# Analysis And Mathematical Modeling Of Consumer Behavior In Mobile Telecommunications Industry

Saranga Gunasekara

**Abstract**: The mobile telecommunications industry is capital intensive by nature. With the rapid advancement of technology and changing consumer behaviors mobile network operators has had to adapt their product and service portfolio in quick succession. The main implication of the need for high capital investments is the risk associated with the investment. Therefore it is essential that mobile telcos follow up technological investments with the correct service provisioning to the customers. This requires a thorough understanding of the behavior of the consumers. Through this paper the author attempts to identify, evaluate and quantify the effects of a number of traits of consumers that determine the consumer preference to a particular mobile network brand. The author also provides recommendations on strategy formulation. The evaluation has been carried out in the context of the Sri Lankan Mobile Telecommunications Industry.

**Index Terms**: Consumer Behavior, Mathematical Modeling, Mobile Telecommunication Industry, Statistical Analysis, Strategy Formulation

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## 1 INTRODUCTION

Sri Lanka, despite being a developing nation has consistently lead the South Asian region in Mobile Telecommunications technology adoption. Celltel which launched in 1989 was the first in South Asia to introduce Mobile Telecommunication services [1]. Sri Lanka was the first to venture into GSM (Global System for Mobile Communications) Technology in South Asia with Dialog in 1996 and within the next several years the other mobile operators also migrated from 1st Generation Analog Telephony to the 2nd Generation GSM. In 2006 Sri Lanka saw the first commercial launch of 3rd Generation (3G) mobile services in South Asia. Today all 5 mobile operators in the country (Bharti Airtel, Dialog, Etisalat, Hutch and Mobitel) offer 3G. The Telecommunications Regulatory Commission auctioned the 4th Generation (4G) mobile spectrum in 2013 and Dialog Axiata became the first mobile operator in South Asia to launch 4G services. As of 2014 both Dialog Axiata and Mobitel offer 4G mobile services. While the Sri Lankan mobile subscribers have been fast to adopt and use the new evolutions of technology, the real question from a business standpoint is whether the technology development is sustainable. The Mobile Telecommunications industry is capital intensive in nature. In order to rollout and maintain the necessary infrastructure, significant levels of financial investment is necessary [2] [3] [4]. Without making sustainable returns on investments, Mobile Network Operators (MNOs) will not be able to continue to invest in technology development.. Especially given the fact that Sri Lanka is one of the countries with the lowest call and data charges, it is essential that mobile service providers adopt the correct business and technological strategies. Key to this is the correct identification and modeling of the needs and behavior of consumers. Through an extensive literature review the author was able to identify a number of factors that determine the behavior of consumers. The effect each factor has on the consumer was quantified using statistical analysis. As the long term sustainability of any business depends to a great extent on its acceptance by the Young Adult segment (i.e. aged 20 – 40 years) of the population, the questionnaire developed by the author targeted the above mentioned age group. The resulting mathematical representation is then interpreted and recommendations are made on strategy formulation.

## 2 LITERATURE REVIEW

Kotler and Keller (2008, pp. 150) [5] citing Simonson et al. (2001) [6] describes consumer behavior as a study of how individuals, groups and organizations buy, use and dispose of goods, services, ideas and experiences in order to satisfy their needs and wants. Khan, M (2006) defines consumer behavior as the decision making process and the physical activities involved in acquiring, evaluating, using and disposing of goods and services. He further goes on to express the idea that due to the high levels of advertising and marketing clutter present in the contemporary media, the consumers are facing a challenge in selecting the product or service most suitable to cater to their needs [7].

### 2.1 Consumer Buying Behavior Models

Kotler and Keller (2008, pp. 168) [5] use the following steps to describe the model.

1. Needs / Problem Recognition
2. Information Search
3. Evaluation of Alternatives
4. Purchase Decision
5. Post-purchase Behavior

Barry T. E. (1987) [8] as well as Court et al. (2009) [9] have presented similar models of the behavior of consumers.
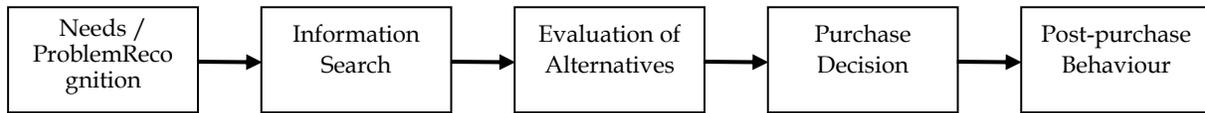
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**Fig. 01** – *Consumer Buying Process*

Based on an extensive review of literature, the following factors were identified as having the most effect on the behavior of consumers. The factors have been categorized into 4 separate segments based on their nature.

## 2.2 Consumer Related Factors

**Technology Preference**
A recent study by Kulviwat et al. (2007)  states that some consumer segments who want to experience the benefits of technology will readily adopt and demand innovative products

(e.g. 3G/4G technology, Mobile broadband in the present context) [10]. Despite this they also acknowledge that there is fear among certain consumer segments that they will be overwhelmed by technology. In such a case, they are likely to resist advanced technology adoption and a mobile telecom brand that portrays itself as being highly technically advanced could face disadvantages. On the other hand the younger segments of the population, who are likely to be more tech savvy will see new technology adoption more favorably. Therefore technology will have a significant impact on both these consumer segments.



Fig 02 - Nielsen Model of Consumer Acceptance of Technology

According to Kulviwat et al. the Technology Acceptance Model (TAM) defines two criteria that determines consumers' attitude towards technology.
1.  Perceived Usefulness of Technology
2.  Perceived Ease of Use

De Silva and Ratnadiwakara [11] also attempted to quantify the impact of a number of social variables on the adoption of mobile technology in several Asian countries including Sri Lanka. They too acknowledge that the perceived use of technology and perceived ease of use are important criteria defining the adoption of mobile technology. One point to note here is the emphasis of De Silva and Ratnadiwakara's approach on the consumers at the bottom of the income pyramid. Garcia-Torres (2009) explains that consumers experience increased utility from a novelty product. In the context of mobile telecommunications, new technology will be one of the key enablers of novelty and innovation [12]. Therefore a brand that consistently delivers novelty to its consumers will have higher levels of preference from the tech savvy segments of the population. The Nielsen Model of Consumer Acceptance of Technology (Figure 02) provides a segmented view of how consumer preferences of technology differ with age [13].

