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Do Innovations Influence Brand Signaling?

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Abstract

Information asymmetry in the market requires firms to signal value to less informed consumers. This study examines, how signaling of various factors such as innovation, price, brand name and promotions influence the consumer preferences in the context of uncertainty created by local brands competing with superior brands. Drawing upon the signaling theory, we have used eight hypothetical simulations, to test market shares in different scenarios using conjoint experiments. The study conducted on products such as biscuits, television, tea and tooth paste using preference rankings of combinations from 300 consumers shows that the most important factors that signal value of a product are brand name and innovation at firm action level. Simulations on the data confirm the theory of adverse selection during imitation scenarios by local brands and a comfortable separating equilibrium in the consumer markets during realistic scenarios, when inferior brand choose low signaling activities.

Keywords: Information asymmetry, Signaling, brand value, Conjoint, Adverse selection

Introduction To The Signaling Perspective of Brand Value

Modern markets are no more, perfectly competitive in nature. It is often, a variation of monopolistic competition. The imperfections in the markets are identified with the informational deficiencies as per the economics of information. Ever since the publication of Akerlof 's [1]seminal work on the second hand car market and his conclusion on the market failure due to 'adverse selection' many economists have provided solutions to fix this problem. Adverse selection occurs when good quality products remains unsold despite gains from trade. One solution was the 'Signaling' of quality by the informed seller to the uninformed buyer. The seller offers a brand value to prospective consumer conditional on the signals. The buyer selects and interprets

signals so as to maximize the difference between the offered utilities and signaling costs. To enable a signal to differentiate one product from another buyer assumes that the signaling costs are negatively correlated with utility. Consider for example, [2] two distinct groups such as branded and unbranded goods. Group 1 is a proportion of q (good quality) among brands. Group II is a proportion of 1- q (Inferior quality). The marginal utility of the group I and II are 1 and 2 respectively. A combination of (Trade off) Innovation, Brand, Price and Promotion are signals which are measured by an index y of level. The cost of signal level is y for group I and y/2 for group II . The buyer is risk neutral. His conditional beliefs are that for $y<y^*$, utility is 1 and for $y>y^*$ the utility is 2. Hence the Brand Value (B*) offered is a step function. Each group selects y to maximize the difference between the Brand value offered and cost of signals. In this example group I selects y=0 and group II $y=y^*$. As the buyers beliefs are confirmed this is called a signaling with separating equilibrium. The equilibrium y^* is between 1 and 2.

Statement of Problem

In Kerala, despite the penetration of large number of global and national brands in almost all categories of consumer goods, unbranded local goods are also observed competing with the superior brands. This is more so, in personal care, food and beverages while to a lesser extent in consumer durables. Moreover, Kerala is a consumerist state exposed to the Research and Development (R&D) expenditures and innovation drives taking place in India after liberalization. Number of brands and variants is also seen as a proxy measure of diffusion of innovations among consumers. However, Innovations create information asymmetry and uncertainty in the market. Therefore, it requires a detailed assessment from a consumer's perception. The research, questions that this study seeks to analyze are.

a) If signaling mechanisms exist in consumer markets, do people in Kerala use them?
b) Do adverse selections occur in case of a hypothetical strong local brand with close imitations competes with superior brands?
c) What are the factors that consumer perceive as the most important signaling factors about a brand? Does innovation as a signal, contributes significantly to consumer's preference?

Review of Literature

Moorthy [3]classifies the managerial approaches to brand equity into, a) cost based b) price based) and consumer based. Consumer based brand equity is measured by loyalty, brand image, identity, awareness, associations and perceived quality. Managerial approaches are thus quite different from the perspective of information economics, in its implications and strategic importance. In a path breaking study, Spence[4] pointed out the role of education as a signaling to the prospective employers. This study has inspired many researchers to examine the value generating process of a product with the perspective of signaling. Nowlis[5] in an interesting study pointed out the multi-attribute diminishing sensitivity and performance

