

# An Empirical Study on the Length of Association of Mobile Phone Subscribers with Mobile Network Operators: A Case of Bolgatanga Polytechnic Students

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**Abstract** - This study was carried out to investigate if a relationship exists between the length of time a subscriber uses a particular mobile network service and the network provider using students of Bolgatanga Polytechnic. The study employed survey research by collecting and processing data from 412 students. Using the chi square independent sample test, it was established that, there is no relationship between the duration of using a particular network service by a student and the network provider. The study also discovered that, subscribers are generally not willing to change their numbers and therefore mobile network providers will have a difficult task to win subscribers of rival network operators. On the basis of this research findings, we recommend that, network operators should endeavor to identify and target potential new mobile phone users and fashion strategies that can entice them to subscribe to their platforms whilst working to retain their existing customers.

**Index Terms** – Chi Square, Loyalty, Mobile Number Portability, Mobile Network Operators and Subscribers

## I. Introduction

The invasion of the world by the telecommunication industry has generated a lot of excitement and opened numerous windows of opportunities for businesses and researchers. In the last two decades the telecom industry has received a lot of attention in terms of research works.

Hitherto, the mobile phone was viewed as a luxury but with the advancement of time, the mobile phone is no longer regarded as such but considered an indispensable part of human life. The significance of the telecom industry cannot be under stated. Users of products and services of telecom operators differ in various ways and their interests, desires and expectations are also diametrical. Therefore the increased in the number of mobile service providers has provided subscribers with the space to choose between mobile service providers based on their needs and expectations. Today, the introduction of the Mobile Number Portability (MNP) has even made it much easier and convenient for subscribers to switch between service providers without having to worry about losing their existing contacts. The introduction of MNP marked a significant milestone in the annals of the telecommunication industry. The phenomenal transformations within the telecom industry have placed serious burdens on mobile network operators in their bid to capture and retain subscribers. As observed by Ndukwe (2008), in the Nigeria mobile phone industry, service providers compete with each other for the same consumers, that a single bad contact experience can have an exponential triple effect, which may occur through referral or badmouth of the company and its products. This phenomenon is not different from the Ghanaian situation. It is estimated that, a total of 209,646 subscribers ported their mobile numbers from one service provider to another as at the end of the third quarter of 2017 (NCA, 2017). With the competition becoming

tough, Coyle and Gokey (2005) points out that, service providers are beginning to appreciate that retaining their existing customer base is important as much as the acquiring of a new customer. Similarly Tseng (2007) and Kotler (2009) points out that, under such a fierce business climate, the challenge for mobile network providers goes beyond providing quality services and products to how to retain loyal customers who will contribute to long-term profits of their firms.

The duration or length of time a subscriber uses a particular network provider is a matter of great concern to network operators. Subscribers who hook up to network providers for longer durations are considered loyal customers of the network provider. Lovelock (1996), described customer loyalty as the willingness of a customer to continue to utilize a firm's goods and services over a lengthy period of time and on a repeated and preferably exclusive basis, and voluntarily recommending to friends and associates of the firm's products. Suffice to say customer loyalty has been defined by several scholars (Newman & Werbel 1973; Dick & Basu 1994; Jones & Sasser, 1995; Oliver, 1999; Tellis, 1988; Mei-Lien & Green, 2010). In all these definitions the underlying construct is the long-term relationship between a customer and a service provider.

Despite the several research works related to the telecom industry there is very limited research in establishing the relationship between the duration of using a particular mobile network service and the network provider by subscribers. In fact most of the available researches related to this current study have been concerned about examining the relationship between customer loyalty and customer satisfaction, customer loyalty and brand image, customer loyalty and service quality. However, a study analyzing the relationship between the length of time a subscriber uses the services of a mobile network provider and the network operator is limited or nonexistent within the Ghanaian telecom environment. In Ghana, it is a common feature to hear of subscribers complaining of unsatisfactory services and products from their network providers. This observation is confirmed in a study by (Nimako, Azumah, Donkor & Veronica, 2010; Mahmoud & Hinson, 2012) on the overall customer satisfaction within the Ghanaian telecom industry which showed that, customer satisfaction was low among subscribers of the various mobile network operators. This notwithstanding, the volume of subscribers switching from one network provider to the other constitutes a very small fraction. Available figures from the National Communications Authority (NCA) reveals that, the total number of mobile subscribers who ported their numbers in the third quarter of 2017 was 209,646 a decline from the second quarter 2017 figure of 225,085 (NCA, 2017). It is estimated that, only 0.6% of mobile phone subscribers switched the network operators as at the end of the third quarter of 2017 (NCA, 2017). This certainly makes this scenario puzzling in the wake of MNP. To this end, this research sought to find out if the duration of using a particular mobile network service by subscribers is dependent on the network operator.

