis. Based on the positions of buying stimuli the marketing mix strategies for all the companies could be suggested.

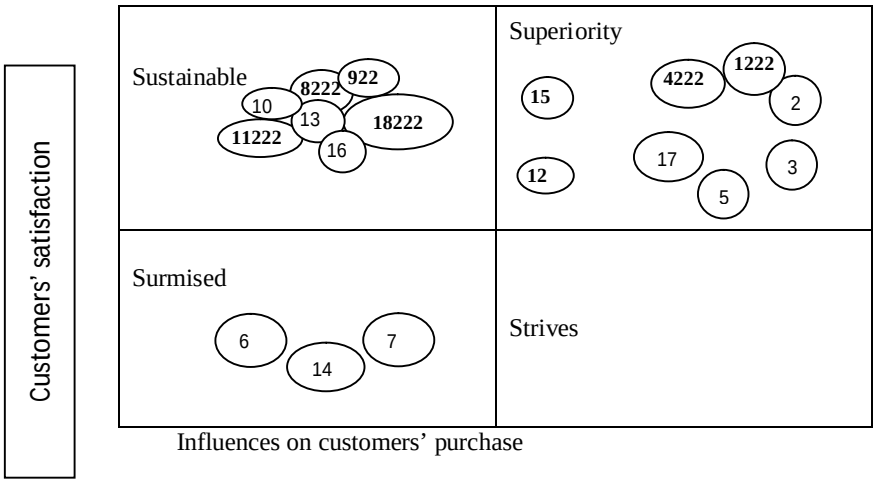

Fig.13: Current Status of Buying Stimuli for Airtel

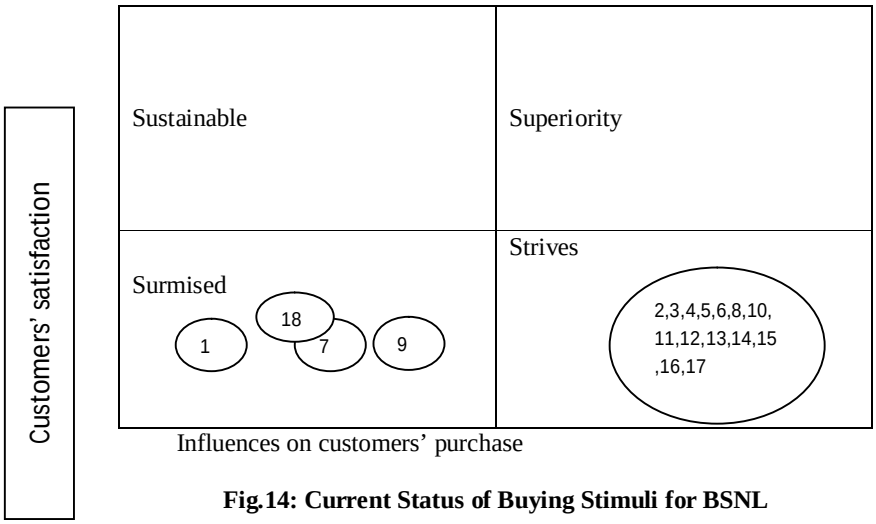

Fig.14: Current Status of Buying Stimuli for BSNL

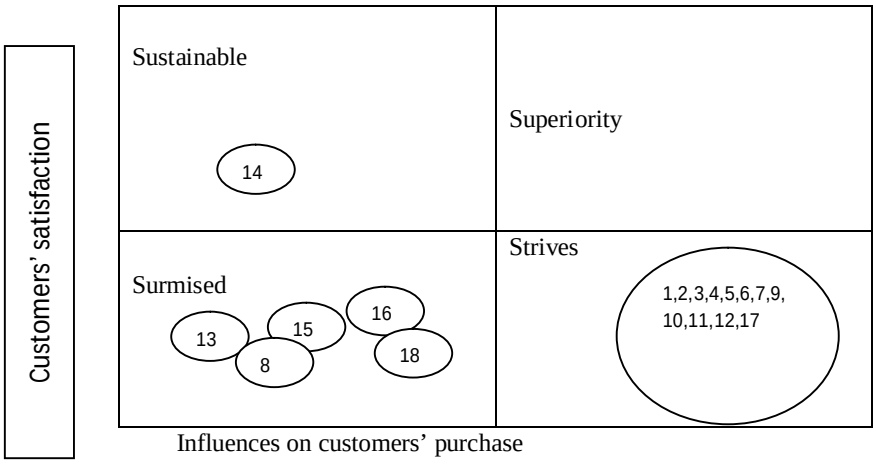

Fig.15: Current Status of Buying Stimuli for Idea

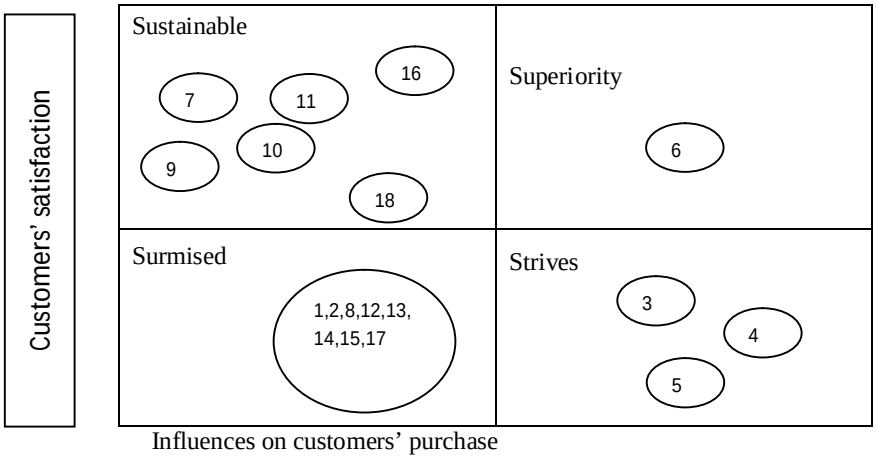

Fig.16: Current Status of Buying Stimuli for Reliance

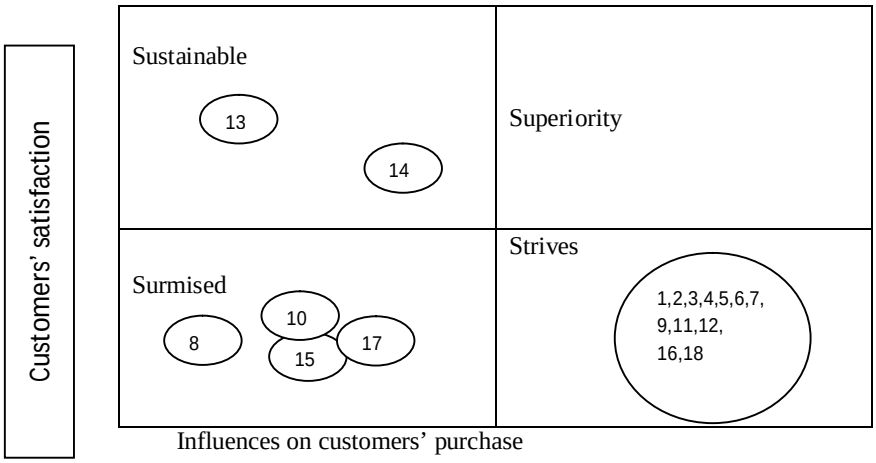

Fig.17: Current Status of Buying Stimuli for Vodafone

DISCUSSION AND STRATEGIC SUGGESTIONS

The buying stimulus that comes under the category Superiority are those that have high level of sway on customers' buying deeds in the product category and higher satisfaction on the current marketing performance of the brand. After analyzing the figures we can observe that Airtel has maximum number of buying stimuli in this cell, of marketing mix category of Product and Advertising. Reliance is superior in terms of economic value of prices. Therefore these stimuli will have greater influence in the consumers decision making to choose one of the service providers over the others in these features. The service provider is suggested to maintain the same features of all these buying stimuli which are positioned in the superiority cell. The buying stimuli that come under the cell Sustainable are those that have low level of sway on customers' buying decisions in the product category but higher satisfaction on the current marketing performance of the brand. From the figures we can conclude that the buying stimuli of Variety of price plan, Price performance, Multiple Channels of Customers interaction, Advertising media, Promotional Offers and Special Offering for Airtel are in this category and Advertisement Campaign for Idea, and Competitive Price, Price performance, Multiple Channels of Customers interaction, Easy availability at outlets, Promotional offers, Special offerings for Reliance, and Advertising Media, Advertising Campaign for Vodafone are placed in this