**Previous Experience**
Previous experience measures the familiarity of the consumer with that particular brand or the service. The higher the level of experience the user has the more knowledge he / she will have which will be used in making the purchase or retention decision. Garcia-Torres (2004)presents a consumer behavior model on the effect experience has on consumer behavior. The central component is the "experience utility" gained in using the product. Based on whether the experience was negative or positive for the consumer, future purchase decisions will be affected [14]. The idea is further developed in Garcia-Torres (2009) [12]. Yang, He and Lee have come to a similar conclusion in their 2007 research [15]. Informational Influence has been identified as one of the key criteria affecting consumer behavior. It is an assessment of a person's desire to make informed decisions. When the person is well experienced in the product or service, they will have more information required to make a better judgment. Thus the influence of third parties (be it peers or marketing / branding communications) in the purchase decision will reduce.

**Ethnocentricity of the Consumer**
Ethnocentricity is the preference a consumer has on companies identified as local or national brands vs. foreign brands. The nationality of the service provider is portrayed in the company's marketing communications. According to Netemeyer, Durvaula and Lichtenstein (1991) during the past

few decades, with the growth in globalization, competition between domestic brands and multinational brands has increased [16]. Consumers have the option of selecting a domestic brand or a multinational (or global) brand. Samiee, S. (1994) names this "country stereotyping effect" and defines it as the influence or bias that arises from the country of origin or the country of manufacture of the product or brand[17]. Initial understanding of ethnocentrism portrayed a picture of preference of brands of one's own country. However Watson and Wright (2000) citing Lantz and Leob (1996) have broadened the field of study by explaining that ethnocentric consumers favor products from not only their own country, but also from countries they feel are culturally similar [18], [19].

## 2.3 Value Based Factors

A study by K. A. Silva and S. T. W. S. Yapa (2009) on the Sri Lankan mobile telecom industry has identified value delivery as the most important criteria that determine customer happiness and thus customer retention and repurchase intent[20]. The delivery of value to customers is determined as a mix of a number of criteria including reliability, responsiveness to queries, quality of service and price.

## Quality of Service

Service quality has been established as a key determinant through the research of many authors. Johnson and Sirikit (2002) describe service as a form of attitude which is related to customer satisfaction which leads to customer loyalty and future purchase [21]. Boyer and Hult (2005) point out that in the absence of cost elements, "Service Quality" emerges as the key criterion that determines customer purchase decision [22]. According to Davis, Landsbergen and Lawton (1996) service quality in telecoms is comprised of availability, reliability, security, flexibility, choice, simplicity and assurance [23]. Product and service quality form the basis of consumer value creation in a company. Therefore maintaining high levels of Service Quality is required in order to improve customer loyalty. As Asaari and Karia (2001) explain, cellular operators should not promote price, but should promote value to the customers [24]. Citing Spoor (1994) they explain that this is because price can be beat by anybody but not value created through product or service quality [25]. The study by Silva and Yapa (2009) on the Sri Lankan mobile telecom industry confirms the importance of creating customer satisfaction which results in an intention to repurchase [20]. In addition to the likelihood of that customer's repeat purchases, there will be additional benefits to the firm in the form of good word of mouth and recommendations which will create more purchases among the happy customer's peers. Another important observation made by Silva and Yapa is that out of the customers dissatisfied with their current mobile service provider, 45% indicating that the main reason is customer service. Therefore in the context of Sri Lankan mobile telecommunications industry we can argue that it has been well established through empirical research that quality of service is a critical factor that determines the customer satisfaction and hence the preference of a particular service provider. Iqbal et al. (2008) are of the opinion that rather than quality, the "Perceived Quality" should be the key criteria affecting the purchase decision [26]. The authors attribute this to their observation of many differences in "Perceived Quality" and "Actual Quality". An earlier study by Palkar (2004) also supports this view [27].

## Features

In addition to the two main products (i.e. Voice Calls and Data Services) mobile operators provide customers with a wide variety of added features. Some examples are Short Message Services (SMS) based features (including news alerts, sports updates, Daily horoscope), and mobile application based services (Such as streaming, M-Banking, E-Commerce as well as voice and data communications). These new features become available mostly due to new developments in technology. According to M. De Angelis (2008) adding product features allows the companies to differentiate their products from competition and to enhance its functionality [28]. Lambert (1980) as well as Nowlis and Simonson (1996) have pointed out that consumers' evaluations of a product's overall quality are influenced by the availability of additional features in comparison with the competition [29], [30]. Ammirati S. (2003) however is not in agreement with these viewpoints. He argues that as the typical consumer uses only a fraction of the features available in a product or service adding on more features does not necessarily make the product more appealing to consumers, despite what most manufacturers and service providers believe [31]. Jakob Nielsen (1993) has stated that every new feature is "one more thing to learn, one more thing to possibly misunderstand, and one more thing to search through when looking for the thing you want" [32]. Therefore Thompson, Hamilton and Rust (2005) comment that an overload of features could detract the users from the usability of the product or service [33]. They have created the term "Feature Fatigue" to explain this behavior. In a practical sense this implies that customers will be less interested in features they seldom use, if at all. Still the data collected by Rust, Thompson and Hamilton indicate the preference respondents had for more features, though the respondents themselves have agreed that the higher the number of features, the lower is the usability. This low incidence of new feature adoption is seen mainly in developing countries. According to De Silva and Ratnadiwakara (2009) research conducted in several Asian countries including Sri Lanka has revealed that mobile consumers at the bottom of the income pyramid use hardly any additional features other than voice calls and SMS [11].

