Markov Analysis for Assessing Consumers' Brand Switching Behavior: Evidence from Telecommunication Sector in Bangladesh

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Abstract

The aim of this paper is to explain how to use markov analysis to evaluate consumers' brand switching behavior in the telecommunication sector. Markov chain has been used for accessing the brand switching tendencies of consumers from one to another, which could help to take right strategies for improving the brand quality of different service providing organization and to capture high market share by reducing the brand switching behavior of the consumers. Also, the logistic regression model has been used to determine the importance of the factors that influence consumers' decision to move from one telecommunication brand to another. Findings of Markov chain highlight that a consumer will move from GP to Banglalink, GP to GP, GP to Robi and GP to Teletalk, whereas the consumers will move from BL to BL, BL to GP, BL to Robi and BL to Teletalk, Lastly, the likelihood that the consumer will move from Robi to Airtel, Airtel to Robi, Robi to Teletalk, and Teletalk to Robi. Moreover, the results of a binary logistic regression model reveal that strong advertising has a major impact on brand switching. Furthermore, buyers who have a favorable view of the package being offered are more likely to switch brands than those who do not. Age, the use of multiple SIM cards, occupation, and perceptions of the current SIM's total attributes rating are all factors that have a vital effect on brand switching behavior in the perspectives of telecommunication sector. Consumers' solid knowledge and experiences about the products or services and their long-term observation and intentions have played an important role in a service sector. Therefore, consumers' brand switching behavior in our country can easily be measured with the observations or using various types of model. The implications of these findings can be extended to the growth of many telecommunication service providers' competitive positions in the industry.

Keywords: Markov chain, Transition probability matrix, Binary logistic regression model, Brand switching behavior, Users, Telecommunication sector, Bangladesh.

1. Introduction

Telecommunication is an essential component of modern life. People have tried to interact with one another since the beginning of human evolution in order to meet their social needs. Though the tools of communication have evolved over time, they remain relevant in today's society. The cellular phone has sparked a revolution in the field of communication today. Telecommunication service associated with intrinsic and intrinsic concepts (Neger et al., 2019). Telecommunication decreases the whole planet to a small town, making life more comfortable and convenient. Telecommunication is used to conduct trade in its broadest sense, encompassing interactions within businesses, between businesses, and between businesses and consumers. It is a stochastic method that uses numerical equations to control the future state of a given phenomenon. It is determined by the likelihood of reciprocal control over time (Mehmood and Lu, 2011).

The term "market brand switching behavior" refers to situations in which consumers switch from purchasing one brand of product to another. Brand switching behavior called a behavior that consumers change or shift from one brand to another brand while buying. Brand switching behavior leads to brand loyalty. Consumer switching behavior mentions to consumers deserting a products or services in support of a competitors. Price, marketing, in-store displays, superior availability, perceived advancement or modernizations in competitive products, aspiration for novelty, number of available brands, perceived risk, frequency of purchasing, quality changes, level of satisfaction with recent purchases, and other factors can all promote brand switching. As a result, brand switching is the process of switching from regular use of a product or brand to regular use of a similar but separate product or dual consumer. One more thing Markov analysis is a stochastic process in which the probability of being in either state is solely determined by the prior state of the system. A markov analysis is a method for describing how a state would behave in a complex situation. It precisely describes a state's behavior in a complex situation. In contrast, future purchasing decisions are influenced by recent past choices. A Markov chain is well known for determining brand preference. It is used to make a two-stage decision: (a) whether to proceed or rethink the previous option, and (b) which brand to choose in the latter case. The process in which a consumer switches from purchasing one brand of a product to purchasing another is referred to as brand switching or brand flying (Keller, 2008). Since the cost of switching brands in the telecommunications industry is relatively low, customers simply turn to another network that offers better pricing and service. Market brand switching is caused by a negative consumer experience as a result of poor product quality or service (Sultana, 2012). The main concept of using Markov chain is to construct a markov predicting model to forecast the state of a purpose in a certain period of time in the future. Similarly, the markov chain prediction method is merely a probabilistic forecasting technique, with the expected outcomes expressed as a probability of a particular future state (Zhang and Zhang, 2009).