The study also explored among other things the following:

- (i) The most preferred network provider by students
- (ii) The number of students aware of Mobile Number Portability (MNP)
- (iii) The number of subscribers who have changed their network providers before.

## II. Review of Literature

The duration of utilizing the services of a service provider by a customer is a fundamental component of the success of the service provider. Several studies have revealed that there are huge benefits associated with developing customer loyalty, especially within the telecommunication industry. According to Lee and Cunningham (2001) developing and increasing loyalty is key for the growth and performance of companies. Customer loyalty according to Fornell (1992) is that, it is closely related to the company's continued survival and of course to strong future growth. Thus, for a company to sustain a stable profit level when subscription level has reached saturation point, the market is matured and competition is fierce, a defensive strategy which attempts to retain existing customers is more important than an aggressive one. However, according to Deng, Lu, Wie and Zhang (2009) the ability of a service provider to create high degree of satisfaction is crucial for product differentiation and developing strong relationship with the user. Also Hanif, Sehrish, and Adnan (2010) posited that, user satisfaction makes the phone users loyal to one telecommunication service provider.

In today's market, the telecom industry has been extremely competitive and service providers are moving aggressively to attract users by offering some meaningful attractive promotions and services (Rahman, Haque & Ismail, 2010). The fierce rivalry within the telecommunication sector has made telecom companies to promote not only their service quality, but also modify their principal marketing strategy to holding their existing customers by enhancing and optimizing customer loyalty (Long & Jen, 2004). It is believed that, the cost of serving a loyal customer is five times or six times cheaper than a new customer (Keaveney, 1995; Peters, 1988; Ndubisi, 2005). In view of this, Walsh, Groth and Wiedmann (2005) indicated that, it is better to look after existing customers before acquiring new ones. In the view of Salgaonkar (2004) loyal customers are profitable customers and generate income by purchasing more, more often, a wider range and by recommending new customers and as such deserve special consideration from the firms. According to Bharadwaj, Varadarajan and Fahy (1993) a loyal customer base may be the only enduring source of competitive advantage. In view of this, companies and firms are now in the business of building long-term relations with their customers. This might account for Luston (1998) observation that, the use of loyalty packages as a way to expand customer loyalty is very prevalent in today's business environment. Wulf, Schroder, Cannier and Oppen (2003) postulate that, there is an existing perception that both consumers and companies can reap the benefits from such arrangement (engaging in a loyalty scheme).

According to Eshgi, Haughton and Topi (2007) user satisfaction can help brands to build long and profitable relationships with users. Similarly, Reichheld (1996) revealed that, customer satisfaction is a necessary originator of customer loyalty, which in turn enhances profitability and performance. There is abundant literature that provides evidence to the fact that customer satisfaction leads to customer loyalty (retention, repeat business and referral) which in turn leads to revenue growth and profitability of the firm (Heskett, Jones, Loveman, Sasser & Schlesinger, 1994; Stone, Woodcock & Macthynger, 2000; Xu, Yen, Lin, & Chou, 2002; Thompsonson, 2004).

Due to the importance of customer loyalty in the telecom industry a lot of researchers have researched into the determinants of customer loyalty in the service industry. For example Adeleke and Aminu (2012) identified service quality, customer satisfaction, and corporate image as important determinants of customer satisfaction and loyalty in Nigeria's GSM market. Also Zeithaml (2003) noticed that customer satisfaction is a key determinant of customer retention. Various studies on the determinants of customer loyalty include (Gronroos, 1988; Chen & Ching, 2006; Kandampully, 2007; Liu, 2008; Adeleke & Aminu, 2012; Kelly, Hoffman & Davis 1993; Rust & Zahorik 1993).

Also the works of (Woodruff, 1997; Kollman, 2000; Varki and Colgate, 2001; Ogwo & Igwe, 2012) have also examined the effects of price on customers buying behaviors within the service industry and its relationship with customer loyalty.

