Factors affecting Service Quality, Customer Satisfaction and Customer Churn in Pakistan Telecommunication Services Market

Yasser Khan\textsuperscript{1,2}, Shahryar Shafiq\textsuperscript{2}, Sheeraz Ahmed\textsuperscript{3*}, Nadeem Safwan\textsuperscript{4}, Mehr-e-Munir\textsuperscript{5}, Alamgir Khan\textsuperscript{6}

\textsuperscript{1,2}Department of Electrical Engineering, Iqra National University, Peshawar, Pakistan
\textsuperscript{3}Department of Computer Science, Iqra National University, Peshawar, Pakistan
\textsuperscript{4}Department of Management Science, Iqra National University, Peshawar, Pakistan
\textsuperscript{1,2}Faculty of Engineering and Technology, Gomal University, D.I.Khan, Pakistan
\textsuperscript{1,3,5,6}Career Dynamics Research Centre, Peshawar, Pakistan

*e-mail: sheerazahmed306@gmail.com

https://doi.org/10.26782/jmcms.2019.08.00048

Abstract

Telecommunication quality of service and customer satisfaction are the important decisive factors responsible for shifting of loyalties and increase profitability to face the fierce competition in Pakistan telecommunication market comprised of 154 million cellular subscribers with 73.85% Teledensity. This paper intend to determine relationship among these variables and their impact on customer switching to another operator which has also become global phenomena. The analysis is conducted on primary data collected that is randomly sampled. The results clearly indicate the strong positive relations of value added services on service quality & customer satisfaction and strongly negative relationship with customer propensity to churn in Pakistan Telecom Environment. Resultantly, the customer churn can easily be controlled by providing enhance quality of voice, robust and reliable connectivity, better complaint management, customer care, and value added services with adequate features.

Keywords: Service quality, Customer Satisfaction, Customer Churn, Customer Loyalty

I. Introduction

To sustain the ever increasing competition in market, telecommunication firms are focused not only to acquire new customers but also to retain the existing customers. The movement of customers from one service providers to another is termed as customers churn. The main reason behind the phenomena is dissatisfaction...
of client with quality of service, high tariff. Also include some unavoidable circumstances that make customer almost impossible to further continue the contract, like financial problems make customer unable to pay the service bills or change location where operators offer excuse to provide service. The cost of taking new customers is far greater than working on retaining the already connected customer in order to stabilize the customer base line [XXIX].

In broad term, churn means switching of customers loyalty from one service provider to competing operators. The two mostly used terms relating to this phenomena are churn prediction and churn management. The first term is binary classification task which differentiate between churner and non-churnerintends to identify dissatisfied customers likely to leave the service usage from existing operators to their competitors while the later term on the other side aims the action taken by organization to control the impact caused by churn. The profit from telecom service can easily be maximize by identifying the likely churn customer and retain them [XII].

Several demographic, behavioral, customer perception and environmental studies are carried out to explain the churn[XII]. The demographic studies include the analysis of data based on customer social, geographical, education, age and gender causing churn. The behavioral studies comprised of usage pattern offered while utilizing telecom services for example call and data usage volume, length, contents and timings. The customer perception recognizes the way they observe upto their satisfaction, reliability of service, complaints registration for problems and resolution of issue, image they carrying about specific operators and quality of service.

A. Pakistan Telecommunication Service Market

Pakistan being the fastest growing telecom market which has grown tele-density exponentially from 6.3% in Y2004 to 79.9% in Year 2014, although the telecom suffer a big blow by forcible introduction of biometric verification system by government which bring down the density by 21% to 62.9% in Year 2015. The growth in last two years has again re-gain the tele-density to 71.8% in Aug-2017 for total subscriber base of 140 million. In Year2016, Pakistan telecom market has gained considerable amount of foreign direct investment (FDI) of 0.25M US $ which is greater amount and contributing share of 13% of total FDI.
The arrival of 3G/4G service in Pakistan telecom market has opened up new avenues of innovative products and services and discover new arrays of revenues which has made the market more stable. By the introduction of next generation telecom services due to heavy investment of foreign companies like China Mobile, Telenor & Vimple-Com has made huge growth while on another side made posing challenges of market consolidation and high competition.

Fig. 2: Pakistan Telecom Market Indicators
(Courtesy Pakistan Telecommunication Authority)
The tendency for the customers to leave the company is typically called telecom churn, hence to minimize for the propensity of customers in company is to devise strategies for greater market shares. The main doctrine behind the churn management is the acceptance of facts that already working customers are great assets. To be successful in this high competitive market, operators have to play a crucial role in customer relationship management and focus all the attentions towards customer retention. So before retaining the customer the first step is to determine the potential churners in advance and only then can we establish the relationship with existing customers and deal accordingly [IX].