## Price

Price is a key determinant of the purchase decision in many products and services. Price of using mobile telecom services primarily includes any rental charges as well as call charges. Other services such as Messaging Services and Data are charged separately. Kollmann, T. (2000) commenting on the influence of price on consumer purchase decision states that the company that offers low prices will be able to attract more subscribers and thus will be able to grow the "minutes of use" on the network. The increased volume of calls made on the network will then increase the commercial success of the mobile telecom service provider [34]. A similar viewpoint is borne by Haque, Ahmed and Rahman (2006) whose research was based on the mobile telecom industry in Malaysia [35]. They further elaborate that in a market dominated by price competition, the consumers will have more choices and opportunities to compare the pricing structures. Parvez, M. (2005) who conducted his research in Bangladesh was also of the opinion that to increase market share, a firm has to reduce the price level [36]. The impact of price in the Sri Lankan Telecommunications Industry has been explored by

Moonesinghe et al. (2006) [37]. According to them, to the financially constrained (poorer segment of the population) the price isoften the most important criteria that will determine their purchase of mobile telecom services and which brand they will use. When the income level rises, price will become less of a factor. Since the publication of this research the Sri Lankan mobile telecommunications sector has seen drastic reductions in price levels due to intense price competition. The government has had to intervene by introducing minimum price controls. Kenesei and Todd (2003) have observed a positive relationship between brand loyalty and price sensitivity [38]. This indicates that higher the brand loyalty of a consumer, the less will be the adverse impact of a price increase. According to Ramachander (2010), who studied the mobile telecom usage in 6 countries including Sri Lanka, the importance of price has seen a decline in recent years due to low price levels and multiple SIM usage [39]. In an independent study De Silva and Ratnadiwakara (2009, p. 20) have estimated the multiple SIM usage at the bottom of the pyramid of consumers in Sri Lanka to be 16% [11]. They identify the main reason as the significant On-Net benefits (reduced price of calls and messaging when communicating with a customer of using the same mobile network).

## Cost of Switching

The cost of switching is the cost a consumer has to bear when moving from one product or service to an alternative. According to Farrell and Klemperer (2007) [40] a product or service has switching costs if;

1. A buyer will purchase the product repeatedly and will notice that it's costly to move from one provider to another
2. Buyer has to purchase follow-on products / services (e.g. complementary goods or services) and it's expensive to move to a different vendor

In accordance with the above classification the main costs involved in switching for mobile telecom services are;

1. Purchase cost of the new mobile service connection
2. Cost of usage (including rental, call and data charges, cost of value added services)

In the Sri Lankan context, the cost of purchasing a new mobile connection is no longer a deterrent especially on prepaid, where SIMs are available free or at very low prices with free outgoing minutes also on offer from all the service providers. The post-paid consumers are often bound by contractual obligations that make it more costly to change the service providers as also noted by Lee, Murphy and Dickinger (2006) [41]. Tahani Iqbal (2010) studied the impact of implementing mobile number portability in South Asian countries, including Sri Lanka [42]. This study has revealed that costs of switching are significantly higher if the number is used for business purposes. Business associates who do not know about the number change may not be able to call, which can result in loss of business opportunities. Business cards and other materials may have to be reprinted causing additional costs. Therefore consumers who use the mobile for business purposes will have significantly higher perception of switching costs than others and are likely to be more resistant to move. Further in countries such as Sri Lanka, where Mobile Number Portability technology is absent, this resistance to switch can be even higher (Park, 2005) [43].

## Social Influence

Yang, He and Lee (2007) citing Hawkins, Coney and Best (1997) state that the reference groups that influence the consumer purchase behavior includes not only the groups the individual has frequent contact with (such as friends, family and work associates) but also the groups the individual does not have membership of or direct contact with (such as groups the person aspires to be in) [44], [45]. In fact, based on the Social Identity Theory, people tend to classify themselves into different social categories. That leads to evaluation of objectives and values in various groups and organizations in comparison with the customer's own values and objectives. As the groups prefer members who share similar objectives and values (Kuusik, 2007), it has the potential of creating pressure on an individual's purchasing decisions of which products and brands they should choose [46]. The more the influence level the social group has on the individual the higher will be the effect on the purchase decision. According to Moonesinghe et al. (2006), research conducted in both India and Sri Lanka has revealed the belief of many respondents that using a mobile phone elevates their social standing [37]. This may be attributed to Maslow's Hierarchy of Needs theory (Kotler and Keller 2008, p. 163) [5]. After the basic needs are fulfilled, people tend to look to improve their esteem needs. Similar results have been observed in the research study conducted on the mobile telecom industry by De Silva and Ratnadiwakara (2009) as well [11].

## Peer Recommendations

Peers of a person (e.g. friends, family, work associates etc.) form an important part of their social circle, capable of a significant level of social influence. Peer recommendation directly refers to the product or service being recommended as good or reliable by the respective peer. Jeff Swystun of DDB Worldwide in his 2009 article "Realizing Opportunities in Challenging Times" presents an extract of a research conducted by the Nielsen Research [47]. Based on a survey conducted of 25,000 people it has been established that "Recommendations from People Known" is the factor with most trust with 90% of the respondents confirming that they would trust a recommendation of a person known to them. Opinions posted online by consumers and the information available in the brand's website shared the second place, but with only a trust level of 70%. TV, Newspaper and Magazine advertising enjoyed only 62%, 61% and 59% success in comparison. It is to be noted that trust level the consumer has on the peer will affect how seriously the consumer will take the recommendation.

## 2.4 Brand and Marketing Related Factors

### Perceived Brand Equity

Keller, K. L. (2003) defines brand equity as a differential effect that the knowledge a customer has about a brand has on their responses to the marketing activities of the brand [48]. This viewpoint encompasses not only the facts about the brand, but also thoughts, feelings, perceptions, images as well as experiences into the concept of brand equity. Therefore when the brand association is strong and unique, the consumer will have positive bias towards the products or services of that brand (Leone et al. 2007) [49]. From the context of studies done in Sri Lanka, Silva and Yapa (2009) explain that brand loyalty is a key component in determining consumer retention

in the Sri Lankan mobile telecom industry [20]. The American Marketing Association (2015) defines as an indicator of the value of a brand. The definition states that from the perspective of a customer, the brand equity is based on the customer's attitudes about positive brand attributes and the perceived favorable consequences of using the brand. Therefore it can be deduced that brand loyalty is an important element in brand equity [50].