uncertainty . Nowlis also, shows that the added new features have significant impact on the sales and choice of brands. Henard [6]also pointed out the positive impact of reputation for Innovation(RPI) of a firm on the consumer choice. Consumer involvement levels mediate between the RPI signal and lead to higher loyalty towards the high RPI valued firm. Kunz [7],recognized the fact that consumer perspective of innovation is necessary to understand the failures of most of the innovations. Perceived firm innovativeness (PFI) is therefore a subjective factor, based on consumer information, knowledge and experience. According to Nelson [8], firm's advertising expenditure increase as sales increases and it conveys valuable information for search(Search goods are goods for which judgments regarding product attributes, quality may be made by consumer prior to the purchase). It is competing mainly on price, substitutability etc. and experience[9] (Experience goods are those goods for which such judgments can be made only after purchase goods) The price per utility of highly advertised brand is high and hence it is a valuable cost that is incurred by firms. By examining search goods, experience goods and credence [10]The price per utility of highly advertised brand is high and hence it is a valuable cost that is incurred by firms. By examining search goods, experience goods and credence (goods are those goods for which quality judgments are not even possible after purchase.) Mixon also, found that advertising provides valuable information. In a further study to their 1998 model of brand equity as signaling phenomenon, Eredem, has improved it further including relative price (RP). They considered relative price positioning as a function of credibility. The assumption was highly credible brands can charge premium price in the market. However, the study found that the RP is positive to credibility and it is negative to consideration and purchase (C &P)[11]. Consumers faced with information asymmetry and moral hazard will face an apprehensive and doubtful consumer. Consumers never know the quality before purchase and hence he will give only low price expecting low quality. According to Klein[12], the only solution to the problem is premium pricing(Super price minus Competitive price). According to Rao, Uninformed buyers would then allow charging price premium while informed buyers do not allow this to happen buyers tend to pay premium price for experience products due to quality consciousness while for search products paying a price premium decreases with increase in quality consciousness[13].

Objective, Methodology and Hypothesis

The main objectives of the study are

1. To explore whether consumers use signaling mechanisms which separates relatively good brands from bad ones?
2. Do imitations lead to adverse selection?
3. To identify the relative importance of the factors such as Innovation, Brand name, Price and Sales Promotions by consumers.

Hypothesis

H0 = Signaling of key attributes lead to separation of markets for regulars and super products.

H1 = Signaling of key attributes do not lead to separation of markets for regulars and super products

H0 = Imitation by using the key signaling attributes lead to adverse selection in consumer markets.

H1 = Imitation by using the key signaling attributes do not lead to adverse selection in consumer markets

Methodology

The study was carried out for four brands in four categories with an unbranded or local brand in each. The selected product categories were, Tea which represents food and beverage items and is a subset of fast moving consumer good category (FMCG), Tooth paste Personal care is also from the subset of FMCG, Television is the subset of Consumer durables (CD) and Biscuits again is from the subset of food and Beverage - FMCG. More over these products have some characteristics that are important from the perspective of Economics of information. Tea and Biscuits belong to Experience goods category, Television belongs to search goods category, Tooth paste belongs to credence goods category. Moreover, these are the most frequently used products in Kerala. Respondents of this study consist of Students belonging to Mahatma Gandhi University within the four districts in Kerala selected through a multi stage random sampling. It therefore covers Ernakulam, Kottayam, Pathanamthitta and Idukki districts in Kerala state. The decision was taken to restrict the study among students is for the ease of using probability sampling procedures and access to sampling frame. Moreover, students are more aware of new brands and exposed to advertising in this cluttered market. The decision was taken to restrict the study among students is for the ease of using probability sampling procedures and access to sampling frame. The sampling criteria are shown in the Table 1.