category. These stimuli are less influential but highly satisfactory for the customer these need to break through to utilize the surplus capabilities of the product. If the companies start their marketing efforts in the direction of public awareness it can take the advantage of pushing the product feature into the superiority segment.

The buying stimuli that come under the cell Surmised are those that have low level of sway on customers' buying deeds in the product category as well as lower level of satisfaction on the current marketing performance of the brand. From the figures we can conclude that the buying stimuli of Airtel lying in this category are Economic Value of Prices, Competitive Prices, and Advertising Campaign. Similarly for BSNL we have following stimuli Network Quality, Competitive Prices, Price performance, Special offerings in this category. For Idea we have Variety of Price Plan, Advertising Media, Impact of Advertisements, Promotional offers, Special offerings.

For Reliance, Network Quality, Call Quality, Variety of Price Plan, Delivery Speed, Advertising Media, Advertising Campaign, Impact of Advertisements, and Other value-added services. Lastly for Vodafone, stimuli lying in this category are Variety of Price Plan, Multiple Channels of Customers interaction, Impact of Advertisements, Other value-added services. These are least powerful and are not successful in the consumers' view. Therefore the markets should think about spending money to strengthen these least powerful stimuli. Henceforth the labour can also be proven to be meaningless investment without any returns. The buying stimuli that comes under the cell Strives are those that have high level of sway on customers buying deeds in the product category but lower satisfaction on the current marketing performance of the brand. From the figures we can observe that none of the buying stimuli of Airtel are in this category. For BSNL 14 of the stimuli are under this category, some of them are- call quality, coverage, voice quality, easy availability of outlets, advertisement and Promotional offers etc. For Idea the count