**Promotions and Advertising**
According to Kotler and Keller (2008) promotions are a vital component in the 4Ps structure of marketing proposed by E. Jerome McCarthy [05]. Promotions have the potential to provide an additional incentive or push to potential consumers in order to make them more enthusiastic about purchasing the product or service. Khan, M. (2006, p. 12) [7] sees promotions as a means of changing the attitudes of the consumer, so that they become more favorable towards the product or services of the brand. However some authors have cast doubt whether marketing and related promotions are as successful as widely believed. Based on a research conducted by Nielsen Research (2009), Jeff Swystun (2009) states that marketing and promotion related activities only enjoy moderate levels of trust from consumers [47].
1. Brand Sponsorships: 64%
2. Television: 62%
3. News Paper: 61%
4. Magazines: 59%
5. Advertisements before movies: 52%
6. Online Video Ads: 37%
7. Online Banner Ads: 33%

Compared with the 90% trust level for recommendations by known people, it is seen that the effectiveness of advertising and promotions towards convincing consumers to consider a product or service is moderate.

**Retailer Recommendations**
The retailers are the main part of the sales network of any mobile operator. Effective sales communications and providing incentives to retailers are key sales promotion strategies followed by mobile operators to motivate the retailer channel to recommend a particular mobile services brand. Empirical research on the impact of retailer's recommendation on the purchase decision is limited especially in the context of Sri Lanka. However with over 7,000 retailers engaged in selling SIMs and over 50,000 engaged in selling Scratch Cards and Re-loads Island wide, it is expected that they can exert some influence over the purchasing choice of consumers. A study by Sandeep B. (2010) on the consumer behavior of rural India for mobile telecom services identifies retailer influence as a factor that decides which mobile service provider will be selected by the consumer [51]. He however has measured the level of influence by dealer or retailer at 4% as against 29% influence level for friends and relatives. Further it has been recommended by Dey, P. (2008) that by having the retailer or the shopkeeper well informed of the products and services on offer by the mobile service provider, it will see an increase in sales. Therefore it is up to the mobile service provider to educate the retailer channel sufficiently to keep them well informed and motivated [52].

# 3 RESEARCH DESIGN
The 'Level of Preference for Mobile Operator' was used by the author as the dependent variable. This is of primary concern in the model proposed by the author as the consumers' preference for the company will determine continued usage and repeat purchases.

Based on the literature review the proposed conceptual framework is as denoted in Figure 03.
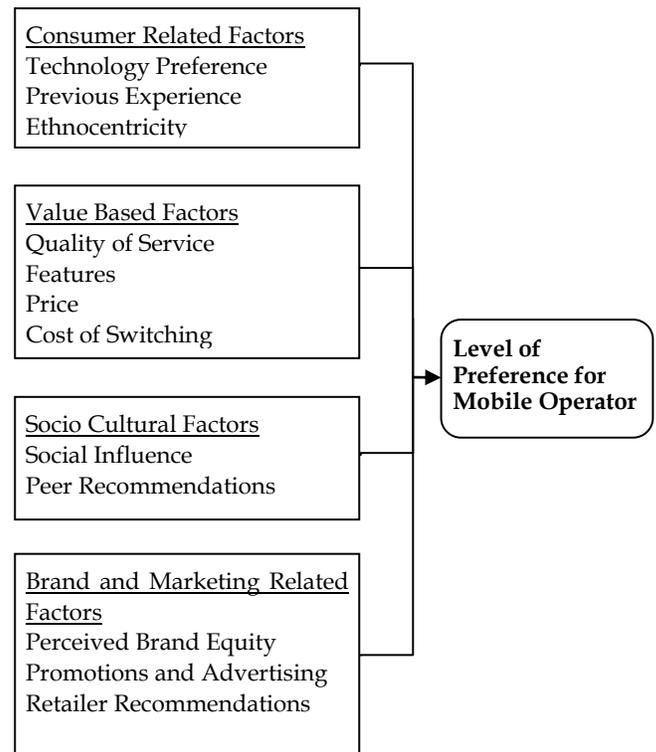


*Fig. 03* – *Conceptual Framework*

The mathematical model assumes a relationship of linear regression between the independent variables and the dependent variable. Where Y denotes the dependent variable, $X_1$, $X_2$, $X_3$ ... $X_{12}$ the independent variables and $K_1$, $K_2$, $K_3$ ... $K_{12}$ denotes the regression coefficients;

$$Y=K_1X_1+K_2X_2+K_3X_3+\cdots+K_{12}X_{12} \quad (1)$$

Statistical analysis techniques have been used to quantify the applicable regression coefficients (i.e. the values of $K_1$, $K_2$, $K_3$ ... $K_{12}$) in order to complete the mathematical representation. Hypotheses were developed linking each of the independent variables to the dependent variable. A Questionnaire was developed which measured each variable using several indicators on a 5 Point Likert Scale. Due to economic factors the data collection process was limited to the Colombo District of the country.

# 4 DATA PRESENTATION AND ANALYSIS
The total number of valid and complete responses received was 391. The data collection process was carried out in 2011.

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Table 01: Users and Non Users

| Category | Responses | % |
|---|---|---|
| Current Users | 363 | 92.84% |
| Planning to purchase in next 6 Months | 25 | 6.39% |
| Not Planning to Purchase | 3 | 0.77% |

Table 02 – Profile of Users and Expecting to Purchase in the next 6 Months

| | Male | | Female | |
|---|---|---|---|---|
| | Subs. | % | Subs. | % |
| Prepaid | 161 | 54.0% | 137 | 46.0% |
| Post-paid | 43 | 66.2% | 22 | 33.8% |
| Non Users | 11 | 44.0% | 14 | 56.0% |
| Total Respondents | 215 | 55.4% | 173 | 44.6% |

For strategy formulation of a mobile telecom company, it was deemed that only the current users and those who plan to purchase connections in the next 6 months are relevant.