Other studies have also focused on the switching behaviors of customers and other related matters pertaining to switching within the service industry (Nilssen, 1992; Jones, Mothersbaugh & Beatty, 2000; Colgate & Lang 2001; Chen & Hitt, 2002; Kim, Klinger & Vale, 2003; Kim, Park & Jeong, 2004; Lam, Shankar, Erramilli & Murphy 2004; Bell & Smalley, 2005; Oyeniyi & Abiodun, 2010; Makwana, Shamma & Arora, 2014).

### III. Research Methods

To achieve the objectives of this study, a questionnaire was developed and a pilot survey carried out with an initial sample of 40 students. This exercise was important in exposing the challenges that were bound to occur in the main survey for corrective measures to be pursued. The pilot survey was also used to obtain some basic information relevant for the sample size determination. For example the sample variance was estimated from the pilot survey. Lessons from the pilot survey guided the design and finalization of the research instrument for the data collection. The designed questionnaire was self-administered to randomly selected students of Bolgatanga Polytechnic. A total number of 482 sampling units (students) were selected from a total population of 1058 students by simple random sampling.

#### Sample Size Determination

We determined the appropriate sample size using the formula

$$n_0 = \frac{t^2 s^2}{d^2}$$
$$n = \frac{n_0}{1 + n_0/N}$$

*N – Total population*

*n<sub>0</sub> – is the initial sample size*

*n<sub>1</sub> – is the unadjusted sample size*

*n – is the adjusted sample size*

*s – is the estimated standard deviation of students age*

*t – t value at the 95% confidence interval*

*d – desired margin of error*

$$n_0 = \frac{(1.96)^2(0.758)^2}{(0.05)^2}$$
$$n_0 = \frac{2.207}{0.0025}$$
$$n_0 = 882.8 \approx 883$$
$$n = \frac{n_0}{1 + n_0/N}$$
$$n = \frac{883}{1 + 883/1058}$$
$$n = \frac{883}{1 + 0.835}$$

$$n = \frac{883}{1 + 0.835} \\ n = 481.19 \approx 482$$

Based on the sample size calculation, a total sample of 482 questionnaires was administered to 482 students selected for this study. Following the administration of the 482 questionnaires, 412 of the retrieved questionnaires were considered valid and good for purposes of this study.

#### IV. Data Presentation and Discussion

The statistical packages SPSS and Excel were used for the data analysis. The data collected and processed revealed that, students captured for the survey were made up of 214(52%) males and 198(48%) females. Majority of the students 282(68%) belonged to the age group 21-25 followed by the age group 26-30 constituting 81(20%). The age group 15-20 was made up of 43(10%) and the age groups 31-35 and 36 and above constituted 6 (2%).

To investigate if a relationship exists between the length of using a network provider and the network provider, we formulated and tested the hypothesis below using the chi-square as the statistical device.

#### Hypothesis Testing

$H_1$ : The length of time of using a mobile service operator's sim card is not independent of the network provider

To validate this hypothesis we used the chi-square independent sample test. The data collected was summarized and organized into rows and columns as shown in Table 1. Rows contained information on the length of time a student had used his regular mobile number and the columns on the other hand represented the mobile network operators.

Table 1: Relationship between Length of Time of Usage and Mobile Network Operator

<i>Length of Time</i>	Mobile Network Operator				<b>Totals</b>
	<i>MTN</i>	<i>Vodafone</i>	<i>Tigo</i>	<i>Airtel</i>	
< 1	4	1	0	0	<b>5</b>
1 – 2	36	27	1	0	<b>64</b>
3 – 5	113	58	3	2	<b>176</b>
> 5	128	36	0	3	<b>167</b>
<b>Totals</b>	<b>281</b>	<b>122</b>	<b>4</b>	<b>5</b>	<b>412</b>

$$\chi^2_{cal} = \sum_{i=1}^4 \sum_{j=1}^4 \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

$$E_{ij} = \frac{R_i \times C_j}{n}$$

$$E_{11} = \frac{5 \times 281}{412} = 3.41, \quad E_{12} = \frac{5 \times 122}{412} = 1.48, \quad E_{13} = \frac{5 \times 4}{412} = 0.05 \quad E_{14} = \frac{5 \times 5}{412} = 0.06$$

$$E_{21} = \frac{64 \times 281}{412} = 43.65, \quad E_{22} = \frac{64 \times 122}{412} = 18.95, \quad E_{23} = \frac{64 \times 4}{412} = 0.62 \quad E_{24} = \frac{64 \times 5}{412} = 0.78$$