The fundamental definition of churn customers given by marketing experts is to identify those customers who are expecting to be diverted to another service provider or to be the part of existing operator but purchase little. The churn phenomena becomes more worsen in online customers where the grip to retain the customers are more weak and hence it becomes more mandatory to determine in advance the behavior of churn customers by predicting the signs to save the business revenues. If companies do not take necessary action to hold customers before they permanently leave the company who might not returned back and cause income loss, the customers may never come back and income may not be saved from lost. The valuable revenue can be saved by implementation of effective retention strategy[IX].

According to marketing research, churn rate by cellular operators calculated is nearly 02 % monthly which is approximately equal to 25% annually or in other words they lost almost quarters of their customer per year. The telecom service providers due to tough competition in market has to design equipment's of low price but also pay good attention towards standard quality so to offset the pricing impacts they have to provide discounts on both cellular handsets and other miscellaneous peripherals. This approach make the customers baseline more stable, in addition, offers are made only those customers which are more prone to churn by evaluating their CDR (Caller details records)[XVII].

B. Customer Churn Impact in Pakistan Telecom Market

It is defined as switching of customer from service provider to telecom market competitor who decided to leave a specific product, service provider or entire company[X]. Every service provider made every efforts to identify the reason behind the churn and bring down the churn radio due to the fact the existing customers are the main source revenue as compare to new acquired customers [XVIII]. The main loses suffered due to high churns cause tarnish the image of company, increase the uncertainty, effecting existing customer, revenue loss, low sale because the customers buy less services, badly suffering the performance of company.

The in-depth literature review enabled the researcher to formulate schematic diagram and on the basis of which some hypotheses have been developed which will be tested through statistical tests in the main study.
II. Literature review

To determine the factors affecting the customer churn in telecommunication sector, structure model was proposed for in Jordanian telecom industry and map the relationship among depending variables. The study has resulted that switching cost and value added services are contributing insignificantly to customer churn while customer satisfaction is considered as key variable to reduce the customer defection in telecom service industry. So to decrease the customer switching service provider has to pay a lot of attention towards billing systems, timely resolution of customer complaints, provide value added services to the customer on competitive prices and arrangement of training to frontline employees for customer care[1].

The telecom industry being highly competitive sector contributing largely to country economy are threatened by attrition hence to compete in consumer business and remain unaffected by any shock waves of extreme competition, service provider has to bring innovative and sophisticated churn control strategies. Customer behavior monitoring has become paramount important through machine learning and data mining techniques with implementation of feature engineering and exploratory factor analysis. For customer prediction the seven prediction techniques like Generalized linear model, Naïve Bayes, logistic regression, Random forest, Gradient boosted trees, Decision Tree and deep learning along with analysis of data set through verification metrics like accuracy, F1 Score, recall, Area under the curve and precision[V].

The customer retention has become deemed necessary to stop the customer from leaving the company and major part is comprised of factors contributing to attrition and creation of predictive model to detect the churners in advance. The problem of customer defection is declared as binary classification problem which can be executed through information obtained from historic behavior and design of algorithms for correct prediction of potential churn customers. In addition, the prediction results can be further refined through performance measures such AUC. In order to make this model more profitable, the research study is comprised of expected higher profit measure for defected customer. The already prevailing technique is combined with learning profit driven decision tree has emerged new design called Pro-Trees. This technique has given best results on profit maximization on real life data sets as compared to classical decision tree [XXX].

In order to make the retention a successful story, the timely and accurately prediction churn is crucial devise an effective retention strategy. The predicted model has also been facing challenges due to which generalization of those models are not applicable. Those suffers are negligence of selection in information rich variables, the bench marking of data sets which in reality is not the representation of real world problems and limited work is extended in intelligent and automatic retention processing. Hence to cover the mentioned limitations accurately, identification of churn customer through fuzzy logic and launching of retention campaign according to customer relevant information and patterns obtained during customers complaints, the strategy has predicted 87% of potential churners on churn severity and categorization[XXV].

Copyright reserved © J. Mech. Cont.& Math. Sci.
Yasser Khan et al
In the Korean Mobile telecom service Company, the factors influencing the customer churn are analyzed through a research study by taking the billing and transaction data. The results showed that call quality is main factor responsible for churn. Also customer having membership card can also has affinity to defect from existing operator. The relationship of complete churn with churn determinants are also analyzed with mediating effect of partial defection and its implication is derived [XVI].

To survive in a highly competitive market of telecom, the retention of existing customers are very much critical as compare to acquiring new customers. The prediction of churn can better executed by analyzing the data from an operator and determines the pattern of customer behavior. The author has proposed a new model through WEKA data Mining Software which is comparatively more efficient in performance from both decision tree and logistic regression [XXI].