Consumers make brand switching decisions based on a methodical process of acquiring, assessing, and combining product or service quality. Even if a customer is loyal to a particular brand, if that brand fails to meet his or her needs, the customer will switch to a rival brand. The switching behavior from one brand to another is influenced by a variety of factors and triggers. Consumers in third-world countries are price conscious, but due to market growth, they have the opportunity to switch mobile service providers. Because of competitors' creative and appealing services, the mobile industry is growing precisely and being moderately priced. Since the number of businesses in this field is growing, each one needs to outdo the others in order to entice customers.

The study discusses to investigate the use of markov analysis to assess consumers' brand switching behavior in the telecommunication sector in the contexts of Bangladesh, as well as to identify the factors that influence brand switching behavior and brand efficiency. From a marketing perspective, the study is important because it allows marketers to recognize the powerful factors and determinants that influence switching behavior from one brand to another, allowing them to develop appropriate marketing strategies to increase market share.

The paper is allocated into the following segments. Initially, represents the statement of the problem. Secondly, objectives of the research. Thirdly, literature review & research gap of markov analysis related to consumers' brand switching. Fourthly, model specification of this present research. Next, represents the results and discussions of the study. Also next, describe the recommendations and conclusion, lastly, limitations of the study and future research directions are presented.

1.1 Statement of the problem

Although numerous studies on consumers' switching behavior toward telecommunication services have been conducted, the complex and difficult natures of aspects of switching behavior, especially firm selection of consumers and their opinions on brand preferences and competitive strategies, have not been clearly addressed in Bangladesh.

Consumers' brand switching behavior is affected by a variety of factors, including perceived brand growth impact, environmental factors, affects and cognition (feelings, thinking), and culturally adopted goods and services, which has become a problem in Bangladesh. Consumers, on the other hand, have a good chance of switching mobile service providers due to industry development. When the number of businesses in this industry grows, each one needs to outdo the others in order to entice customers. It has become more cost-effective, resulting in lower switching costs for customers.

Hence, the relevant elements of this study were empirically evaluated in the contexts of Bangladeshi consumers. As a result, the findings of this study will assist policymakers and planners in developing a more sustainable brand in the marketplace.

1.2 Objectives of the study

The broad objective of the study is to investigate the markov analysis for evaluating consumers' brand switching behavior towards telecommunication sector in the context of Bangladesh. The specific objectives of this study, which are given the below: To measure different factors and determinants which impact on brand switching behavior; To find out the consumers' brand switching behavior based on markov analysis; To highlight some suggestions to reduce the consumers' brand switching tendencies; To improve the market position of mobile phone operators in Bangladesh.

2. Literature Review and Research Gap

A summary of the related literature has been presented in this section, from which we can determine the research gap. To determine the relevant research void, a few selected reviews are presented below:

According to Reza et al. (2015), the aim of the paper was to better understand the factors that influence brand switching in the telecommunications industry. The independent variable in the study was switching cost, while the dependent variable was service quality, brand image, value provided, confidence, price, satisfaction, and loyalty. Data was collected using a variety of methods. The statistical package was used to analyze the data for the study. The study identifies many factors that influence customer switching behavior in the telecommunications industry. The study's main drawback was that it only looked at some of the nominated factors, but some intrinsic and extrinsic factors that influence brand switching behavior were left out.

Makwana et al. (2014) stated that the study's aim was to look into the factors that influence consumers' brand switching behavior in the telecommunications industry. The aim of the study was to find out what factors influenced customers to turn their behavior to the telecommunications industry. Telecommunication service providers can monitor customers' brand switching behavior and build relationships with them by offering value added services and realistic pricing approaches, according to the report. The study's main drawback was that, while many other internal and external factors can affect brand switching behavior, they were omitted from the study due to the model's reach.

According to Hasan et al. (2013), the aim of the study was to identify the factors that influence Bangladeshi consumers' cell phone operator selection and behavior change. Both primary and secondary data were used, and data was obtained from 174 consumers using the survey process, with self-administered questionnaires distributed to consumers at the study field regardless of socio-demographic characteristics. According to the findings, network coverage, quicker internet access, call charges, and incentive packages such as bonus on recharge and cash back on use are the most important factors that influence customers' preference and switching behavior when it comes to cell phone operators.