$$E_{11} = \frac{176 \times 281}{412} = 120.04, \quad E_{12} = \frac{176 \times 122}{412} = 52.12, \quad E_{13} = \frac{176 \times 4}{412} = 1.71 \quad E_{14} = \frac{176 \times 5}{412} = 2.14$$

$$E_{21} = \frac{167 \times 281}{412} = 113.90, \quad E_{22} = \frac{167 \times 122}{412} = 49.45, \quad E_{23} = \frac{167 \times 4}{412} = 1.62 \quad E_{24} = \frac{167 \times 5}{412} = 2.03$$

$$\chi^2_{cal} = \frac{(4-3.41)^2}{3.41} + \frac{(1-1.48)^2}{1.48} + \frac{(0-0.05)^2}{0.05} + \frac{(0-0.06)^2}{0.06} + \frac{(36-43.65)^2}{43.65} + \frac{(27-18.95)^2}{18.95} + \frac{(1-0.62)^2}{0.62} + \frac{(0-0.78)^2}{0.78} + \frac{(113-120.03)^2}{120.03} + \frac{(58-52.12)^2}{52.12} + \frac{(3-1.71)^2}{1.71} + \frac{(2-2.14)^2}{2.14} + \frac{(128-113.90)^2}{113.90} + \frac{(36-49.45)^2}{49.45} + \frac{(0-1.62)^2}{1.62} + \frac{(3-2.03)^2}{2.03} \\ 0.10 + 0.16 + 0.05 + 0.06 + 1.34 + 3.42 + 0.23 + 0.78 + 0.41 + 0.66 + 0.97 + 0.01 + 1.75 + 3.66 + 1.62 + 0.46$$

$$\chi^2_{cal} = 15.68$$

Comparing  $\chi^2_{cal} = 15.68$  with  $\chi^2_{(0.05,9)} = 16.919$  indicates that, we retain the null hypothesis since the calculated value is less than the table value. The results suggest that, the duration of using the services of a mobile service provider is independent of the network provider. This means that, students are likely to use a mobile service provider for a long time regardless of which network operator it is as long as their expectations are met. In other words, the loyalty of a student to a mobile service provider has nothing to do with the network provider. A review of the findings of other scholars (Groholdt, Martensen, & Kristensen 2000; Smith & Taylor, 2004; Kandampully, 2007; Liu, 2008; Adeleke & Aminu, 2012; Hashim, 2014) showed from their respective works that corporate image is a key factor of customer loyalty for firms. However, the finding of (Adjei & Denanyoh 2014) contradicts the conclusion of scholars (Groholdt, Martensen, & Kristensen 2000; Smith & Taylor, 2004; Kandampully, 2007; Liu, 2008; Adeleke & Aminu, 2012; Hashim, 2014) that, contribution of brand image to customer loyalty is less significant.

Juxtaposing our results with the findings of other writers whose research established a positive relationship between brand image and customer loyalty within the telecommunication industry, we are of the view that, the network operator may play a critical role in creating a positive impression in the mind of a new mobile phone subscriber's decision to choose a particular mobile network operator. However, once the decision is made by the subscriber, the mobile network operator may no longer have a binding influence over the subscriber.

By extension, we are of the considered opinion that, brand image may be a considering factor by a subscriber when first choosing a mobile network operator, however, once the decision is made, brand image may no longer be determining factor of customer loyalty.

We infer from our chi result that, all the network operators have an opportunity of building long-term relationships with their customers if they pay attention to the needs of their customers.

### Most Preferred Network Provider

The study revealed that the most preferred network provider is MTN followed by Vodafone. It is therefore not surprising that MTN is the leading mobile network provider in terms of subscriber base in Ghana. Vodafone comes second as per statistics from the National Communication Authority. The two leading network providers constitute 96% of the most preferred network whilst the remaining network providers (Tigo, Airtel, Expresso and Glo) constitute 4%. This data shows that, the subscriber base of Tigo, Airtel, Expresso and Glo are extremely low among students of Bolgatanga Polytechnic. This situation therefore calls for aggressive marketing strategies by these four mobile network operators to be able to cut into the subscriber base of the two leading operators or target new users and win them before they are captured by the two leading network operators knowing the effect of the bandwagon factor. It is therefore not surprising and certainly not out of place to be hearing of a possible meager of some of the network operators with very low subscriber base in recent times in the Ghanaian telecom space. The Fig 1 is a graphical illustration of the most preferred network by students.