Table 1: Sample Criteria

Criteria	Selections
Category	Tea & Biscuits (Experience goods), Television (Search goods), Tooth paste (Credence goods)
Geographical Criteria	Ernakulam, Idukki, Kottayam, Pathanamthitta, Cochin
Education	Post graduate and Graduate
Sample size	300 Each
Age	18- 23 Years

Conjoint analysis is generally used to determine the utilities to calculate the final market share through simulations. Basic conjoint model can be stated as follows. Utility is the fundamental concept in conjoint analysis. Utility is a subjective judgment of preference unique to each individual. This utility represents the total worth of a product can be regarded as sum of part worth utility. The general form of

conjoint model can be shown as (Total worth of product)*ij* ..... *nij*=Part-worth of level *i* for factor 1 + Part-worth of level *j* for factor 2 +... part-worth of level *n* for factor *m*. Where the product or service has m attributes each having n levels. The product consists of level *i* of factor 2, level *j* of factor 2 and so forth, upto level *n* for factor *m*. Conjoint analysis is used to determine the utilities to calculate the final market share through simulations. As we turn now to the conjoint analysis, the first step is to design combinations of attributes and its corresponding levels. This study used orthogonal design to create the best combinations for ranking of preferences from 1 to 19 including 4 holdout samples. The table 2 shows the factors used to create the orthogonal design and creation of combination cards for the survey.

Table 2: Factors For Conjoint Analysis and Values

Attribute	Tea (Experience	Television (Search goods)	Biscuits (Experience	Toothpaste (Credence
Brand(level -	Tata Tea	LG	Priya	Colgate
(Level-2)	AVT	Philips	Parle	Dabur
(Level -3)	Brooke Bond	Samsung	Britannia	Amar
(Level -4)	Local /Loose	Assembled/Loc	Local	Local
Innovations	High /Frequent	High /Frequent	High	High
(Level 2)	Low/Infrequen	Low/Infrequent	Low/Infreque	Low/Infreque
Promotions	High	High	High	High
(Level 2)	Low/Infrequen	Low/Infrequent	Low/Infreque	Low/Infreque
Price	Premium price	Premium price	Premium price	Premium price
(Level 2)	Low pricing	Low pricing	Low pricing	Low pricing

Factors such as brand name, innovations, investments for advertisement and promotions, and pricing of each brand were considered for the analysis as these were found to be critical from the action point of view of the firm. A local hypothetical brand was chosen to analyze the effect of signaling and adverse selection. Levels for price was premium pricing and low pricing, for promotions and innovations 2 levels are used such as high and low. Brands selected for each category is given in the Table 2. A sample of combination cards generated using orthogonal design is given below in the Table 3 for tooth paste. Similarly, combinations were generated for all other categories under this study using orthogonal design.

Table 3: Sample Combination card generated using orthogonal design for Tooth paste

Card ID	Brand Name - Tooth Pastes	Ads, Promotions, Services Investments	Usage of feature/materials New to market	Price Levels	Pref Rank
1	Dabur	High	High and frequent	High premium pricing	
2	Amar	High	Low and Infrequent	Low pricing	
3	Local	High	High and frequent	High premium pricing	
4	Dabur	Low	Low and Infrequent	Low pricing	
5	Local	High	Low and Infrequent	High premium pricing	
6	Colgate	Low	High and frequent	High premium pricing	
7	Dabur	Low	High and frequent	Low pricing	
8	Local	Low	Low and Infrequent	Low pricing	
9	Dabur	High	Low and Infrequent	High premium pricing	
10	Amar	Low	High and frequent	High premium pricing	
11	Colgate	High	Low and Infrequent	Low pricing	
12	Local	Low	High and frequent	Low pricing	
13	Colgate	Low	Low and Infrequent	High premium pricing	
14	Amar	Low	Low and Infrequent	High premium pricing	
15	Amar	High	High and frequent	Low pricing	
16	Colgate	High	High and frequent	Low pricing	
17	Dabur	Low	High and frequent	High premium pricing	
18	Dabur	High	High and frequent	Low pricing	
19	Colgate	High	Low and Infrequent	High premium pricing	

Data Analysis

Table 4 presents two statistics computed from the output i.e., Pearson's R and Kendall's tau. Both provide correlations between observed and estimated preferences. The table also provides Kendall's tau for holdout cases. Hold out cases is used to validate the results and in this case it is positive in the range of .57- .59 with significance $p < .05$ level. Since this is done for just 4 samples we expect that this improves with more samples. Most important is the Pearson's R which is above .70 which is an indication of good fit and Kendall's tau (above .60) is also showing better correlation. Hence it can be concluded that the model is good for further analysis