In Jordanian Telecom sector, after conducting research on cluster analysis, there were three main clusters where customer satisfaction and customer churn were main factors in one cluster while in another cluster the high value of customer churn were due to customer loyalty and switching cost. Hence recommended to pay more attention towards resolution of customer complaints, value added services and marketing. The result, however in third cluster poor quality of customer loyalty which persuade the customer to switch over to another service provider [II]. The technique of distance factor is used for customer churn prediction by introducing the concept of classifiers certainty estimation where data set is divided into categories that with High certainty, low certainty. The author indicated that distance factors has strong correlation with classifier certainty and having high accuracy with high distance factors [III]. While extracting the rules for churn prediction, two important techniques that is rule bases decision tree and rough set theory is used to analyses the performance of four different algorithms. After applying these technique on publicly available data set, the technique is capable to predict all customers intended to leave the company and make big part in strategic decision making [VI].

The issue of customer churn was demonstrated by using machine learning on publically available dataset and technique used is Monte Carlo Simulation for determining the cross validation and performance improvement. The results clearly reveal that the superiority of booted versions of model over plain version and classifier identified as SVM-POLY (Support Vector Machine) with accuracy of almost 97% and F-Score resulted as 94% by using Ada Boost [XXXIII].

By applying data mining technique along with other techniques and data patterns on data set obtained from different telecom companies. The aim of the study to understand churn hazard, churn risk in stipulated timing and most favorable strategy may be adopted to curb a particular customer from switching over to rival operators and optimization of retention process [XXXI].

The customer churn retention and prediction is processed according to 3V’s that is volume, variety & velocity which has significantly boost the big data set both in Business Operation System (BOS) and operation support system (OSS) in one of china telecom operator. The experiment is conducted on almost 50000 prepaid potential churn customer that has resulted in improving big business value and recharge rate [XXXV].
The telecom churn has largely become competitive advantage for operator in this industry and present model of churn has failed to operate and new type of algorithm called as semantic-driven subtractive clustering technique (SDSCM) is devised which has fast running speed as compare to other methods. Based on clustering results, some strategies are defined to ensure strong position in the competitive telecom market[XXXIV].

The famous seven data mining and classification methods were used to determine interesting patterns of customer behaviors toward switching to another patterns and Gradient Boosted Trees was declared as most efficient method. The results were further analyzed through data mining metrics like precision, accuracy, recall, F1-Score and AUC. The main aim of the analysis is to remain steadfast in consumer business and develop churn management strategy that will take the strategy one step more in business intelligence[IV].

The application of six sigma technique in analysis of telecom churn and taking maximum customers baseline as bench mark. The author has made the churn process as hole in the container which emptied during the course of time. The mentioned technique is novice for prediction of churn customers that shows the sign to come of net of clusters of customers. Moreover, logistic binary regression is also used for prediction and model is further validated and accuracy is determined through predefined metrics[XXIV].

III. Conceptual framework (factors affecting churn)

A. Motivation

The motivation behind this research is to determine all factors playing pivotal role in services sector of Telecom industry especially in cellular side for devising customer relationship management and marketing strategies. This will help to control the customer churn by application of factor causing the phenomena but also help in customer retention. The main theme of the research is service delivery resulting in customer satisfaction which ultimately negatively affecting customer churn. The service quality is comprised of voice quality, speedy connectivity, clear voice on telephony side while greater transfer rate, lower packet loss, real time communication on data side. This research covey a strong message to ultimate users that required quality of service are delivering customers at their door steps for which they are paying.

B. Service Quality

Quality is very difficult word to explain in absolute wording due to its philosophical nature[XV]. The properties or array of features of the product or service design to satisfy the need of customers is the defined by Marketing analysts[XXII]. The customer expectation can be achieved by providing the service with dynamism, flexibility, and excellent customer care hence according to marketer quality of service is ultimate gain [XXXII]. The important factors perceived by potential customers when intend to take mobile service are quality of signals received, intra network calls discount and size of the operator giving service in Korea [XX]. Multiple regression was used to determine the casual relation through structure questionnaire online.
C. Customer Satisfaction

To achieve positive word of mouth remarks and sustainable profitability in the long run, telecom service organization are struggling for satisfying customer being the ultimate goal [XIV]. The phenomena can defined as response received from customer after fulfillment of their needs & demand up to their satisfaction[XXVI]. The main indicator behind customer satisfaction is actual perception of customer towards service quality expecting or receiving from certain provider[XXXVI].

Multiple benefits can be achieved through customer satisfaction like boosting the reputation of business & improvement of effectiveness through advertisements. Moreover, the customer churn can be controlled through customer loyalty, reduce the cost of operation through improvement in telecom customer baseline [XIII].

The customer satisfaction can conceptualized on the basis of customer service, financial reasons and technology wise. The quality of service is essential not only to retain the already working customers but also to add the potential customers. The feedback from the customers is taken through exchange of information via telephone, face to face, email and mail. The main qualities identified are accessibility, availability, affability, agreeability and accountability. The technological aspects are consist of telecommunication system and network infrastructures which is required to be maintained in high standards. In case of service failure, the customer should be compensated in term of monetary value or extra minutes on call drops. The selection of a particular operator by customer has essentially has financial factor in mind as compare to his competitor. Hence perceived financial value, price and fairness in
price are actual financial aspects for a service and plays pivotal role in determining the customer satisfaction[XXIII].

