Sulaimon Olanrewaju Adebiyi, Emmanuel Olateju Oyatoye, Owolabi Lateef Kuye

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Sulaimon Olanrewaju Adebiyi[1]
Department of Business Administration,
Fountain University, Osogbo, Nigeria

Emmanuel Olateju Oyatoye[2]
Department of Business Administration,
University of Lagos, Nigeria

Owolabi Lateef Kuye[3]
Department of Business Administration,
University of Lagos, Nigeria

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Abstract

The introduction of mobile number portability (MNP) in the Nigerian telecommunications industry has brought a new challenge for mobile operators. This study investigates the use of Analytic Hierarchy Process (AHP) in customer retention decisions in the Nigerian telecommunication industry using a cross-sectional survey design. Primary data were obtained through questionnaires administered to 480 mobile telecommunications subscribers in six tertiary institutions located in Lagos State, Nigeria. These educational institutions were chosen using a multistage sampling technique. Of 438 questionnaires received from subscribers, 408 were valid. Based on this sample data an AHP model was built to assess the determinants of customer retention decisions. Next, eigen values, an eigen vector and maximum lambda (λ_{Max}) were obtained using the AHP analysis for the matrices. This analysis shows that customers considered call quality as the important in the retention decision. We conclude that AHP is a meaningful tool for determining

what motivates retention decisions, that can help network operators formulate effective customer retention strategies.

Keywords: analytic hierarchy process, mobile number portability, retention management, telecommunication, marketing strategies
JEL: M1, M2, M31, M150, C83

Introduction

A key issue for telecommunications service providers in Nigeria today is customer churn: that is, the inability of firms to retain subscribers over time. This problem is rampant, and negatively affects such companies as Code-Division Multiple Access (CDMA): Starcom PLC, Multilinks, O`nets, and Reltel. Although most industries undergo expected churn, i.e. a loss of some customers to competition, retaining customers is the goal of all companies, including mobile telecommunication and wireless companies [Arthur, 2008]. Reducing churn is often addressed by academics and practitioners assisting telecom companies seeking ways to acquire new customers [Rahul, 1999]. In this study, we examine relevant issues motivating customers` retention decisions in the telecomm industry. To assess network operator performance and the effectiveness of technical and/or on marketing/corporate strategies we need to examine service quality [Douligeris, Pereira, 1994]. Methodologically, we rely on the Analytic Hierarchy process (AHP) for data analysis because it allows us to elicit weights for each attribute and decision level and helps explain individual decisions regarding preferred product or service providers. To implement the AHP analysis, we conducted a survey of subscribers who were asked to value different services attributes in hierarchical order. This approach is based on the literature and focus group discussion (FDG) on telecommunication services delivery and customer retention in Nigeria.

The acceptance of limited inconsistency and the possibility of managing it is often considered an advantage of the AHP method [Harker, Vargas, 1987]. Measures of inconsistency set AHP analysis apart from other multi-criteria methods such as goal programming, Multi-Attribute Utility Theory (MAUT), conjoint analysis (CA), or choice experiments. AHP allows us to determine preference scores at individual level, which the CA does not, AHP is considered the most appropriate for this study. An additional advantage of the AHP analysis is that it is a flexible method and permits the tracing of inconsistencies. [Ramanathan, 2001].

Network operators ought to offer impeccable substitute services for subscribers. However, the situation in Nigeria is different as operators' SIM cards are interchangeable. Therefore, average expenditures on telecommunication are increased due to the common

need to keep multiple SIM cards to access a range of services not offered by any single operator. This makes the search for a suitable telecom service a continuous process. The mentioned practice makes it hard for telecommunication operators to satisfy customers, who are many SIMs users. This in turn results in frequent brand switching and/or maintaining accounts with different providers, thereby making it difficult for telecom operators (or carriers) to retain customers [Oyatoye, Adebiyi, Amole, 2015]. Subsequently, it is essential to model retention behavior to provide the solution that will enhance subscribers' satisfaction. Subsequently, an optimal retention model needs to identify solutions that will enhance subscribers' satisfaction.