Table 4: Correlation Coefficients

Correlations	Tooth paste	Biscuits	Television	Tea
Pearson' R *	0.876	0.723	0.744	0.703
Kendall's Tau*	0.667	0.68	0.69	0.65
Kendall's tau Hold out cases*	0.59	0.57	0.583	0.58

*p<.05

Table 5 and Table 6, provides the results of conjoint output with part-worth utilities. In all type of goods local brands have more utility compared to branded goods. However, utilities were found to be high for high brand investments, premium pricing and frequent innovations. In case of tea consumers prefer to have low pricing instead of premium pricing in contrast to other categories.

Table 5: Estimated Part-Worth's Television and Tea.

Television- Search goods Category (Food and Beverages)					
	Levels	Utility Estimate	Std. Error	Rescaling (with Min Part worth)	Rescaling the part worth estimates
Brand	LG -Television	-0.44	1.27	0.70	41
	Samsung	-0.72	1.27	0.42	25
	Philips -Television	-1.14	1.27	0.00	0
	Local/ Assembled	2.31	1.27	3.45	201
Brand Investments	High	-0.93	1.46	0.93	54
	Low	-1.86	2.92	0.00	0
Innovations	High and frequent	-2.15	1.46	2.15	126
	Low and	-4.31	2.92	0.00	0
Price	High-Premium	-0.89	1.46	0.89	52
	Low Pricing	-1.79	2.92	0.02	1
(Constant)		14.46	3.87		
Tea- Experience goods Category(Food and Beverages)					
Brand	Tata Tea	-0.89	1.38	0.00	0
	AVT	-0.82	1.38	0.06	5
	Brook Bond Lipton	-0.18	1.38	0.71	55
	Loose / Local Tea	1.88	1.38	2.77	213
Brand Investments	High	-1.61	1.59	1.61	124
	Low	-3.22	3.18	0.00	0
Innovations	High Frequent	-2.32	1.59	2.32	179
	Low Infrequent	-4.64	3.18	0.00	0
Price	Premium Pricing	0.01	1.59	0.00	0
	Low pricing	0.01	3.18	0.02	1
(Constant)		14.39	4.21		

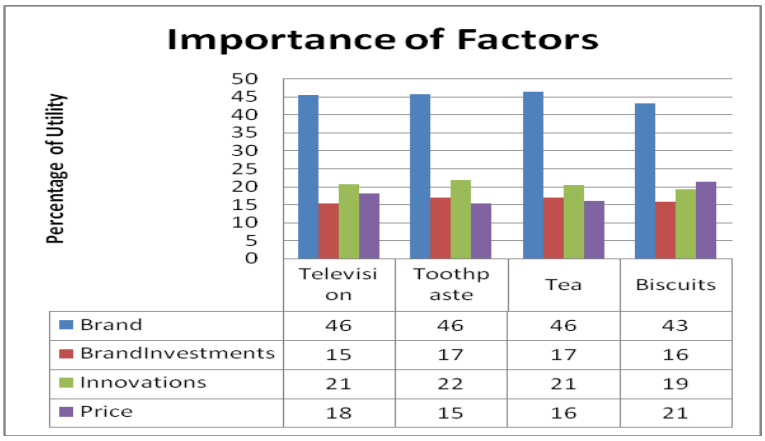
Table 6: Tooth Paste: Credence Goods Category (Personal Care)