# 5 HYPOTHESIS TESTING AND THE RESULTS

## 5.1 Hypothesis Testing

Table 03 – Correlation Testing Results

| | Variable | Pearson Correlation Coefficient | Type | Level of Significance |
|---|---|---|---|---|
| 1 | Technology Preference | 0.552** | Positive | 0.01 |
| 2 | Previous Experience | 0.137 | Correlation not significant | N/A |
| 3 | Ethnocentricity | 0.135 | Correlation not significant | N/A |
| 4 | Quality of Service | 0.672** | Positive | 0.01 |
| 5 | Features | 0.168* | Positive | 0.05 |
| 6 | Price | -0.450** | Negative | 0.01 |
| 7 | Cost of Switching | 0.243** | Positive | 0.01 |
| 8 | Social Influence | 0.219** | Positive | 0.01 |
| 9 | Peer Recommendations | 0.141 | Correlation not significant | N/A |
| 10 | Perceived Brand Equity | 0.588** | Positive | 0.01 |
| 11 | Promotions and Advertising | 0.246** | Positive | 0.01 |
| 12 | Retailer Recommendations | 0.137 | Correlation not significant | N/A |

Table 04: Correlation Summary

| | Variable | Airtel | Dialog | Etisalat | Hutch | Mobitel |
|---|---|---|---|---|---|---|
| 1 | Technology Preference | + Correlation (sig. 0.05) | + Correlation (sig. 0.01) | - Correlation (sig. 0.01) | - Correlation (sig. 0.01) | + Correlation (sig. 0.01) |
| 2 | Level of influence of Previous Experience | Correlation not significant | Correlation not significant | Correlation not significant | Correlation not significant | Correlation not significant |
| 3 | Ethnocentricity | - Correlation (sig. 0.01) | Correlation not significant | - Correlation (sig. 0.01) | Correlation not significant | + Correlation (sig. 0.01) |
| 4 | Importance of Quality of Service | - Correlation (sig. 0.05) | + Correlation (sig. 0.01) | + Correlation (sig. 0.05) | Correlation not significant | + Correlation (sig. 0.01) |
| 5 | Importance of Features | Correlation not significant | + Correlation (sig. 0.05) | - Correlation (sig. 0.05) | Correlation not significant | Correlation not significant |
| 6 | Level of Price Sensitivity | + Correlation (sig. 0.05) | - Correlation (sig. 0.01) | + Correlation (sig. 0.01) | + Correlation (sig. 0.05) | + Correlation (sig. 0.01) |
| 7 | Perceived Cost of Switching | - Correlation (sig. 0.05) | + Correlation (sig. 0.01) | - Correlation (sig. 0.05) | Correlation not significant | Correlation not significant |
| 8 | Influence level of Social Influence | Correlation not significant | + Correlation (sig. 0.01) | Correlation not significant | - Correlation (sig. 0.05) | + Correlation (sig. 0.01) |
| 9 | Peer Recommendations | + Correlation (sig. 0.01) | Correlation not significant | + Correlation (sig. 0.01) | + Correlation (sig. 0.05) | + Correlation (sig. 0.01) |
| 10 | Level of importance of Brand Equity | Correlation not significant | + Correlation (sig. 0.01) | + Correlation (sig. 0.05) | Correlation not significant | + Correlation (sig. 0.01) |
| 11 | Level of Influence of Promotions and Advertising | + Correlation (sig. 0.01) | + Correlation (sig. 0.01) | + Correlation (sig. 0.05) | + Correlation (sig. 0.05) | Correlation not significant |
| 12 | Influence level of Retailer Recommendations | Correlation not significant | Correlation not significant | Correlation not significant | Correlation not significant | Correlation not significant |

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It was noted during the hypothesis testing that the effect each identified independent variable has on the preference for each mobile operator is different. In effect there were only a few universally applicable determinants affecting the consumer's preference of the service provider. The author deduced that this is as a result of the diverse consumer segments that are attracted to the services of a particular company. Therefore the results indicate that whilst some criteria are important to a certain segment of consumers, they are ignored by (and thus does not affect the behavior of) other consumer segments. Hypothesis testing for one mobile service provider (Dialog Axiata)is shown in detail (See Table 03). Table 04 shows the summary of the correlation testing for all operators. The Pearson Correlation Coefficient is denoted with a ** where the level of significance is 0.01 and with a * where it's 0.05. From the results of the survey, it emerged that two factors (i.e. Level of influence of Previous Experience and Influence Level of Retailer Recommendations) do not have any significant influence over the determination of the consumer's preference for a particular mobile operator. It is interesting to note the varying behavior of the consumer segments of each mobile operator with respect to each of the variables tested. For example consumers who have a higher preference to technology are seen to have a higher preference to Airtel, Dialog or Mobitel, while the correlation is negative in concern with Etisalat and Hutch.

## 5.2 Regression Analysis

The regression analysis evaluates how much of the variance of the dependent variable (i.e. the level of preference of the mobile operator) can be attributed to the variables identified. As it's evident from Table 05, a significant portion of the variance of the consumer's preference of the mobile operator has been explained by the variables identified by the author. The remaining unexplained variance can be attributed to variables yet to be identified and the effects of random events. It's to be noted that the mathematical model proposed assumes rational thinking consumers and the availability of all required information to the consumers. When the accuracy of the above two assumption is reduced so will the % variance explained by the mathematical representation.