The growth in the telecommunication industry experienced in Nigeria since being deregulated in 2001 appears to have made the market more competitive and difficult for the service providers to retain or exercise a monopoly over their customer. In fact, most Nigerians seeking better price and quality service find it easy to change their service provider, since the switching cost is sometimes close to zero naira (local currency unit in Nigeria denomination). The inability of some telecom operators to retain customers leads to declining profit levels and likely negative customer recommendations [Reichheld, Sasser, 1990]. In addition, the cost of getting a new customer may be significantly higher than the cost of retaining an existing one [Siber, 1997]. Consequently, Rashid [2010] claims that the telecommunications industry is unstable and developing quickly in relation to market dynamicity and competition, and constantly develops new tools and products, that present customers with new options [Cedric, Laanya, Martin Khenchaf, 2004; Mozer, Dodier, Colagrosso, Guerra-Salcedo, Wolniewicz, 2002].

The vital problem faced by companies, including those in the telecommunication industry is loss of customers to competitors, which is called attrition. A customer who leaves a service provider in favor of a competitor costs provider more than revenue paid by a new customer [Mozer et al, 2002]. Thus, inability to retain customers` is one of the major problems faced by telecommunication companies in general [Behravan, Rahman, 2012]. As Behravan and Rahman observed, for many service industries the utmost concern is monitoring customer churn. Statistical data on the telecommunication industry indicates a 20 to 40 percent churn rate in many countries [Ahna, Hana, Lee, 2006] which leads to a decrease in profits and in the number of premium price plans, reduction in market share and loss of potential customer recommendations needed to expand market share.

The introduction of MNP in April 2013 appears to have made the Nigeria telecommunication business environment more volatile and competitive, as subscribers can easily switch (port) telecommunications service providers while still maintaining their original phone number. Thus, keeping profitable subscribers loyal is central to business success and growth in the telecommunication industry. To better address factors contributing to increased retention, one needs to understand customer motivation when switching providers. In order to from a guide to effective customer retention strategies in the industry

various factors motivating customers need to be prioritized and appropriate weights attached to those factors, which is the major objective of this research.

Thus, this study uses the AHP model for estimating the determinants of customers` retention decision in the Nigerian telecommunications industry. The specific objectives include:

(i) model customer retention behavior of mobile phone subscribers in the Nigeria itelecommunications industry with AHP;
(ii) analyze the customer retention drivers in the telecommunication industry using AHP;
(iii) prioritize the influence of customer retention drivers on customers' retention decision.

Literature Review

Analytic Hierarchy Process Applications

AHP is a Multicriteria Decision Analysis methodology that allows both objective and subjective factors to be considered in the decision-making process. Similar to other MCDA techniques, its purpose is to develop a theory and provide a methodology for modeling unstructured decision problems [Okeola, Sule, 2012]. AHP helps to determine which variable has the highest priority in influencing a particular decision. AHP assumes that people are more capable of creating comparative decisions than absolute decisions, and is based on the key rules of disintegration, relative decision, and synthesis of priorities [Dey, 2003].

Studies on the application of AHP are not limited to developed countries. As shown below, the AHP methodology has been applied to Nigeria to analyze various decision-making situations:

(i) Choice: Choosing one option from a set of options [Oyatoye, Okpokpo, Adekoya, 2010];
(ii) Prioritization/evaluation: Determining comparatives value of a set of options [Ogunyemi, Ibiwoye, Oyatoye, 2011];
(iii) Resource allocation: Discovering better combinations of options subject to different restrictions [Joseph, Oyatoye, Ihie, 2011; Oluwafemi, Oyatoye, 2012];
(iv) Benchmarking: Benchmarking processes or systems with other known processes or systems [Okeola, Sule, 2012].

None of the above studies deals with the Nigerian telecommunications and, to the best of our knowledge, no study has used this methodology to model and estimate customer behavior in that industry. The industries where AHP has been applied include health care, defense, project planning, technological forecasting, marketing, new product pricing, economic forecasting, policy evaluation, and social sciences. When used in conflict analysis, military operations research, regional and urban planning, Research and Development management and space investigation, AHP served was used as the dominant (and adaptable) decision-making process model for setting priorities and making decisions based on

qualitative and quantitative analysis. The methodology reduces complicated judgments to a series of one-on-one assessments, and then synthesizes outcomes.

Retaining customers in the Nigerian telecommunications industry is a complex problem affecting all stakeholders. The severity of the problems has increased because customers can retain their phone numbers when switching service providers. Besides helping companies reach decisions AHP also explains the way people think. This study is designed to help model subscriber thinking, to facilitate rational decision-making regarding mobile network provider retention. The study serves as the basis for developing industry to enhance customer satisfaction and, therefore, customer retention.