Tooth paste category (Credence goods)					
	Levels	Utility Estimate	Std. Error	Rescaling (with Min Part-worth)	Rescaling the part-worth estimates
Brand	Dabur	-1.074	1.059	0.111	6
	colgage	-1.185	1.059	0.000	0
	Amar	-0.743	1.059	0.442	24
	Local/ Assembled brand	3.002	1.059	4.187	227
Brand	High	-1.050	1.223	1.050	57
	Low	-2.100	2.446	0.000	0
Innovations	High and frequent Innovations	-2.504	1.223	2.505	136
	Low and Infrequent Innovations	-5.009	2.446	0.000	0
Price	High -Premium price	-0.917	1.223	0.918	50
	Low Pricing	-1.835	2.446	0.000	0
(Constant)		15.208	3.235		
Biscuits - Category(FMCG- Food and Beverages)					
Brand	Parle	-0.92	1.36	0.00	0
	Britannia	-0.70	1.36	0.21	16
	Priya	-0.87	1.36	0.04	3
	Local / cookies brand biscuits	2.49	1.36	3.40	253
Brand Investments	High	-1.01	1.58	1.01	75
	Low	-2.03	3.15	0.00	0
Innovations	High and Frequent	-1.97	1.58	1.97	147
	Low and Infrequent	-3.95	3.15	0.00	0
Price	High premium pricing	-0.99	1.58	0.09	6
	Low pricing	-1.97	3.15	0.00	0
(Constant)		14.46	4.17		

Note: Rescaling calculated based on Total part worth is proportionally rescaled to total 500. See Multivariate Data Analysis Sixth edition Joseph F Hair Jr .

The next important part of this analysis is to look at the relative importance of signaling attributes. The Figure 1 shows the importance of each signaling attribute for

consumer goods categories. Brand name was found to be the most valued attribute if one is has to consider and select between brands. The second most importance identified was Innovations in all the categories. Factors such as price and promotions seem to have lesser importance except in the case of biscuits category. The data indicates that credence goods have the highest importance in respect of innovations followed by search goods and experience goods. For search good (Television) Brand name, innovations and price are important while promotions have least importance.



	Television	Toothpaste	Tea	Biscuits
Brand	46	46	46	43
BrandInvestments	15	17	17	16
Innovations	21	22	21	19
Price	18	15	16	21

Figure 1: Relative importance of attributes

Evidence For Signalling and Adverse Selection Using Simulation

A conjoint simulation is to understand how the respondents would chose among a specified set of stimuli. This provides a powerful tool to use the estimated part-worth utility, in evaluating some realistic choices or combinations. In this section this tool is used to analyze adverse selection in the in the presence of strong imitation**.**

Figure 2 shows a scenario when, local brands are competitive and adopt imitation (Free ride problem) and the superior brands are also spending and competing it in the same way. This section attempts to use the information and part-worth estimates to find out the market shares for hypothetical market situations. This is to dissect the effect of signaling and adverse selection due to the strategic actions by the sellers. The result confirms adverse selection showing the absence of significant market for plums. The local brand if signals high innovation, high promotion and premium pricing will gain 86.1 percent of the market share and rest of the good brands with signaling the same qualities will fare poorly with insignificant market shares. In the credence goods category therefore signaling was confirmed as important to maintain the market of good quality products. Next, we move on to find out how a market respond with some realist assumptions based on the current market cues. The following Figure 3 shows the market share in such situations for each brand in the tooth paste category. In this experiment the study used simulations with bundling with all the factors that is very close to current market situations. Here we have used Colgate with high innovations, premium pricing and high promotions where as local brand is hypothesized as low pricing, less innovative and less active in sales

promotions. Dabur and Amar being ayurvedic cosmetic dental solution have less brand extensions than Colgate and this they are hypothesized as having low and infrequent innovations, Premium pricing and high promotions. The outcome of the simulation is very clear from the Figure 3. It displays separate market for all the brands and creates market for all the brands. Colgate with 52% share is surely found in the top followed by hypothesized local brand. Dabur and Amar are noted having low market share. The high market share of local in this situation is an indication of market potential for economy segment. However, absence of imitation and effective signaling results in a favorable situation where superior brands acquiring most of the market share.