Table 05: Regression Analysis

| | Airtel N=37 | Dialog N=167 | Etisalat N=61 | Hutch N=19 | Mobitel N=104 |
|---|---|---|---|---|---|
| R | 0.819 | 0.782 | 0.794 | 0.919 | 0.797 |
| R Square | 0.671 | 0.612 | 0.631 | 0.845 | 0.634 |
| % of Variance Explained | 67.10% | 61.20% | 63.10% | 84.50% | 63.40% |
| Adjusted R Square | 0.506 | 0.582 | 0.539 | 0.535 | 0.586 |

## 5.3 Proposed Mathematical Model

Using the correlation data obtained the author was able to quantify the proposed conceptual model. Based on the data on correlation (Table 4) it's clear that different mathematical models can be developed for each of the mobile operators. One point of note is that correlation does not mean causality. Therefore the interpretation of the results should be done with that in mind. Figure 04 represents the behavior of the consumers of Dialog presented as a graphical form of Equation (1) discussed previously. The arrows denote a statistically significant relationship between the dependent variable (i.e. Level of preference of mobile operator) and the independent variables. The numbers alongside the arrows depict whether the relationship is positive or negative.

## 6 CONCLUSION AND RECOMMENDATIONS

Through this research study the author was able to identify and quantify the effect of the various factors that affect the behavior of consumers in the mobile telecom industry. Interpretation of the raw results of the statistical analysis could be difficult for anyone without an understanding of statistical techniques; figure 04 provides a simpler representation.

## 6.1 Support for Strategy Formulation

As noted before, key to success in any business strategy is to understand the needs and the preferences of your existing customers as well as potential new customers. The mathematical presentation can assist a firm to understand the different consumer segments that view the firm's service offering as attractive and those that do not. Thereby considering the whole population, the mobile network operator will be able to identify the reasons why certain consumer segments are not attracted to try its services. This would be the first step in developing a sustainable competitive strategy. Further the model can work as an indicative guideline to gauge the response of consumers to a change in the company's service offering, price, technology or brand. For example Figure 04 indicates that consumers who have a high level of preference of technology have an inclination towards using the services of Dialog Axiata thereby resulting in the strong positive correlation. Therefore in order to keep the tech savvy segment of the population satisfied the company will need to invest in technological developments or risk losing the interest of that consumer segment. In addition, a company not seen as attractive by the segment of consumers seeking the latest technology innovation will be able to estimate the potential benefit of investing in technology (i.e. in terms of increased revenue from new customers) vs. the required capital investment. Further the consumer segment surveyed showed negative price sensitivity. This indicates that a statistically significant portion of consumers who prefer Dialog are not price sensitive. Similarly it's evident that there's a strong correlation of Service Quality and the level of preference for the mobile operator (factor of +0.672). Feature availability also shows a positive correlation with the level of

preference shown to the mobile operator. In addition it is clear that a substantial segment of consumers preferring Dialog perceive comparatively high levels of cost of switching. This can be explained partially by the fact that Dialog holds the largest market share in the industry. Therefore the floor prices set by the Government (with higher call and SMS charges for communications made to other operators) work for the benefit of the operators with higher subscriber shares by acting as a deterrent to customer migration to a different network.The other significant factor is the attachment or the importance placed by the consumer on the mobile number itself. As inferred during the literature review, the perceived shortcomings of a change of the mobile number (i.e. by moving to a different service provider) too act to increase the perceived cost of switching. Therefore it can further be deduced that a future introduction to Sri Lanka a technology such as Mobile Number Portability could be detrimental to

Dialog as consumers are likely to perceive a reduction in the cost of switching (due to not having to change one's phone number although the mobile operator changed). Therefore, in a similar manner the developed mathematical representation of the consumer behavior can be interpreted to evaluate the effect of company strategy as well as macro-economic changes.    In order to facilitate the changing economic conditions and the evolving consumer needs, the author proposes that the model be updated on a periodic basis (e.g. bi-annually). It can also reveal customer segments that are becoming dissatisfied with the company's services and thereby having an increased risk of migration to another network. Therefore the author believes that the discussed mathematical representation helps mobile telecom companies to rationalize their investment decision making process by providing a measurement of the resulting change to the brand preference.
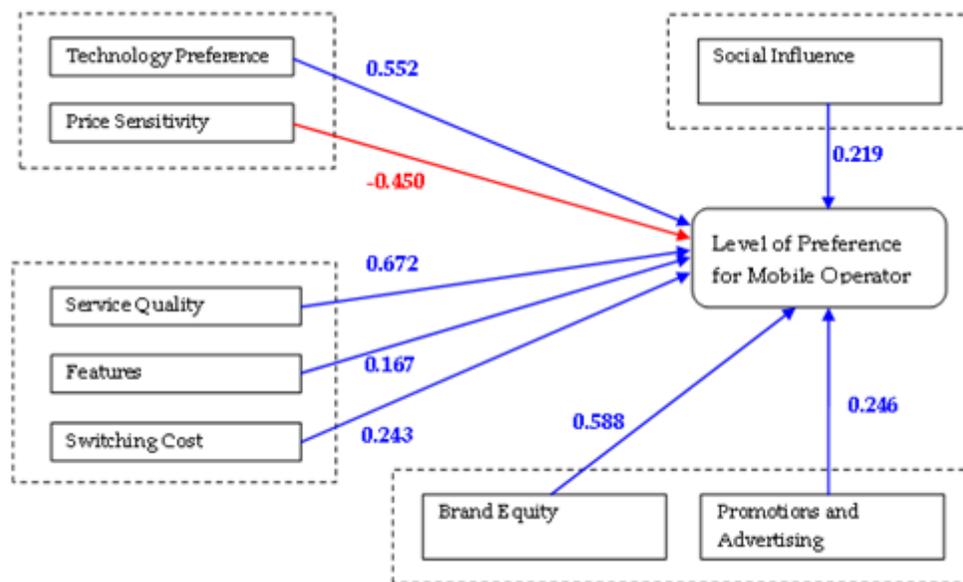


Fig. 04: Quantified Mathematical Model for the Behaviour of the Consumers of Dialog

## 6.3 Limitations of the Study

The author identified the following limitations in the presented study. Due to economical reasons the data collection was limited to the Colombo District of the country. Therefore the data may not be representative of the whole country or the mobile telecommunications sector in general. Further gathering of data will be required in order to develop the model to cover the whole country. Change in industry factors during the data collection phase is also likely to affect the outcome of the research. For example both Etisalat and Hutch launched 3G services following the data collection process of this research. This is likely to have an impact on how the brands are perceived by the consumers. However the results as of the data collection period still holds and any change in industry or economic factors can be overcome by a fresh gather of data and a reevaluation of the model. The author received only 19 samples of subscribers using Hutch (the operator with the smallest market share) out of the valid 391 responses received. Thus the reliability of the findings for that operator could be limited without additional data.