Customer Retention

Since implementation of the MNP in April 2013 (by which customers can switch providers and keep their phone number) telecommunication need to move beyond a new customer focus (through buying a new SIM card) and include the retention problem, which for many firms is the key to profitability [Wilson, Soni, O'Keeffe, 1995]. In most countries, the telecommunications industry facilitates effective communications and also generates revenues in excess of operational costs. Thus, customer retention accounts for between 25% to 80% of firm profits [Reichheld, Kenny, 1990], and the longer a customer stays with an organization the more valuable he/she becomes [Reichheld Sasser, 1990]. This is linked to a number of factors, including the higher initial costs of introducing and attracting new customers, increases in both the value and number of purchases, customer understanding of the organization, and positive word-of-mouth marketing.

Apart from the benefits that customer longevity brings, research also indicates that the costs of customer retention activities are lower than the costs of acquiring new customers. According to Rust and Zahorik [1993] attracting new customers may be five times as costly as keeping existing ones. As Portela and Menezes [2011] revealed, customer retention became a buzzword in the 1990 s, mainly due to the work of Reichheld and Sasser [1990], who first evidenced its advantages [Carroll, 1992; Dowling, Uncles, 1997; East, Hammond, Gendall, 2006; Gupta, Zeithami, 2006; Reinartz, Kumar, 2000]. Although, their results did not converge in all respects, these works changed related marketing theories. Following this new paradigm, many firms have focused on customer retention, which should be strongly linked to lifetime customer value (the expected net present value of future cash flows of the customer). Therefore, enterprises should not try to retain all current customers regardless of their contribution to company's profits [Gupta, Lehmann, 2003; Jain, Singh, 2002; Malthouse, Blattberg, 2004; Thomas, Reinartz, Kumar, 2004] and efforts to retain unprofitable customer should be eliminated [Thomas et al., 2004].

Customer retention requires maintaining continuous relationships with customers over the long term. High retention means low defection [Ahmad, Buttle, 2001]. Ramakrishnan [2006] defines customer retention as preventing customers from going to competitors. Customer retention depends on company efforts to satisfy existing customers so that they

will continue to do business with it [Mostert, Meyer, Rensburg, 2009] and is measured by the number of customers retained over a given time period [Dawes, 2009]. In a highly competitive environment characterized by ever better deals [Fluss, 2010], annual customer attrition rates range from 7% in industries of high exit barriers such as banking and insurance, to almost 40% in the mobile phone industry, which is therefore considered to be particularly challenging [Molapo, Mukwada, 2011].

Customer retention has a direct impact on long-term customer lifetime value, which is a more profitable avenue for firms seeking growth and protection from market fluctuations [Gee, Coates and Nicholson, 2008]. Corroborating this argument, Lombard [2009] argues that today pressure on companies to retain customers is fueled by a market in which customer acquisition is slow. Customer retention is particularly important when decreasing loyalty and sales cycles are aggravating the business environment (Molapo, Mukwada, 2011).

Typically, customer retention falls within the Customer Relationship Management (CRM) Department. According to Payne [2006], CRM seeks to create and develop relationships with carefully targeted subscribers to improve customer value, corporate profitability and shareholder value. Thus, effort by telecommunications firms to improve customer value helps to ensure business and profits. Hennig-Thurau and Hansen [2000] argued that CRM is now one of the most prosperous branches of marketing theory and a critical management tool for business.

The argument supporting retention efforts relies on a straightforward cost/benefit analysis. It costs less to keep existing customers than to acquire new ones because the fixed costs involved in are high at the beginning stages of the commercial relationship [Hurley, 2004; Reichheld, Kenny, 1990]. To retain customers, telecommunications companies must understand their subscribers and the factors that will motivate them to remain with the current service provider.

Methodology

This research work is descriptive and analytical in nature. Data collection was based on questionnaire survey method. The questionnaire was structured in an analytical hierarchy process (AHP) format. The sample consisted of 480 telecommunication operators subscribers (staff, students, visitors and persons conducting businesses on campuses) across six tertiary institutions (University of Lagos, Akoka; Yaba College of Technology, Yaba; Lagos State University, Ojo; Micheal Otedola College of Primary Education, Epe; Wolex Polytechnic, Ikeja and Caleb University, Imota), all Lagos State, Nigeria. A non-probability convenience sampling of subscribers of four GSM players (MTN, Airtel, Glo and Etisalat) in the Nigeria telecommunications industry was used. Four hundred and eight copies of the questionnaires (85% of the sample) were returned and considered valid for

our analysis, which was done by calculating the weight of the criteria and alternatives. The process using AHP method involved two stages [Taylor III, 2002]:

i. First Stage. Determinants of customer retention in the Nigerian telecommunication industry: (a) Establishing a pair-wise comparison matrix for each decision alternative for each criterion; (b) Synthesization; (c) Establishing a pair-wise comparison matrix for each criteria; (d) Establishing the normalized matrix; (e) Establishing the preference vector; (f) Calculating overall values for each decision alternative; and (g) Determining the rank of alternatives according to the values acquired in the previous stage.
ii. Second Stage. Test of Consistency: The test of consistency was carried out using the following formulas:

$$CI = (\lambda_{max} - n)/(n - 1) \quad (1),$$

where $\lambda_{max}=\Sigma w_i c_i$

After acquiring a Consistency Index (CI), a Consistency Ratio (CR) was calculated using the formula:

$$CR = CI/RI \quad (2),$$

where n is the number of items compared; W_i is the weight; C_i is the sum along the column; CR is the consistency ratio; CI is the consistency index; and RI is the random consistency index. The Random Consistency Index (RI) appears in Table 1.

TABLE 1. Random index

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R.I.	0	0	0.58	0.90	1.12	1.25	1.32	1.41	1.45	1.49	1.54	1.48	1.56	1.57	1.59

Source: adapted from Saaty [2000].

If CR ≥ 10%, the data acquired is inconsistent, otherwise (CR < 10%) the data acquired is consistent. The results obtained from the above process are reported and discussed in the next section of this paper.

The AHP Model for Customers` Retention

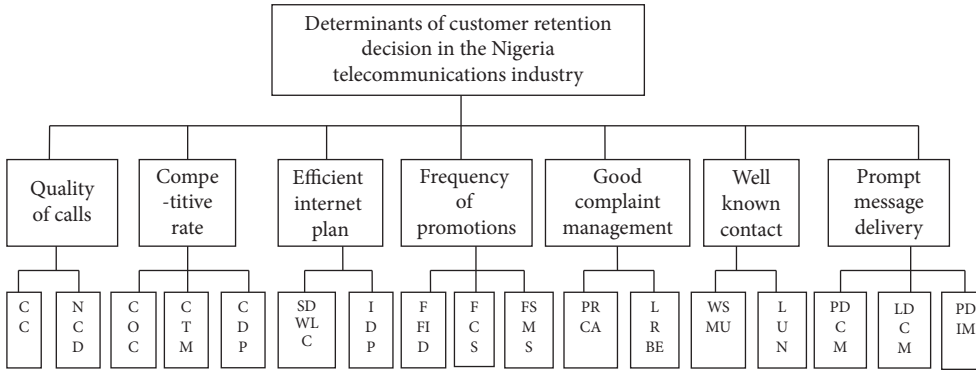
The hierarchy of the model is as follows:

Level 1. The Goal: Determinants of customer retention in the Nigerian telecommunications industry.

Level 2. The Criteria: There are seven criteria, namely, quality of calls, competitive rates, efficient internet plan, frequent promotions/bonuses, good complaint management, widely spread/known number and message delivery.

Level 3. The Alternatives: The components of each customer retention driver formed the alternatives. The alternative for quality of calls are call clarity and no call drop from the network operator; for competitive rates low costs of calls and of text messaging, while efficient internet plan has sufficient data with low cost and ineffective-affordable data plan as its alternatives. For frequency of promotion, frequent free data, free calls services and free SMS services from network operators are the alternatives while good complaint management has prompt response by operator's agent and late response but effective by network operator's agents as its alternatives. Widely spread mobile number and long in-use number are the alternatives for widely spread/known number criteria. Message delivery has prompt delivery of complete message, late delivery of complete message and prompt delivery of incomplete message as alternatives. The hierarchical model is presented in Figure 1.

FIGURE 1. Proposed hierarchical model for customers` retention decision in the Nigeria



Source: own elaboration.

Keys:

CC	– Call clarity
NCD	– No calls drops
COC	– Cheapness of calls
CTM	– Cheapness of text messages
CDP	– Cheap data plan
SDWLC	– Sufficient data at low cost
IDP	– Insufficient, affordable data plan
FFID	– Frequent free internet data
FCS	– Frequent free calls services
FSMS	– Free SMS
PRCA	– Prompt response by customer agent
LRBE	– Late response but effective
WSMN	– Widely spread mobile number
LUN	– Long in use number
PDCM	– Prompt delivery of complete message
LDCM	– Late delivery of complete message
PDIM	– Prompt delivery of incomplete message

Results and Discussion

A total of 3,264 comparison matrices were constructed from the survey responses. For the AHP analysis, each comparison matrix must be reduced to one (1) for each level of the hierarchy. Therefore, the 3,264 matrices were reduced to eight (8) comparison matrices by finding the average of each matrix after the first individual questionnaires analysis.