According to Prasad and Prasanna (2016), the aim of the study, was to discover factors that influence cell phone users' decision to switch service providers. Service quality, technological shift, social impact, price, switching cost, and advertisement are all factors that influence consumers' willingness to move from loyalty to switching intentions, according to the report. The findings revealed that cellular service providers pay close attention to all aspects of the service, especially the price, since the price was found to have the greatest impact on consumers' switching intentions. The study's main drawback was that it only looked at six factors that could influence consumers' cellular service switching behavior. However, there could be other factors that influence consumers' switching behavior that were not included in the study.

Gulamali and Julia (2017), when customers willingly switch brands after a social media influencer endorses a brand. The study was presented that the paper aimed to discover which category of informants the social media influencers represent. When consumers move from dissatisfaction to an unavoidable need for variability, social media influencers prominently symbolize the position of an opinion leader, according to the data results of the 190 active questionnaires. According to the findings, social media influencers serve as opinion leaders, social leaders, and micro-celebrities. The key drawback was that the approach was not applicable to the rest of the world in terms of examining how different consumption incentives could be linked to brand switching motivation.

According to Shujaat et al. (2015), the aim of the study was to look into the factors that enable customers to switch brands in the telecommunications industry. Since switching costs are low, customers can easily switch from one network to another, necessitating research into those factors and evaluating customer switching behavior in the telecommunications sector. The information was gathered using a standardized questionnaire that was completed by 500 consumers. To test the study hypothesis, regression analysis, ANOVA, and correlation tests were used. The findings showed that brand image, network efficiency, value added services, promotional events, and price all have a direct impact on young people's switching behavior. The findings of the study will help telecommunications companies determine which factors are more important in keeping customers loyal and preventing brand switching.

The area of the study, according to Brezavscek et al. (2017), was to develop a stochastic model for assessing and continuously perceiving various quality and usefulness pointers of a given higher education study program. A minimal markov chain was used to model the study program, which included five brief and two interesting scenarios. It was decided to construct a probability transformation matrix. The fascinating markov chain's quantitative characteristics, such as the expected time before fascination and the chances of absorption, are used to standardize the program's chosen pointers. In a Slovenian higher education institution, the model was used to investigate the trend of customer enrolment and academic success. The users' progress was forecasted for the next phase of the research project. It was calculated how much time a student would spend at a given period and how long the research will last. Graduation and removal were also possible outcomes. In addition, a forecast was made for the consumers' enrollment over the next three academic years. The findings were analyzed and discussed. The findings were relevant to all stakeholders of higher education. It was particularly beneficial to the managers of a higher education institution because it provides knowledge that can be used to prepare future changes in terms of the quality and usefulness of their study programs in order to improve their place in the educational market.

Migdadi (2017) revealed that the paper's focus was on using markov analysis to forecast mobile phone service providers' operational competitive advantages. For this study, secondary data from of service provider over a period of time was used. The markov analysis was used to advance a series of estimated competitive position indexes for each service provider, and then regression analysis was used to estimate changes in operational competitive positions. According to the findings, Zain's competitive role as a leading service provider will be improved in terms of network coverage, call costs, and network usability. However, the supporter's competitive advantage would be enhanced in terms of call costs, as well as the number of basic and entertainment services available. Over time, the laggard competitive status would deteriorate. This is the first study to use markov analysis to assess the competitiveness of operations. Corporations' executives have a good understanding of their future competitive role. The leader and follower should maintain their positions, but the laggard should continue to improve in order to prevent its position from deteriorating. The researcher can use the methodology described in this paper to embrace markov analysis in order to forecast the competitive position of operations.

Two models, the mixed markov and the latent markov models, were demonstrated by Paulsen (1990). Both of these models can be thought of as simplified versions of Lazarsfeld's latent class model. A finite mixture of markov chains was described as the mixed markov model, which allowed for individual differences in transition probabilities. It makes the latent class model easier to understand by removing the presumption of local independence. Because of, for example, errors in determining the pertinent states, the latent markov model defines a markov chain operating at the unobservable or latent stage. A partial division approach was used from a marketing standpoint. This is done with well-defined mathematical models that can be accurately estimated and evaluated. A data collection on brand switching from Aaker (1970) is used to illustrate the structural insights and forecasts offered by the models.