Due to greater impact of deregulation, globalization, competition and privatization the customer satisfaction is vital in telecommunication industry so operator should focus on affordability of service tariffs, promotional programs and corporate social responsibility to improve their image in country. As customer is the source of revenue for company hence required to adopt customer centric culture and focused attention towards better customer experience and relationship[XXVII].

D. Customer Loyalty

Loyal customer keep a strong and reliable connection with same or different brand of a company. Loyalty is defined as deep inside commitment to buy and rebuy a particular product or service repeatedly in future despite situational efforts extended by competitor to shake this firm commitment and generate switching behavior. This can be seen as primary indicator to gain performance especially in highly competitive market of telecommunication. The introduction of effective solution in term of main sector of offerings and their operations which can be achieved through interactions with suppliers. The performance of the firms can be achieved by innovation of new products[XXVIII]. For achievement of competitive advantage in telecommunication service industry literature customer loyalty has attained an important place [XI]. By application of deregulation in Korean Telecom industry will enhance competitiveness and ultimately lead towards customer loyalty through impact of business strategy.

The loyal customer establish bond with company and exhibit different behavior as compare to non- loyal customers for example the purchase decision is change and ultimately lead the firm towards profitability.Companies are suggested through research to engage the customer emotionally and should divert its focus towards new areas like employee engagement, co-consumption, co-design and co-creation its value as these are mainly the decisive factors for customer loyalty [XIX].

![Fig. 3: Conceptual framework](image-url)

E. Path Model and Development of Hypotheses

This research is intended to establish a relation among the factors ultimately affecting telecommunication customer churn and help in retention of those defected customers in Pakistan telecommunication market. Based on available literature, the important dimensions i.e. values added services, data usage, data rate, voice quality, voice & data packages and complaint management has positive impact on quality of

Copyright reserved © J. Mech. Cont. & Math. Sci.
Yasser Khan et al
service, customer satisfaction and negative effect on customer churn. These propositions can be best reflected through below mentioned set of hypotheses:

- Hypothesis 1: Value added services affects the service quality of customers positively
- Hypothesis 2: Data usage affects the service quality of customers positively
- Hypothesis 3: Data Rate affects the service quality of customers positively
- Hypothesis 4: Voice Quality services affects the service quality of customers positively
- Hypothesis 5: Complaint Management affects the service quality of customers positively
- Hypothesis 6: Service Quality affects customers Satisfaction positively
- Hypothesis 7: Customer Satisfaction affects the Customer churn negatively

IV. Research methodology

A. Data Collection

The collection of data is carried out through deductive approach by applying the cross-sectional time domain. The data is sampled though convenience sampling method which is considered as one of most appropriate methods to approach the customers by collecting telecommunication voice, data and corporate services. Moreover, analysis of data is conducted through quantitative methods. In the first section of questionnaire, the demographic information (Age, gender, Education) and preferred telecom company. While total 3 questions are asked about value Added service, 3 on data usage, 3 on data rate, 4 on voice quality, 2 on complaint management and 4 each on quality of service, customer satisfaction and customer switching to another operator.

Table 1 – Descriptive Statistics

| Table 1 – Descriptive Statistics |
|----------------------------------|
| **Age** | **Frequency** | **Percentage** | **Education level** | **Frequency** | **Percentage** | **Tenure** | **Frequency** | **Percentage** |
| 10-19 Years | 37 | 8 | Matric or Below | 90 | 19 | Less than 1 Year | 89 | 18 |
| 20-29 Years | 84 | 17 | Intermediate | 94 | 20 | 1-3 Years | 110 | 23 |
| 30-39 Years | 217 | 45 | Graduation | 166 | 34 | 4-6 Years | 98 | 20 |
| 40-49 Years | 144 | 30 | Post-Graduation | 132 | 27 | 6-9 Years | 99 | 20 |
| Telecom Operator | | | | | | | | |
| Employment status | | | | | | | | |
| Non-Employee | 122 | 25 | | | | | 10-12 Years | 66 | 14 |
| > 15 Years | 20 | 5 | | | | | | |

Copyright reserved © J. Mech. Cont.& Math. Sci.
Yasser Khan et al
The questionnaire were distributed both in hard and soft form to draw representations from all segments of society and give statistically appropriate sampling. One set is distributed in education institutes (school, colleges & universities), health centers, and markets while another set is sent through emails in bulk and responses were collected in email reply. Out of 520 questionnaire 482 responses were complete and satisfactory in all aspects.

The respondents were diverse in age hence 8% were 10-19 years, 17 were 20-29 years, 45% were 30-39 years and 30 % were 40-49 years of age. With reference to gender 72% were male and 28% were female. The education level of the respondents varied diversely 19% were matric and below , 20% intermediate ,34 % Graduates and remaining 27 % have completed their post- graduation studies. The subscription period of the respondents, 18% were having less than 1 year subscription tenure, 23% were 1-3 years, 20% were 4-6 years, 20% were 10-12 years and 5% were greater than 15 years subscription period. With reference to telecom service providers, 28% respondents had subscribed for Ufone, 20 % Mobilink, 14% Telenor and 38% Zong.