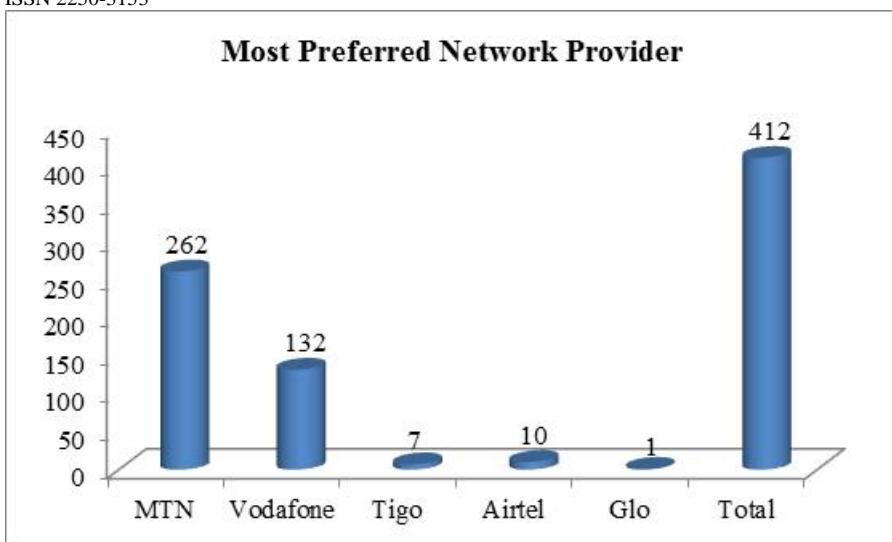


Fig 1: Most Preferred Network Provider

### Awareness of Mobile Number Portability

In line with our primary objective, this study sought to know the percentage of students aware of MNP. The results showed that 281(68%) of the students knew of MNP whereas 117(28%) registered their ignorance about MNP. The result of the analyzed data is presented in Table 2. Since MNP is a critical technology required to stimulate competition by putting mobile network operators on their feet, there is the need to raise public awareness on MNP among mobile subscribers through public sensitization. More education on MNP can help mobile phone subscribers feel a little at ease changing their mobile sim cards since there will be no anxiety of losing contacts when they change their existing phone numbers. When more subscribers adopt the use of MNP to register their displeasure against unsatisfactory services from mobile network operators, mobile network operators will be pressured to improve their service to their clients. This ultimately will go a long way to benefit subscribers.

Table 2: Awareness of Mobile Number Portability

		Frequency	Percent	Cumulative Percent
Valid	Yes	281	68.2	70.6
	No	117	28.4	100.0
	Total	398	96.6	
Missing	System	14	3.4	
	Total	412	100.0	

### Change of Network Provider

The data in Table 3 relates to subscribers who have changed a network provider based on one reason or the other. Out of the 412 students from which data was collected, 182(44%) revealed they had changed their network provider. On the other hand, 230(56%) revealed they have never changed their network provider. Clearly, majority of the students surveyed have not changed their network provider.

Table 3: Statistics on Network Provider Switch

	Frequency	Percent	Cumulative Percent
Valid Yes	182	44.2	44.2
Valid No	230	55.8	100.0
Total	412	100.0	

### Reasons for Changing Mobile Numbers

The data collected revealed that, 182 students had switched from one network provider to the other. In examining the reasons that influenced these students to change their network providers, majority of them 71(39%) who had switched network providers revealed network challenges as the main reason for their action. The second leading reason cited by them for switching network providers was lost of number and this recorded a count of 56(31%). Other reasons like (higher call rates, mobile money, family and friends, internet and bad customer service) accounted for 55(30%). The graph in Fig2 gives a pictorial view of the scenario.