According to Fudenberg and Tirole (2000), consumer poaching and brand switching. The study's aim was to look at the impact of ads on switching and repeat purchases in mature, regularly purchased product categories. The study used consumers' framing and consumption superiority behavior philosophies to develop a logit preference model for evaluating these impacts. The model was also evaluated using data from a single-source scanner in the study. The findings suggest that advertisement influences brand switching but has little impact on repeat purchases by customers who have recently acquired the brand, a result that is consistent with usage dominance rather than inclosing. The switching effect was found to be mostly limited between the current and earlier purchase times. The study determined the extent of the impact and the potential for benefit. Scanner-panel data were used in the first analysis. The logit option model was also used in the second analysis. For their discovery, these two studies used different mechanical features.

Neger (2018) stated that the aim of the study was to assess consumers' attitudes toward brand switching in the telecommunications industry. The stimuli telecommunication service was chosen as a candidate. The variables were assessed using the Tricomponent Attitude Model (TAM), Fashion's Multi-attributes Attitude Model (FMAM), Logistic Regression Model (LRM), and Markov chain. Telecommunication service-related intrinsic and extrinsic cues included five individual attributes such as network availability, service quality, service charge strategies, brand image, and offered value that served to influence consumers' attitudes, as well as some persuasive aspects such as strong advertising policy, large offering packages, perception of network coverage, FnF tariff, and so on that were effective in influencing consumers' attitudes. The study's biggest drawback was that it only looked at three major telecommunications firms. If the total number of telecommunication service providers in Bangladesh had been included in the study, it would have been more representative.

Following a review of related literature, it is clear that most scholars attempted to analyze consumers' brand switching behavior from the perspective of international consumers, but this study attempted to concentrate on this area from the perspective of Bangladeshi consumers, which was previously unexplored. These studies have looked at some of the factors that affect consumers' decision to turn to the telecommunications industry. However, there are several external factors that affect consumers' brand switching behavior of the products or services that have yet to be investigated.

Furthermore, no comprehensive study has been conducted in Bangladesh to date. So, in order to assess consumers' brand switching behavior towards the telecommunication sector in the future. The study used additional determinants (strong advertising policy, FnF tariff, perception of age of consumers, marital status, satisfaction level with current SIM) and appropriate statistical analysis techniques (logistics regression, markov chain) to fill in this gap.

2.1 Model specification

The section is observed details model used in the study to fill up the research gap on the basis of literature review.

2.1.1 Logistic regression model

The logistic regression model is that model where to outcome (dependent or response) variable is binary. The qualitative response of the model is that yes/no or presence/absence and this response are coded by numerical value "1" and "0". The distribution of this model is binomial distribution. Maximum likelihood method is used to analyze the logistic regression model.

The maximum probability estimates and is denoted as $\hat{\beta}$. In practice many scholars select the logistic regression model due to its comparative mathematical simplicity that means, easily usable and explicable. In summary, we have shown that in a regression analysis when the outcome variable is dichotomous:

a) The model for the provisional mean of the regression equation must be confined between zero and one.

b) The binomial, not the normal, distribution of the errors and is the statistical distribution on which the analysis is based.

c) The principles that guide an analysis using linear regression likewise guide us in logistic regression. The proposed logistic regression model is that

$$Yi = \beta_0 + \beta_1 PPi + \beta_2 AGEi + \beta_3 NSPCi + \beta_4 NSPCi + \beta_5 ANCi + \beta_6 CCi + \varepsilon_i; i = 1,...,n$$

Where Y = 　　　{0, No Switching
　　　　　　　{1, Switching

PP　　　= Promotional Packages
AGE　　= Age of the consumer
FnF　　　= No of FnF
NSPC　= Number of SIM of the consumer
ANC　　= Area of the network coverage
C　　　　= Call charge
ε_i　　　= Random of error.

2.1.2 Markov chain model

Brand switching has been designated usually in a straight forward way by markov chains (Bass 1961; Schmalensee 1972). A markov analysis is a process that can be used to express the behavior of a state in a forceful situation. The significant portion of the markov chain is transition probability matrix.