For the analysis of data, SmartPLS (Partial Least Square on structural equation modeling) software was used to test the impact of value added service, Data usage, Data rate, voice quality, complaint management on quality of service, customer satisfaction and telecom churn as hypotheses are already developed.

Further details will be furnished according to standard procedure prescribed for PLS based SEM comprised of model specification, estimation, structural model estimation and finally testing of hypotheses and multiple group analysis.

V. ANALYSIS

A. Specification of Model

The value added service, data usage, data rate, voice quality and complaint management is impacting the service quality, customer satisfaction which ultimately affect customer churn.
The measurement model and its estimates are furnished in Fig2. All dependent and independent variables are given in self-explanatory manner.

### 4. Model Estimation & Reliability Statistics

The testing of reliability were conducted through SmartPLS and estimation of model is performed and average variance extracted values, composite reliability, and communality of each variable is extracted. The AVE is the actually the measurement of quantity of variance that is taken by construct in relation to the quantity of variance due to measurement error. Cronbach’s Alpha for each variable is within the acceptable range(>0.7) and composite reliability (acceptable range between 0.7-0.9) for obtaining the internal consistency. Hence, the reliability of each variable is with in satisfactory range.

**Table 2 – Statistics regarding reliability of Research**

| Table 2- Reliability of Research |
|----------------------------------|
| **Variables** | Average Variance Extract | Composite Reliability | Cronbach’s Alpha | Communality |
|----------------|-------------------------|-----------------------------|-----------------|-------------|
| VAS            | 0.588765                | 0.852478                    | 0.784574        | 0.498547    |
| Data Usage     | 0.614571                | 0.914775                    | 0.781475        | 0.521476    |
| Data Rate      | 0.514798                | 0.821445                    | 0.814756        | 0.598872    |
| Voice Quality  | 0.657844                | 0.895477                    | 0.678547        | 0.614287    |
| Complaint Mgm. | 0.524716                | 0.869554                    | 0.754614        | 0.595985    |
| Service Quality| 0.614455                | 0.899147                    | 0.844587        | 0.496589    |
| Customer Satisfaction | 0.457771 | 0.874415                    | 0.786512        | 0.654258    |
| Churn          | 0.514765                | 0.903214                    | 0.829635        | 0.656482    |

**Table3 – Cross Loading through Discriminant Validity**

**Table3-Cross Loading through Discriminant Validity**

| VAS   | Data Usage | Data Rate | Voice Quality | Complaint Mgm | Service Quality | customer satisfaction | Churn |
|-------|------------|-----------|---------------|---------------|-----------------|-----------------------|-------|
| va1   | 0.89854    | 0.4854    | 0.5857        | 0.2546        | 0.23154         | 0.0322                | 0.857489 |
|      | 5          | 84        | 48            | 12            | 2               | 14                    | 0.52854 |
| va2   | 0.78145    | 0.6412    | 0.2548        | 0.3254        | 0.03125         | 0.0321                | 0.625412 |
|      | 8          | 25        | 79            | 87            | 4               | 46                    | 0.62574 |
| va3   | 0.76478    | 0.4544    | 0.2548        | 0.2354        | 0.02214         | 0.9854                | 0.232541 |
|      | 5          | 14        | 65            | 87            | 4               | 76                    | 0.06526 |
| du    | 0.71968    | 0.0524    | 0.6952        | 0.3523        | 0.65412         | -                     | 0.321546 |
|      | 75         | 11        | 47            | 65            | 4               | 47                    | 0.21245 |
| du    | 0.74968    | 0.0974    | -             | 0.9857        | 0.32145         | -                     | 0.0354  |
|      | 4          | 87        | -             | 24            | 1               | 0.0354                | 0.023544 |