## 7 ABBREVIATIONS

**2G**: Second Generation Mobile Services
**3G**: Third Generation Mobile Services
**GSM**: Global System for Mobile Communications
**MNO**: Mobile Network Operator

## 8 ACKNOWLEDGEMENTS

## 9 REFERENCES

[1] Telecommunications Regulatory Commission of Sri Lanka http://spectrum.trc.gov.lk/Cellular/CELLULAR1.html, Visited 1st May 2015

[2] Financial Times Sri Lanka – Online Edition, Dialog dials more investments, http://www.ft.lk/2013/07/30/dialog-dials-more-investments/, Visited on 1st May 2015.

[3] The Island – Online Edition, Mobitel signs BOI agreement for US$ 60mn expansion project,

340

http://www.island.lk/index.php?page_cat= article-details&page=article-details&code_title=24169, Visited on 1st May 2015

[4]  Daily Mirror – Online Edition, Sri Lanka Etisalat to spend US$163mn to expand, http://www.dailymirror.lk/5227/sri-lanka-etisalat-to-spend-us163mn-to-expand, Visited on 30th April 2015

[5]  Kotler, P. and Keller, K. L., 2008, Marketing Management, 13th ed. Pearson Education Inc, pp. 150.

[6]  Simonson, I. Carmon, Z. Dhar, R. Drolet, A. and Nowlis, S. M., 2001, Consumer research: in search of identity, Annual Review of Psychology, vol. 52, pp. 249-75.

[7]  Khan, M., 2006, Consumer Behaviour and Advertising Management, 1st ed. New Age International Publishers, pp. 4.

[8]  Barry, T. E., 1987, The development of the hierarchy of effects: an historical perspective, Current Issues and Research in Advertising, vol. 10, pp. 251-95.

[9]  Court, D. Elzinga, D. Mulder, S. and Vetvik, O. J., 2009, The consumer decision journey, McKinsey Quarterly, June 2009, [online]. Available at <http://www.mckinseyquarterly.com/The_consumer_decision_journey_2373> [Accessed on 23 November 2010]

[10] Kulviwat,S.,BrunerII,G.C.,,Kumar,A.,Nasco,S.A.,& Clark,T.(2007)Toward a unified theory of consumer acceptance of technology. Psychology & Marketing, 24, pp. 1059–1084

[11] De Silva, H. Ratnadiwakara, D., 2009, Social influence in mobile phone adoption: evidence from the bottom of the pyramid in emerging Asia, Mobile 2.0: Beyond Voice?, Chicago, Illinois, 20 – 21 May 2009

[12] Garcia-Torres, M. A., 2009, Consumer behaviour: evolution of preferences and the search for novelty, [online] Available at: <https://atmire.com/labs/bitstream/handle/123456789/6634/file14712.pdf?sequence=1> [Accessed on 25 January 2011]

[13] Nielsen Research, 2010, Reveal consumer communication behaviors and their likelihood to adopt new technology with Nielsen ConneXions, [online] Available at: <http://nielsen.com/content/dam/nielsen/en_us/documents/pdf/Fact%20Sheets%20IIIII/NielsenClaritasConneXions_US_SS043010.pdf>

[14] Garcia-Torres, M. A., 2004, Consumer behaviour: utility maximization and the seek of novelty,

[online] Available at: <http://www.druid.dk/conferences/winter2004/papers/Garcia.pdf> [Accessed on 17 November 2010]

[15] Yang, J. He, X. And Lee, H., 2007, Social reference group influence on mobile phone purchasing behavior: a cross-nation comparative study, International Journal of Mobile Communications, vol. 5, no. 3, pp. 319-38.

[16] Netemeyer, R. G. Durvaula, S. Lichtenstein, D. R., 1991, A cross national assessment of the reliability and validity of the CETSCALE, Journal of Marketing Research, vol. 28 (August 1991), pp. 320-327.

[17] Samiee, S., 1994, Customer evaluation of products in a global market, Journal of International Business Studies, vol. 25, pp. 579-604.

[18] Watson J.J. and Wright K. (2000), Consumer Ethnocentrism and Attitudes towards Domestic and Foreign Products, European Journal of Marketing, vol. 34, no. 9/10, pp. 1149 – 1166.

[19] Lantz, G. and Loeb, S. (1996), Country of origin and ethnocentrism: an analysis of Canadian and American preferences using social identity theory, Advances in Consumer Research, Vol. 23, pp. 374-8.

[20] Silva, K. A. Yapa, S. T. W. S., 2009, Customer retention: with special reference to telecommunication industry in Sri Lanka, International Conference on Business and Information, Kuala Lumpur, Malaysia, July 2009.

[21] Johnson, C. W. Sirikit, A., 2002, Service quality in the Thai telecommunication industry: a tool for achieving a sustainable competitive advantage, Management Decision, vol. 40, no. 7, pp. 693-701

[22] Boyer, K. K., and Hult, G. T., 2005, Customer behavior in an online ordering application: a decision scoring model, Decision Sciences, vol. 36, no. 4, pp. 569-98.

[23] Davis, V. W. Landsbergen, D. Lawton, R. W., 1996, Telecommunications service quality, Ph. D., Ohio State University.

[24] Asaari, M. H. A. H. Karia, N., 2001, Behavior of cellular subscribers: demands and satisfactions, The International Seminar on Consumer and Consumerism: Issues and Challenges, Kuala Lumpur, Malaysia, 23 – 25 October 2001.

[25] Spoor, D. L. (1994), Selling Cellular 01, Cellular Business, vol. 11, no. 1.