Transition probability matrix is a matrix used to clarify the transitions of a markov chain. Each of its accesses is a nonnegative real number demonstrating a probability. To put some structure into the transition likelihoods it has been recommended (Schmalensee 1972,) that brand loyalty or switching behavior includes two-stage decision procedure: a) whether to switch to the same brand, and if not, b) which new brand to select? There are two basic likelihoods here, whether the old brand will be controlled out or not. While Schmalensee presumed the likelihoods of brand loyalty to be the same for all brands, we permit it to depend on the brand, since it is taken together an indication of consumers' satisfaction with the products or services.

Transition probability matrix is the matrix; by which to regulate the possibility of the consumers to switch from one state to another. The probability transition matrix for three states GP, Banglalink, and Robi are given table 1:

Table 1. Probability transition matrix

States	GP	BL	Robi	Airtel	Teletalk
GP	P_{11}	P_{12}	P_{13}	P_{14}	P_{15}
BL	P_{21}	P_{22}	P_{23}	P_{24}	P_{25}
Robi	P_{31}	P_{32}	P_{33}	P_{34}	P_{35}
Airtel	P_{41}	P_{42}	P_{43}	P_{44}	P_{45}
Teletalk	P_{51}	P_{52}	P_{53}	P_{54}	P_{55}

Sources: developed by the authors

Since the total of transition probability from a state i to all other states must be 1, so that

$$\sum_{j=1}^{n} Pij = 1.$$

3. Research Methods

The core area of the research is to evaluate consumers' brand switching behavior towards telecommunication sector in Bangladesh. The area of the present section is to deliberate a detail research method which has been used to collect and analyze the data. On the way to conduct a research, what is required is to plan the research outline and choice the suitable research method. The survey method is used for this research. Details of the pretests, sample respondents, types and sources of data, questionnaire design and data analysis processes are deliberated below.

3.1 Pretest 1

The aim of the first pretest was to obtain information, which aided in developing questionnaire. 10 corporate officers, 50 students of both public and private universities, 10 housewives, 10 bankers and 20 university teachers from both public and private universities who stay at Dhaka Metropolitan city and they are the voice caller have been selected for presetting. The pretest sample established the similarly accumulating constant with the prior expectation for the last research.

3.2 Pretest 2

In this stage the first pretest survey questionnaire was disseminated to universities teacher, students of both (public and private) universities, corporate officers, housewives, bankers and businessman who stay at Dhaka Metropolitan city and they are the voice caller. The goal of this method was to regulate if there was an essential for modification of the survey approach, arrangement, wording, and if it was essential to state any confusing measurement items. Respondents were stimulated to contribute their response and comments regarding the predominantly developed survey questionnaire, and then such recommendations were considered in the modification of the questionnaire. A total of 100 participants from the sampling frame were designated and asked if they understood the questions and if anything was left out that they felt should have been encompassed. Their notes and recommendations were amalgamated into the design of the final questionnaire.

3.3 Target population

The population of the exploration are mostly students of the universities (public and private) and professional of different groups (Universities Teachers, Different Businessmen, Bankers, Corporate Officers, Housewives and other Government, Non-government employees) who stay at Dhaka Metropolitan city; age 18 to 65 years, and they are the voice caller.

3.4 Sampling technique and sample size

The probability sampling technique *(stratified sampling)* has been used on the basis of gender and profession of consumers. The sample size can be designed on the basis of the following formula:

$$n_{strat} = D \times n_{srs}$$

Where, n_{srs} refers sample size of simple random sampling

$$n_{srs} = \frac{z^2 pq}{d^2} = \frac{(1.96)^2 \times 0.47 \times 0.53}{(0.05)^2}$$

$$= 383$$

Here, n = required sample size

z = standard value of 1.96 at 95% confidence level

p = estimated proportion of Grameen Phone Users

d = margin of error at 5% (standard value of 0.05)

D = refers design effect for stratified random sampling (say, D = 2)

So, required sample size *2 × 383 = 766.*

3.5 Types and sources of data

Both primary and secondary data have been used to get the real results of the research. Primary data has been collected from the field directly and secondary data has been collected from the published materials of different organization (BTRC, Grameen Phone Limited and others).