Copyright reserved © J. Mech. Cont.& Math. Sci.
Yasser Khan et al

587
| Parameter | Value 1 | Value 2 | Value 3 | Value 4 |
|-----------|---------|---------|---------|---------|
| \( u_d \) | 0.74789 | 0.2354  | 0.2541  | 0.0215  |
| 3        | 0.84      | 0.73    | 0.5475  | 0.2014  |
| \( d_r \) | 0.73378 | 0.0021  | 0.5457  | 0.65214 |
| 1        | 0.84      | 0.2548  | 0.2251  | 0.00124 |
| \( q_v \) | 0.74525 | 0.0358  | 0.2541  | 0.01412 |
| 1        | 0.84      | 0.6548  | 0.6551  | 0.02136 |
| \( c_m \) | 0.71343 | 0.5414  | 0.5475  | 0.98751 |
| 5        | 0.84      | 0.3365  | 0.6772  | 0.2524  |
| \( s_1 \) | 0.75487 | 0.5244  | 0.6233  | 0.87545 |
| 5        | 0.82      | 0.5244  | 0.6233  | 0.2524  |
| \( s_2 \) | 0.62354 | 0.4978  | 0.5412  | 0.76548 |
| 9        | 0.62      | 0.2514  | 0.5412  | 0.1423  |
| \( s_3 \) | 0.75463 | 0.7548  | 0.1200  | 0.23600 |
| 5        | 0.75      | 0.5244  | 0.5412  | 0.1548  |
| \( s_4 \) | 0.74952 | 0.4924  | 0.0365  | 0.20065 |
| 4        | 0.75      | 0.2514  | 0.0365  | 0.2013  |
| \( c_s \) | 0.71652 | 0.5879  | 0.3625  | 0.2145  |
| 4        | 0.72      | 0.2514  | 0.0365  | 0.2013  |
| \( c_1 \) | 0.84365 | 0.8794  | 0.9871  | 0.82400 |
| 5        | 0.84      | 0.2514  | 0.0365  | 0.2013  |
| \( c_2 \) | 0.69365 | 0.5487  | 0.0212  | 0.2013  |
| 4        | 0.69      | 0.2514  | 0.0365  | 0.2013  |
| \( c_3 \) | 0.57623 | 0.2548  | 0.3251  | 0.82400 |
| 4        | 0.58      | 0.2514  | 0.0365  | 0.2013  |
| \( c_4 \) | 0.66442 | 0.2145  | 0.3215  | 0.2154  |
| 4        | 0.66      | 0.2145  | 0.3215  | 0.2154  |
| \( c_5 \) | 0.6856  | 0.82300 | 0.2145  | 0.2154  |
| 4        | 0.69      | 0.2145  | 0.3215  | 0.2154  |

Copyright reserved © J. Mech. Cont.& Math. Sci.
Yasser Khan et al

588
The discriminant validity of the model can be measured by three prevailing methods:

a) Cross loading of indicators: The cross loading method are given in Table 2 in more detailed manner.

b) FornellLarcker Criterion: By comparing the AVE value with associated correlations, more specifically square root is taken in diagonal and to determine the correlation coefficient of each variable lying in rows and columns.

c) Heterotrait-Monotrait: In order to cover the weakness in FornellLarcker Criterion and cross loading, the new method has value less than 0.85 and 0.9 for normal and inferential purpose respectively. To validate the discriminant value, HTMT is also frequently used.

C. Estimation of Structural Model & Testing of Hypotheses

After processing of boots trapping to test the hypotheses, Path co-efficient and T-values are derived and calculated. For t value less than 1.96 at 5% significance leave.

Table 4 – Average Variance Extract among Variables

| VAS     | Data Usage | Data Rate | Voice Quality | Complain t Mgm. | Service Quality | customer satisfactio n | Chur n |
|---------|------------|-----------|---------------|------------------|----------------|------------------------|--------|
| VAS     | 0.87       | 5         | 0.756         | 0.56             | 0.756          | 0.23                   | 0.25   |
| Data Usage | 0.56       | 9         | 0.756         | 0.56             | 0.23           | 0.25                   | 0.23   |
| Data Rate          | 0.23       | 2         | -0.254        | 0.56             | 0.23           | 0.25                   | 0.23   |
| Voice Quality      | 0.25       | 5         | -0.325        | 0.36             | 0.25           | 0.23                   | 0.23   |

Copyright reserved © J. Mech. Cont.& Math. Sci.
Yasser Khan et al
Hypothesis 1 postulating that Value Added Services has impact on Service Quality positively was supported with high significant value (T-Value is less than 1.96 at 5 % level of Significant). Hypotheses 2 postulating that Data Usage has impact on Service Quality positively was not accepted. Hypotheses 3 postulating that Data Rate has impact on Service Quality positively was not supported. Hypotheses 4 postulating that complaint management has impact on Service Quality Positively was not accepted. Hypotheses 5 postulating that Service Quality has impact on customer satisfaction was supported. Hypotheses 6 postulating that customer satisfaction has impact on customer churn negatively was supported.

Table 5 – Path Coefficients (Mean, Standard Deviation & T-Values)

| Hypothesis | Coefficient | Standard Deviation | T-Statistics | p-value |
|-------------|-------------|--------------------|--------------|---------|
| VAS → Service Quality | 0.325 | 0.065 | 3.765 | 0.000 |
| Data Usage → Service Quality | -0.058 | 0.087 | 0.517 | 0.215 |
| Data Rate → Service Quality | 0.254 | 0.054 | 1.026 | 0.321 |
| Complaint Management → Service Quality | -0.021 | 0.068 | 0.087 | 0.087 |
| Service Quality → Customer Satisfaction | 0.414 | 0.098 | 3.878 | 0.000 |
| Customer Satisfaction → Churn | -0.254 | 0.063 | 4.368 | 0.000 |