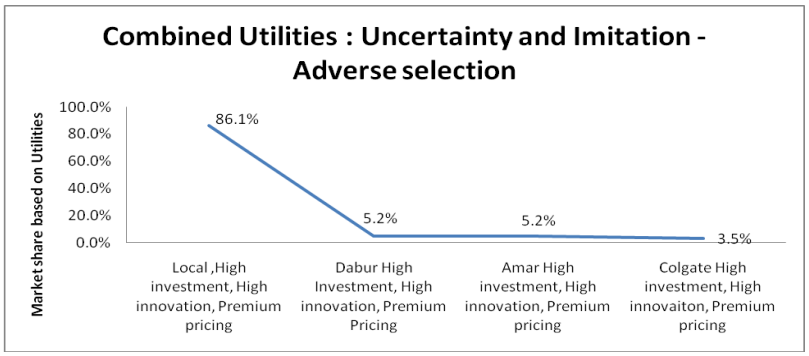


Figure 2: Market Share Based on Maximum Utility In An Imitation Scenario (Tooth paste- Credence goods)

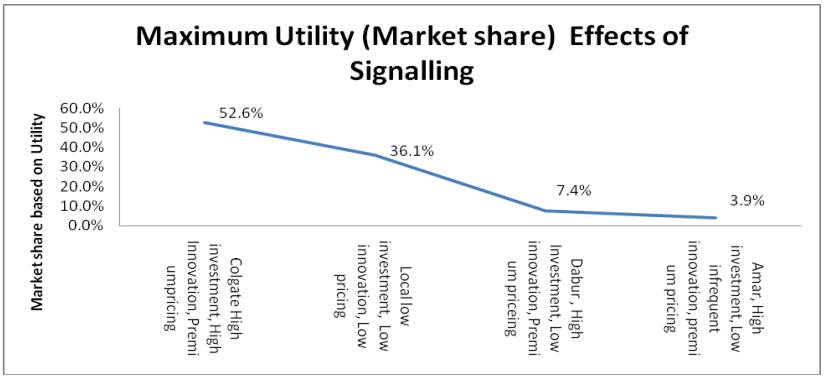


Figure 3: Market Share Based on Maximum Utility In Realistic Scenario (Tooth Paste- Credence Goods)

A similar experiment in biscuit category is shown in the Figure 4 given below. For the purpose decomposing the effect of imitation of super brands on the market share local brands also has been bundled with high investment, high innovation and premium pricing along with supers. The outcome eliminates the existence of Britannia and Parle while settles with 84.8% market share going to local brands with nearly no market for goods brands. Figure 5 shows the separating equilibrium of market at various prices in the absence of imitation.

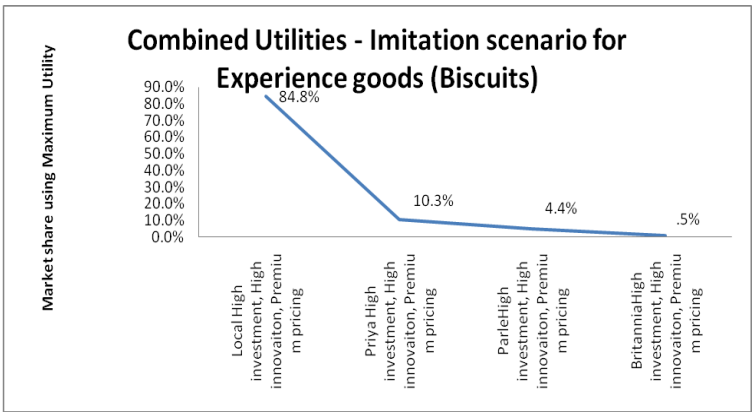


Figure 4: Market Share Based on Maximum Utility For In An Imitation Scenario (Biscuits- Experience Goods)

After the proper signaling and in the absence of imitation, the market keeps a space of superior brands with Parle gains with 32.5% share, Britannia 27% and Priya 8% and Local /cookies are left with 32%. It is clear from this experiment that the majority of the market is gained by superior brand unlike in the imitation scenario.