3.6 Questionnaire design

Data was collected from students at public and private universities, as well as practitioners from different communities, through a series of structured questionnaires. On the first page of the questionnaire, the study's goal is specified. Following that, there are some introductory questions in the questionnaire. Respondents were directed to a page with some dichotomous questions on the following page of the questionnaire in order to examine the impact of some influential factors on consumers' switching behavior against Bangladesh's telecommunications sector. After that, a series of thought-provoking questions was used to investigate business switching trends. Some open-ended questions were used to find out what respondents thought. The questionnaires also provide six pre-determined questions for identifying psychological and demographic factors. The citizens who were the research's target respondents received a total of 1100 questionnaires. There were 912 replies sent in total, with 840 of them completed and available. As a result, the study required 840 questionnaires to complete.

3.7 Data analysis procedures

Tubular presentations and descriptive statistics were used to determine the demographic variables of gender, age, and occupation of the respondents. The opinions of the respondents were examined in light of the research processes used by the logistic regression model to determine the major influencing factors that consumers consider when determining whether or not to switch telecommunications brands. After that, the markov chain (Transition probability matrix) was used to figure out how consumers moved from one brand to the next.

4. Results and Discussions

Both Univariate and Multivariate Analysis were used to analyze the results. Univariate regression is a statistical technique for evaluating the socio-demographic features of respondents.

Multivariate analysis techniques were used to classify the significant influential aspects that affected consumers' brand switching behavior towards the telecommunication industry based on a binary logistic regression model. Then, to evaluate consumer brand switching tendencies from one brand to another, a markov chain (Transition probability matrix) was used.

Table 2. The demographic profile of respondents

Demographic factors	Number of the consumers			Percentage (%)
Age categories	Male	Female	Total	
18 – 25	412	128	540	64.3
26 – 35	136	50	186	22.1
36 – 45	81	15	96	11.4
46 – 55	6	9	15	1.8
56 – 65	2	1	3	.4
Total	637	203	840	100
Profession natures				
Students	557			66.3
University Teacher	35			4.2
Banker	29			3.5
Businessman	66			7.9
Corporate officer	28			3.3
Government Employees	29			3.5
Nongovernment Employees	50			6.0
Housewife	46			5.5
Total	840			100

Sources: developed by the authors

4.1 The demographic profile of respondents

As illustrated in table 2, the results of the respondents' socio-demographic characteristics. The study discloses that 86.4% respondents are in age 18 to 35 from where 75.48% respondents are male. Also, about 66% of the respondents are students of the tertiary levels who have adaptable capability about sophisticated technology and also aware about market change.

4.2 Markov analysis for assessing brand switching behavior

A markov analysis is a process that can be used to elucidate the behavior of a method in a dynamic situation. Specifically, it designates and forecasts the movement of a method, among different method states, as time passes. The markov procedure designates the movement of a method from a certain condition in the current stage to one of n possible states in the next stage. The transition probability is the likelihood that the method, presently in one state, will move to another state in the next period.

Table 3. Transition probability for assessing brand switching

Telecommunication operators	Grameen Phone Ltd. (GP)	Banglalink Digital Communications Limited	Robi Axiata Limited (Robi)	Airtel Bangladesh Limited	Teletalk Bangladesh Limited
Grameen Phone Ltd. (GP)	0.289	0.345	0.19	0.113	0.063
Banglalink Digital Communications Limited	0.19	0.357	0.224	0.176	0.053
Robi Axiata Limited (Robi)	0.36	0.093	0.338	0.115	0.094
Airtel Bangladesh Limited	0.194	0.129	0.269	0.29	0.118
Teletalk Bangladesh Limited	0.283	0.132	0.264	0.057	0.264

Sources: developed by the authors

As illustrated in table 3, the probability that a consumer will move from GP to Banglalink is 0.345 whereas a consumer will move from Banglalink to GP is 0.190. Again, the likelihood that a consumer will move from GP to Robi is 0.190 whereas a consumer will move from Robi to GP is 0.360. Other hand, the probability that a consumer will move from GP to Teletalk is 0.063 whereas a consumer will move from Teletalk to GP is 0.283. A consumer will switch from Banglalink to Robi with probability 0.224 whereas switching probability will be 0.093 from Robi to Banglalink. The likelihood that a consumer will move from Banglalink to Airtel is 0.176 whereas a consumer will move from Airtel to Banglalink is 0.129. The probability that a consumer will move from Banglalink to Teletalk is 0.053 whereas a consumer will move from Teletalk to Banglalink is 0.132.