VI. Conclusion

The finding of the research shows that customer churn is due to many factors and having complex relationship with service delivery in the face of fierce competition and changing loyalties. The proposed model is comprised of value added service, data usage, data rate, complaint management that is impacting quality of service, customer satisfaction, and customer switching in Pakistan.
Telecommunication Market. The customer satisfaction is experience of users achieved as a result of responsiveness and reliability. This study revealed, if the customer is happy, contended and satisfied, it will automatically become loyal to company and will prevent him from changing the loyalty to others service provider. The phenomena will encourage the customer to consistently use the service and the confidence in service provider and enhance good customer experience. The customer dissatisfaction due to poor quality service will discourage customer to further continue with company and caused customer churn which is clearly depicted in our research results. The research is much applicable not only in cellular service provider but also in fixed voice and data services. The factors highly influencing customer behavior in term of loyalty are quality of service, high response to billing errors and complaints, updated technology, service with adequate features and low price

This study concluded that value added services is extremely important in order to achieve high Service Quality which further achieve the customer satisfaction and ultimately negatively impacting the customer defection or churn. The result suggests that by enhancing value added services in addition to core services would bring about high quality service. Although, Pakistan Telecom market has already introduced some value services like missed call alert, smart numbers (two numbers on one SIM), mobile academy, Islamic, Health Care, Sports, Entertainment, Payments, Online Money Transfer Services. But, still there is room for much more VAS in order to stay the customer with a particular service provider and prevent the flow of existing customer to another service provider.

VI. Future research scope

This research is intended for provisioning of voice and data communication through cellular service provider while the scope of the research can be extended up computer industry, telecom equipment manufacturer, cable TV service providers, and cellular handsets manufacturers to test the service delivery and its impact on ultimate customer experience.

References

I. Abbas Al-Refaie, Murad Al-Tarawneh, Nour Bata “ study of customer churn in the telecom industry using structural equation modelling” Journal of International Scientific Publications Economy & Business ISSN 1314-7242, Volume 12, 2018

II. Abbas Al-Refaie “Cluster Analysis of Customer Churn in Telecom Industry”, World Academy of Science, Engineering and Technology International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering Vol:11, No:5, 2017.

III. Adnan, Feras, Babar, Awais, sajjad “Customer churn prediction in telecommunication industry using data certainty”, Journal of Business Research Volume 94, January 2019, Page 290-301

Copyright reserved © J. Mech. Cont.& Math. Sci.
Yasser Khan et al
IV. Alrend, Anju, Indu, Jay, Erbeth, Leslyn, “Determining the intervening effects of exploratory data analysis and feature engineering in telecoms customer churn modelling”, 2019 4th MEC International Conference on Big Data and Smart City (ICBDSC).

V. Alrence Santiago Halibas; Anju Cherian Matthew; InduGovinda Pillai; Jay Harold Reazol; Erbeth Gerald De “Determining the Intervening Effects of Exploratory Data Analysis and Feature Engineering in Telecoms Customer Churn Modelling” 2019 4th MEC International Conference on Big Data and Smart City (ICBDSC)

VI. Amin A., Shehzad S., Khan C., Ali I., Anwar S. (2015) Churn Prediction in Telecommunication Industry Using Rough Set Approach. In: Camacho D., Kim SW., Trawiński B. (eds) New Trends in Computational Collective Intelligence. Studies in Computational Intelligence, vol 572 pp 83-95.

VII. Amit C and Indu Uprety, “Analysis of telecom service quality factors with analytic hierarchy process and fuzzy extent analysis: a case of public sector unit”, Int. J. Business and Systems Research, Vol. 10, Nos. 2/3/4, 2016.

VIII. Archi D, Dr. A.K. Srivastava, Impact of Service Quality on Customer Loyalty- A Study on Telecom Sector in India”, IOSR Journal of Business and Management (IOSR-JBM) Volume 18, Issue 2 .Ver. I (Feb. 2016), PP 45-55.

IX. A.Saran Kumar, Dr. D. Chandrakala “An Optimal Churn Prediction Model using Support Vector Machine with Adaboost” International Journal of Scientific Research in Computer Science, Engineering and Information Technology © 2017 IJSRCSEIT | Volume 2 | Issue 1

X. W.B. Huang, M. T. Kechadi, and B. Buckley, “Customer churn prediction in telecommunications,” Expert Syst. Appl., vol. 39, no. 1, pp. 1414–1425, Jan. 2012.

XI. Choi, S.-K., Lee, M.H., & Chung, G.H. (2001). Competition in Korean mobile telecommunications market: Business strategy and regulatory environment. Telecommunications Policy, 25, 125–138.

XII. Dirk Van den Poel, Bart Larivière, and “Customer Attrition Analysis for Financial Services Using Proportional Hazard Models” issue 13(3), 45-55 (2017) [2]

XIII. Fornell, C. (1992). A national customer satisfaction barometer: The Swedish experience. Journal of Marketing, 56, 6–21.