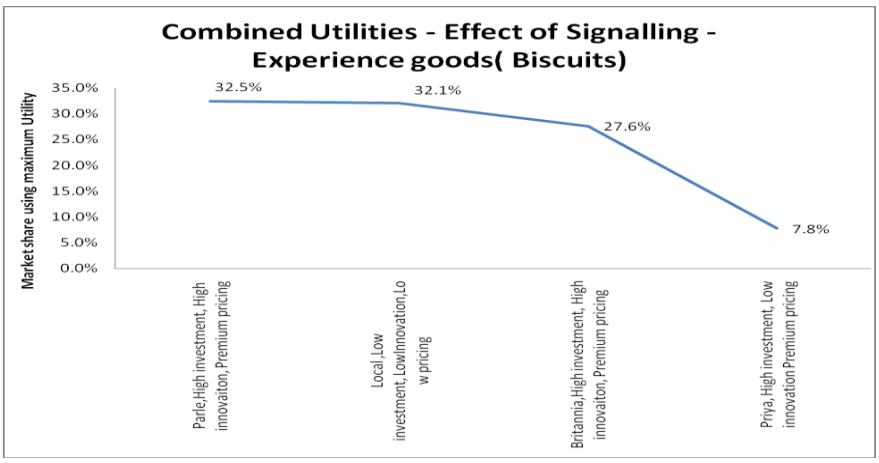


Figure 5: Market Share Based On Maximum Utility For In A Realistic Scenario (Biscuits- Experience Goods)

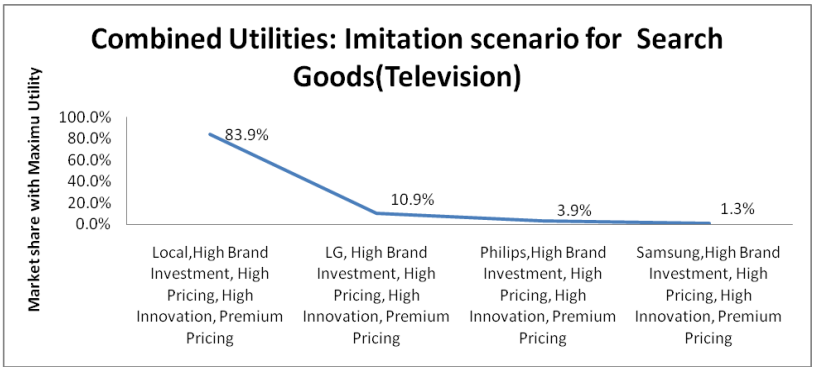


Figure 6: Market share based on Maximum utility for in an imitation scenario (Television- Search goods)

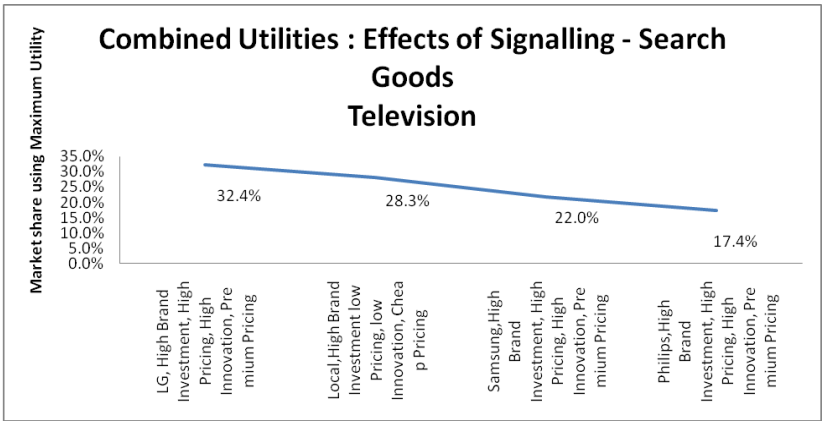


Figure 7: Market share based on Maximum utility in a realistic scenario (Television- Search goods)

Figure 6 indicates how a market share responds when a local brand is imitating the super in the television category (Search goods). For this purpose, local brand has been bundled with high promotions, high innovation, and premium pricing along with supers. The simulation performed for the market share results in 83.9% going to local /assembled brand compared to supers. Virtually Samsung and Philips have observed losing almost all the market. However, with proper signaling occurs in the absence of imitation the uncertainty diminishes and the total share of good brand dominates in the market as shown in Figure 7.