The likelihood that a consumer will move from Robi to Airtel is 0.115 whereas a consumer will move from Airtel to Robi is 0.269. Lastly, the probability that a consumer will move from Robi to Teletalk is 0.094 whereas a consumer will move from Teletalk to Robi is 0.264.

4.3 Binary logistic regression for identifying influential aspects related to brand switching

As illustrated in table 4, Brand switching is a very vigorous issue in telecommunication industries. To increase profit margin and reduce business risk, operation manager needs to know the influential aspect related to consumers' brand switching behavior. Network availability, strong advertisement policy, huge offering packages, perception about network coverage, FnF tariff, perception about age of the consumer, profession of the consumer, marital status and user satisfaction level about the current SIM are the significant associated factors related to brand switching (P<.0.1) on the basis of x^2 and Crammers' V.

On the other hand, the study has been considered call rate, SMS charge, income, and age of the consumer as quantitative variables which may be correlated with brand switching.

Brand switching is a binary response variable (switch= 1 or non – switch=0) in this study which may be depend on several predictors. To find out the degree of the dependency among binary response variable and predictors, logistic regression is appropriate.

Table 4. Association among brand switching and other aspects

Aspects	Brand Switching			
	x^2		Crammer's v	
	Statistic	P value	Statistic	P value
Network availability	8.630	.071	.101	.071
Service quality	3.318	.506	.063	.506
Strong advertisement	52.149	.000	.249	.000
Offering packages	52.611	.000	.250	.000
Perception about network coverage	2.957	.086	.059	.086
FnF tariffs influence	30.892	.000	.192	.000
Perception about age of the user	37.996	.000	.213	.000
Multiple SIM use	.413	.520	.022	.520
Profession of the user	33.476	.000	.200	.000
Gender of the user	1.531	.216	.043	.216
Marital status of the user	29.729	.000	.188	.000
User satisfaction about current SIM	5.983	.014	.084	.014

Sources: developed by the authors

The value of the Hosmer-Lemeshow test statistic is 5.51 with P-value=0.702 which is greater than 0.05, so the null hypothesis (H_o: There is no difference between the observed and predicted values) cannot be rejected. Hence, there is enough evidence to conclude that the current model appears to fit the data reasonably well. Again, higher overall percentage of correct predictions gives better model. The overall percentage of correct predictions is 65.60% by this model.

4.4 Logistic regression estimates the effect of different aspects on brand switching

As illustrated in table 5, the binary logistic regression model recommended that brand switching is significantly influenced by strong advertisement (P<0.01) effort of the telecommunication firm whereas the consumers' those who have positive belief about the perception of strong advertisement is 2.041 times more likely to brand switching rather than those who does not.

Again, the consumers' those who have positive belief about the perception of offering package is 1.542 times more likely to brand switching rather than those who does not. It also revealed that perception of offering package is a significant determinant (p<0.05) for brand switching in the telecommunication sector.

The likelihood of the users who believe that age is a considerable factor for brand switching is about 74% more than the users who does not believes so. It also explained that average switching status will be decrease for every unit increase of age. These indicate that age of the users is a significant determinant of brand switching behavior (p<0.05).

The binary logistic regression model suggested that brand switching is significantly influenced by multiple SIM use of the consumer (p<0.10) whereas the consumers' those who have multiple SIM is 1.354 times more likely for brand switching rather than those who have single SIM.

Likewise, it disclosed that profession of the users is one of the significant factors for brand switching behavior whereas switching rate of university teachers, businessman and other government employee are higher than housewife.

The consumers' who has positive perception about their own service providing brand is 43% less likely to switch their brand than who has comparative less positive perception. This means that, perceptions about total attribute rating about brand is a significant indicator for brand switching.