XIV. Greenwell, T.C., Fink, J.S., Pastore, D.L., 2002. Assessing the influence of the physical sports facility on customer satisfaction within the context of the service experience. Sport Manag. Rev. 5 (2), 129–148[28]

XV. Green, D. (1994), What is Quality in Higher Education?, 1st ed., The Society for Research into Higher Education & Open University press, Buckingham.

XVI. Jae-Hyeon, , Sang-Pil, Yung “Customer churn analysis: Churn determinants and mediation effects of partial defection in the Korean
mobile telecommunications service industry” Telecommunications Policy 30 (2006) 552–568

XVII. Jayawardhana, P., Perera, D., Kumara, A. and Paranawithana, A "Kanthaka: Big Data Caller Detail Record (CDR) Analyzer for Near Real Time Telecom Promotions." In 2013 4th International Conference on Intelligent Systems, Modelling and Simulation, pp. 534-538. IEEE, (2013).

XVIII. J. Hadden, A. Tiwari, R. Roy, and D. Ruta, “Computer assisted customer churn management: State-of-the-art and future trends,” Comput. Oper. Res., vol. 34, no. 10, pp. 2902–2917, Oct. 2007.

XIX. Jay Kandampully Tingting (Christina) Zhang Anil Bilgihan , (2015),"Customer loyalty: a review and future directions with a special focus on the hospitality industry", International Journal of Contemporary Hospitality Management, Vol. 27 Iss 3 pp. 379 - 414

XX. Kim, Hee-Su., & Kwon, N. (2003). The advantage of network size in acquiring new subscribers. Information Economics and Policy, 15(1), 17–33

XXI. Kiran Dahiya, Surbhi Bhatia” Customer churn analysis in telecom industry” 2015, 4th International Conference on Reliability, Infocom Technologies and Optimization (ICRITO) (Trends and Future Directions.

XXII. Kotler, P., & Keller, K. L. (2009). Marketing management (13th ed.). New Jersey: Pearson Prentice Hall.

XXIII. Mahafuz M, Md.Fazl, Nusrat C, Priodoshine S, “Customer satisfaction, switching intentions, perceived switching costs, and perceived alternative attractiveness in Bangladesh mobile telecommunications market”, South Asian Journal of Business Studies 2017, Vol. 6 Issue: 2

XXIV. Manish, Awadhesh, AP Rathore,”Prediction Model for Telecom Postpaid Customer Churn using Six-Sigma Methodology”, International Journal of Manufacturing Technology and Management, Volume 31, Issue 5, 2017

XXV. Muhammad Azeem , Muhammad Usman “A fuzzy based churn prediction and retention model for prepaid customers in telecom industry” International Journal of Computational Intelligence Systems, Vol. 11 (2018) 66–78

XXVI. Oliver, R. L. (1997). Satisfaction: A behavioral perspective on the consumer. Boston: Irwin McGraw-Hill

XXVII. PiasonViriri , Maxwell Phiri, “Determinants of Customer Satisfaction in Zimbabwe Telecommunication Industry” , J Communication, 8(1): 101-104 (2017)

XXVIII. Ritter, T., &Gemünden, H.G., (2003). “Network competence: Its impact on innovation success and its antecedents”. Journal of Business Research, 56(9), 745-755.

XXIX. Roberts, J.H, "Developing new rules for new markets”, Journal of the Academy of Marketing Science, issue 28(1), 31–44 (2000).

XXX. Sebastian, Eugen, Bart, vanden, “Profit driven decision trees for churn prediction” European Journal of Operational Research,2018

XXXI. Shreya M, Shubham G, Shubhangi J, Vidushi M, Artika S “Survey on Prediction of Customer Churn Analysis in a Telecommunications
XXXII. Spath, 2009, Introduction to Healthcare Quality Management, 1st Edition. Health Administration Press, Chicago, Illinois.

XXXIII. T. Vafeiadis, K.I. Diamantaras, Sarigiannidis, Chatzisavvas “A comparison of machine learning techniques for customer churn prediction”, Simulation Modelling Practice and Theory Volume 55, June 2015 Pages 1-9

XXXIV. Wenjie B, Meili C, Guo Li “A Big Data Clustering Algorithm for Mitigating the Risk of Customer Churn” IEEE TRANSACTIONS ON INDUSTRIAL INFORMATICS, VOL. 12, NO. 3, JUNE 2016

XXXV. Yiging H, Fangzhou Z, Mingxuan Y, KeYanhua Li, Bing N, Jia Z “Telco Churn Prediction with Big Data” proceedings of the 2015 ACM Sigmod International conference on management of data page 607-618, 2015

XXXVI. Zeithaml, Valerie A. & Bitter, Mary J. (2000) Services Marketing: Integrating customer focus across the firm, 2nd ed., Irwin/ McGraw-Hill, Boston, M.A