Figure 8 shows the scenario of experimentation with experience goods using Tea brands. It is clear that the imitation confuses the market and bad quality products drives out good quality. The local or loose brand gains with 74% market share. In the Figure 9, it can be observed that the market share of superior brands regain in the absence of imitation and proper signaling. Broke Bond, AVT and Tata tea together gain 90 % of the market share and local tea was left with 10%.

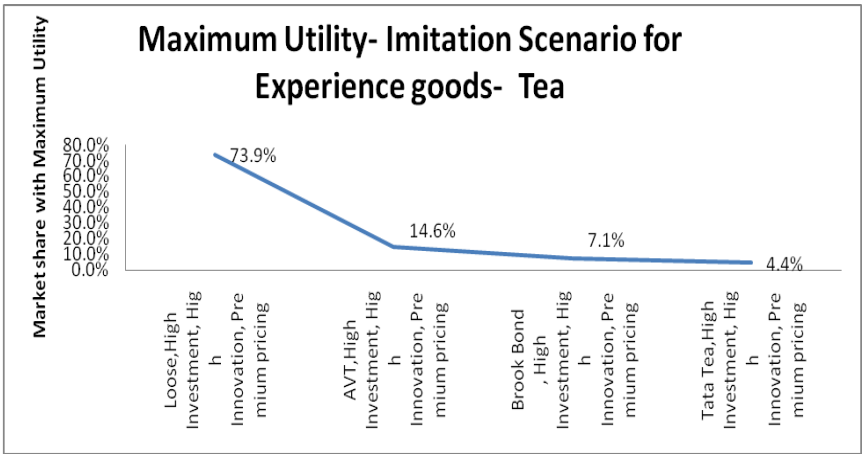


Figure 8: Market Share Using Maximum Utility In An Imitation Scenario (Tea-Experience Goods)

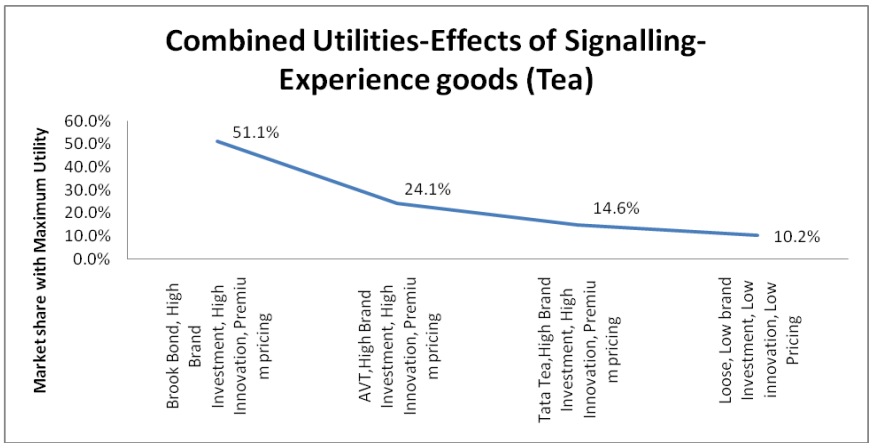


Figure 9: Market Share Using Maximum Utility In Realistic Scenario Experience Goods (Tea)

Conclusion, Limitation and Future Scope

The above study confirms the hypothesis that Signaling of key attributes lead to separation of markets for regulars and super products. It was also found from the discussion that close Imitation using the key signaling attributes such as innovation, price, brand name and promotion lead to adverse selection in consumer markets which is detrimental to the healthy development and performance of markets. It was found also confirmed that brand name and innovations are the key attributes that has to be focused to signal the value of each product at firm action level. The findings were almost commonly shared by the search goods, experience goods and credence goods. However, the study is not without any limitations. The sample is from a homogeneous group and hence may be cautiously interpreted for a heterogeneous segment. Moreover, this is a study based on Kerala state and hence the influence of

cultural differences might have some influence in the preferences recorded. Future researchers can examine different scenarios and can include more goods in each category. It is also recommended to cross validate this study at an all India level with more sample as well. Despite these limitations, the study contributed significantly to identify some of the key attributes to focus on signaling the value of a product and provides ample evidence for signaling and separating equilibrium in different market scenarios.

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