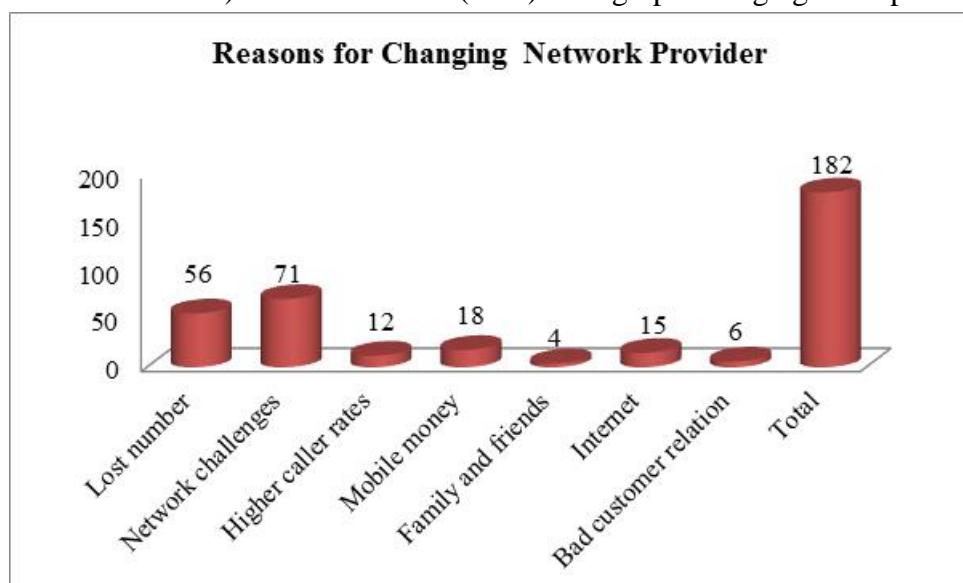


Fig 2: Reasons for Changing Network Provider

### Willingness to Change Mobile Number

Despite the introduction of MNP to make changing of network operators easy for subscribers, our study revealed that out of a total number of 411 students who answered this question, majority of them 370( 90%) indicated that they will not be comfortable to change their numbers. On the other hand, 41(10%) of them said they will be comfortable to change their numbers. This suggests that, customers have a high propensity of being loyal to their operators for various reasons which may not necessarily be attributed to service satisfaction. As suggested by (Levesque & McDougall, 1993) that, even if an existing problem is unresolved, nearly half of the company's customers would stay. The implication of this is that, network operators will have a difficult task attracting subscribers of rival providers. The reluctance of students to change their mobile service providers may also be attributed to the fact that, the services provided by the various network operators are similar in nature and probably shredded with the same kind of challenges. It is therefore incumbent on network providers to hold tight to their existing customers whilst considering innovative strategies of winning new users of

telecom services and products. This observation affirms the position of loyalty by (Keaveney, 1995; Peters, 1988; Long & Chun 2004; Ndubisi, 2005; Walsh et al., 2005) in retaining existing customers. The unwillingness for subscribers to change their numbers for one factor or the other may be a major reason why subscribers are found using multiple service providers. This study revealed that 373(90%) of the respondents depended on additional network providers to their main network service provider whilst only 39(10%) relied on only one network provider for their telecom services and products.

**Willingness to Change Network Operator**

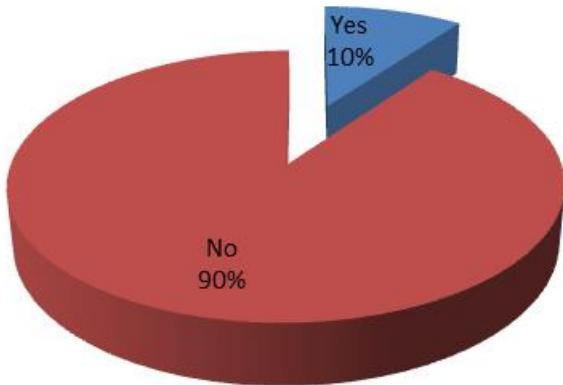


Fig 3: Willingness to Change Network Operator

## V. Conclusion and Recommendation

In conclusion we say that, the duration of a student of Bolgatanga Polytechnic using the services of a particular mobile network provider has no relationship with the mobile network provider. This presupposes that, subscribers are inclined to hook on to a mobile service provider for longer periods into the unforeseeable future regardless of which network provider it is if they satisfied with the services of the network provider. On the other hand, if subscribers' expectations are not met, they are likely to switch to another network provider but with a small probability. One interesting discovery of this study is the unwillingness of subscribers to change their service providers except in very extreme circumstances. This means that, service providers have an uphill task attracting subscribers of rival network providers. This corroborates with the work of (Keaveney 1995; Peters, 1988; Ndubisi, 2005; which postulated that it is about five times or six times cheaper to serve a loyal customer than a new customer in terms of cost. In line with Walsh et al. (2005) profound statement that, it is better to look after existing customers before acquiring new ones, this study recommends that network operators should thrive to keep their existing customers whilst identifying and coming out with strategies that would win potential new users to their platform is paramount is expanding their subscriber base and ultimately growing their profits.



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