is at 12, primarily stimuli lying in this category are delivery speed, network and call quality, price performance and delivery speed etc. For Reliance, Convenience, Coverage, and Voice Quality and lastly for Vodafone, Network Quality, call quality, coverage, voice quality, delivery speed, promotional offers, and Special Offerings. Thus, these stimuli though have potential of influencing the customer, yet they believe that these stimuli of the service providers are lagging. Thus these stimuli's performance needs to be improved so that they reach the Superiority cell.

CONCLUSION

This paper emphasizes the application of multidimensional analysis to find out the marketing mix modification for telecom operators having their products at maturity stage of product life cycle. The analysis helps to understand the customer satisfaction level associated with each buying stimuli. The buying stimuli analysis in this study uses the customers preference ratings and evaluations to understand the perceptual positions of each marketing variables in n-dimension representation. Using the result of influence satisfaction analysis the marketers can easily understand the impact of each buying stimuli on the level of satisfaction of consumer. The marketers can decide the right strategies for enhancing the effect of each buying stimuli on customers' purchase which will ultimately help in increasing the market share and image of the telecom service provider. This study is an initial step suggesting the marketing mix modification strategies for products in their maturity stage.

LIMITATIONS AND FUTURE SCOPE

It is necessary to recognize the limitations of the current study. The sample size itself was relatively small. To accurately evaluate Customers perceptions about telecom service providers, a larger sample size is desirable. Another is the limitations of the statistical methods used. Future research needs to focus on a larger cross section of telecom service users and employ more diversified random samples to verify the findings of the current study.

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