Table 5. Logistic regression estimates the effect of different aspects on brand switching

Independent Variables		ß	S.E.	Odds Ratio (OR)
Strong Advertisement (r: No)				
Yes		.713***	.181	2.041
Offering packages (r: No)				
Yes		.433**	.186	1.542
Perception about Network Coverage (r: No)				
Yes		.004	.169	1.004
Call Rate Per Minute		-.235	.293	0.791
SMS Charge (Per SMS)		-.524	.332	0.592
FnF Tariff Influence		.060	.187	1.062
Perception about Age of the Consumer (r: No)				
Yes		.553***	.175	1.738
Multiple SIM Use (r: Single)				
Multiple		.303*	.180	1.354
Age of the Respondent		-.053**	.021	0.948
Profession of the Respondent (r: Housewife)				
Students		.647	.543	1.910
Universities Teacher		1.592***	.606	4.913
Banker		.871	.642	2.389
Businessman		1.230**	.554	3.422
Corporate Officer		.740	.642	2.095
Government Employees		1.573**	.634	4.822
Non-government Employee (NGO, Company etc.)		.434	.565	1.544
Monthly Income		-.111	.084	0.895
Gender of the Consumer (r: Male)				
Female		-.230	.214	0.794
Marital Status (r: Single)				
Married		.077	.284	1.080
Number of Out Call		.006	.006	1.006
Perception about Total Attributes Rating (r: Negative)				
Positive		-.566***	.163	0.568
Constant		.448	.841	1.566

*Note: Level of significance ***P<0.01; **P<0.05; *<0.10*
Sources: developed by the authors

5. Recommendations and Conclusion

Based on the findings we put forward the following recommendations: Telecommunication service providers need to reduce the higher customer cost and provide increased quality of service. They may offer attractive bundle packages with low price for increasing future consumers' attraction; Operators should create trust worth and rational appeal in their advertisements. They should conduct innovative promotional campaign and generating subject oriented advertisement for creating attraction of different professional; The suggestion for the telecommunication service providing firms is that they should try to improve the technical quality of the service based on their subscribers' expectation; Telecommunication service providers should monitor their activities and take initiative to improve its both intrinsic and extrinsic attributes of service in comparison to competitors' firms.

To summarize, Bangladesh has embraced ICTs as growth tools. Using a Markov chain, the paper was able to identify consumers' brand switching behavior (Transition probability). Consumers will move from GP to Banglalink, GP to GP, and GP to others, according to the findings. The logistic regression model was used to determine the most important influencing factors that customers consider when deciding whether or not to move from one brand of telecommunications service to another. The findings emphasize the importance of gaining a better understanding of the various effects on brand choice and their individual contributions.

Finally, despite the paper's limitations, it could be a useful tool for telecommunication service providers in Bangladesh to assess brand switching behavior. Positively, the approach used in this research can be applied to other studies to better understand the influence of service quality heterogeneity on customer selection and decision-making. The formal procedure of quantitative and qualitative analysis can be followed by students and academicians as a result of this investigation.

Consumer switching behavior must be considered by any business that wishes to control the market and maintain its customers. To ensure a satisfactory level of customer service, they should launch an offer or package that meets the needs of customers, enhance network quality, and organize creative advertising and promotional campaigns; otherwise, they will not be able to survive in Bangladesh's competitive telecommunications market.

6. Limitations and Directions for Further Research

The analysis generates a range of drawbacks as well as possible fertile research directions in the future. The analysis examines the object's characteristics (network availability, strict advertising policy, large offering packages, perceptions of network coverage, FnF tariff, perceptions of the consumer's age, occupation, marital status, and customer satisfaction level with the current SIM). Many other internal and external factors may influence brand switching behavior. Further investigation will uncover and assess the significance of previously unknown internal and external variables that influence brand switching.

The study was then limited to respondents who live in the Dhaka Metropolitan city and are voice callers. Future researchers, on the other hand, will be able to calculate the entire geographical area of Bangladesh in order to pick the sample unit; and they will not only be voice callers, but also internet users from the aforementioned telecommunication firms.

Furthermore, the study's key drawback is that it only considers 5.5 percent of housewives as a sample, almost all of whom are unaware of telecommunication services. They gave their opinion based on their most likely most one, and they gladly declined to respond to the questionnaire. This is particularly important for manufacturers who must determine if the telecommunication service providers and characteristics of telecommunication service shown in this study were restricted to these populations because unconscious and illiterate housewives were not consulted.

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