[26] Iqbal, A. Zia, M. H. Bashir, S. Shahzad, K. Aslam, M. W., 2008, Antecedents and outcomes of

customer satisfaction of customer satisfaction in using prepaid cellular service in Pakistan, [online] Available at: <http://www.wbiconpro.com/Marketing/503-Iqbal,A%20&%20Others.pdf> [Accessed 5 December 2010]

[27] Palkar A., 2004, Determinants of customer satisfaction for cellular service providers, UdyyogPragati, vol. 28 (Jan-March), no. 1.

[28] De Angelis, M., 2008, The effect of adding features on product attractiveness: the role of product perceived congruity, Ph. D., University of Bologna.

[29] Lambert, D.R., 1980, Price as a quality signal: the tip of the iceberg, Economic Inquiry, vol. 18 (January), 1980, pp. 144-50.

[30] Nowlis, S.M. and Simonson, I., 1996, The effect of new product features on brand choice, Journal of Marketing Research, vol. 33 (February), pp. 36-46.

[31] Ammirati, S., 2003, Other voices: ask your users: lesser really can be more, Information Week, [online] (Last updated July 14, 2003) Available at: <http://www.informationweek.com/news/developm ent/tools/showArticle.jhtml?articleID=12800101> [Accessed on 20 November 2010]

[32] Nielsen, J., 1993, Usability Engineering. San Diego: Academic Press

[33] Thompson, D.V. Hamilton, R.W. and Rust, R.T. (2005), Feature fatigue: when product capabilities become too much of a good thing, Journal of Marketing Research, vol. 42, pp. 431-42.

[34] Kollmann, T., 2000, The price / acceptance function: perspectives of a pricing policy in European telecommunication markets, European Journal of Innovation Management, vol. 3, no. 1, pp. 7-14.

[35] Haque, A. Ahmed, I.S. Rahman, S., 2006, Exploring critical factors for choice of mobile service providers and its effectiveness on Malaysian consumers, [online] Available at: <http://www.wbiconpro.com/503-Ahasanul.pdf> [Accessed 23 November 2010].

[36] Parvez, M., 2005, A relational study on service quality, switching cost, trust, customer satisfaction and customer loyalty in the context of grameenphone, Independent University, Bangladesh.

[37] Moonesinghe, A. De Silva, H. Silva, N. Abeysuriya, A., Telecom use on a shoestring: expenditure and perceptions of costs among the financially constrained, 2008, World Dialog on Regulation for Network Economies, [online] Available at: < http://www.lirneasia.net/wp-

content/uploads/2007/04/moonesinghe-de-silva-silva-abeysuriya-2006-teleuse-exp- cost-v30.pdf> [Accessed on 27 November 2010]

[38] Kenesei, Z. and Todd, S., 2003, The use of price in the purchase decision, Journal of Empirical Generalizations in Marketing Science, vol. 8, no. 1.

[39] Ramachander, S., 2010, The price sensitivity of mobile use among low income households in six countries in Asia,[online] Available at:<http://www.lirneasia.net/wp-content/uploads/2010/03/RAMACHANDER-TBOP3_07.pdf> [Accessed on 19 January 2011].

[40] Farrell, J. Klemperer, P., 2007, Coordination and lock-in: competition with switching costs and network effects, [online] Available at: <www.nuff.ox.ac.uk/users/klemperer/Farrell_Klemp ererWP.pdf> Accessed on: 12 January 2011.

[41] Lee, R. Murphy, J. and Dickinger, A., 2006, Investigating the loyalty of the prepaid and postpaid mobile customer, [online] Available at: <http://bai2006.atisr.org/CD/Papers/2006bai6496.d oc> Accessed on: 12 January 2011.

[42] Iqbal, T., 2010, Mobile number portability in South Asia, [online] Available at: <http://lirneasia.net/wp-content/uploads/2010/02/Mobile-2.0_MNP.pdf> [Accessed on 21 January 2011].

[43] Park, M., 2005, The economic impact of wireless number portability, [online] Available at: <http://www.econ.umn.edu/~mpark/WNP%20Pape r.pdf> [Accessed on 22 December 2010]

[44] Yang, J. He, X. And Lee, H., 2007, Social reference group influence on mobile phone purchasing behavior: a cross-nation comparative study, International Journal of Mobile Communications, vol. 5, no. 3, pp. 319-38.

[45] Hawkins, D.I., Coney, K.A. and Best, R.J. (1997) Consumer Behavior – Building Marketing Strategy, 7th edition, McGraw-Hill, Irwin.

[46] Kuusik, A., 2007, Affecting customer loyalty: do different factors have various influences in different loyalty levels?, [online] Available at: <http://www.mtk.ut.ee/orb.aw/class=file/action=pre view/id=302137/febawb58.pdf> [Accessed on 16 November 2010]

[47] Swystun, J., 2009, Realizing opportunities in challenging times, The Yellow Paper Series - DDB Worldwide, [online] Available at: <http://www.ddb.com/pdf/yellowpapers/DDB_YP_ RealizingOPPs_Aug09.pdf> [Accessed on 28 November 2010].

[48] Keller, K. L., 2003, Strategic Brand Management, 2nd ed., Prentice Hall.

[49] Leone, R. P. Rao, V. R. Keller, K. L. Luo, A. M. McAlister, L. Srivastava, R., 2007, Linking brand equity to customer   equity, Journal of Service Research, vol. 9, no. 2, pp. 125 – 138.

[50] Brand Equity, American Marketing Association, 2015, https://www.ama.org/resources/pages/dictionary.aspx?dLetter=B

[51] Sandeep, B., 2010, Understanding consumer behaviour in rural for telecom, [online] Available at: <http://www.scribd.com/doc/34183472/Understanding-Consumer-Behavior-in-Rural-Market-for-Telecom> [Accessed on 18 January 2011].

[52] Dey, P., 2008, Consumer buying behaviour with a focus on perception towards internet data card in Reliance Communication ltd, [online] Available at: <http://www.scribd.com/doc/12778357/Consumer-Behaviour-towards-Telecom-Products>  [Accessed on 29 November 2010].