The values in the last column of Table 2 are the weights/priority vectors, which have a direct physical meaning in interpreting our AHP results. They define the contribution or weight of those criteria relative to the goal, which is to determine the contribution of each criterion to a subscribers' decision to retain a network provider. Following AHP procedure, decision irregularities also need to be checked. The main objective is to obtain sufficient information to decide whether the customers have been coherent with their choices. The irregularity index is built on a maximum lambda value, which is calculated by adding the product of each element in the eigenvector (weight) and the respective column total of the original comparison matrix. Table 3 demonstrates the calculation of the maximum eigen value also called maximum lambda (λ_{Max}).

The test of consistency (consistency index) is calculated below:

$$CI = (\lambda_{Max} - n)/(n - 1) = (7.1542 - 7)/7 - 1 = 0.1542/6 = 0.0257$$

In order to validate that the consistency index is acceptable, Saaty [2000] suggests a consistency ratio (CR), which is resolved by the ratio between the consistency index and random consistency index (RI). The matrix is deemed consistent if the resultant ratio is less than 10%. The random index value is secure and based on the amount of evaluated measures as shown in table 1.

In the case of the retention criteria in relation to the goal of determinant of customer retention, the consistency ratio for the 7 by 7 matrix is calculated as follows:

$$CR = \frac{CI}{RI} = 0.0257/1.32 = 0.0195 = 2\% < 10\%$$

Since its value is less than 10%, the matrix is considered to be consistent.
When considering eigen vector values/priority weight of customer retention criteria, it is evident that the quality of calls is the highest determinant of customers retention, with about 22.62% influence in the decision to retain a network, leaving the remaining six criteria to share 77.38% in their influence on customer retention decisions.

Tables from 12 to 25 (see Appendix) provide the reduced matrix and the calculation of maximum eigen value for each of the decision alternatives (third level of the hierarchical structure).

TABLE 2. Reduced matrix for customer retention criteria

Decision criteria	Quality of calls	Competitive rate	Efficient internet plan	Frequency of promotions/ bonuses	Good complaint management	Widely spread/known numbers	Prompt message delivery	Weight
Quality of calls	1.0000	1.5042	1.5360	2.5635	2.2547	1.7947	1.5283	0.2262
Competitive rate	0.6648	1.0000	1.1860	2.0390	2.1077	1.8813	1.7323	0.1878
Efficient internet plan	0.6510	0.8432	1.0000	1.8943	1.8655	1.6048	1.8894	0.1716
Frequency of promotions/bonuses	0.3901	0.4904	0.5279	1.0000	1.6168	1.6399	1.3498	0.1182
Good complaint management	0.4435	0.4744	0.5361	0.6185	1.0000	1.4816	1.1584	0.1005
Widely spread/known numbers	0.5572	0.5315	0.6231	0.6098	0.6750	1.0000	1.2384	0.0976
Prompt message delivery	0.6543	0.5773	0.5293	0.7408	0.8633	0.8075	1.0000	0.0982

$\lambda_{max} = 7.1542$
CI = 0.0257
CR = 0.0195

Source: own elaboration.

TABLE 3. The calculation of the maximum eigen value for retention criteria

Decision criteria	Quality of calls	Competitive rate	Efficient internet plan	Frequency of promotions/ bonuses	Good complaint management	Widely spread/known numbers	Prompt message delivery
Eigen vector/weight	0.2262	0.1878	0.1716	0.1182	0.1005	0.0976	0.0982
Column sum	4.3609	5.421	5.9384	9.4659	10.383	10.2098	9.8966
Maximum eigen value (λmax)	λ_{max} = { (0.2262 * 4.3609) + (0.1878 *5.421) + (0.1716 * 5.9384) + (0.1182 * 9.4659) + (0.1005* 10.383) + (0.0976 * * 10.2098) + (0.0982 * 9.8966) = 0.986436 + 1.018064 + 1.019029 + 1.118869 + 1.043492 +.996476 + 0.971846 = 7.154212						

Source: own elaboration.

TABLE 4. Analysis of alternatives with respect to prompt message delivery

Decision alternative of prompt message delivery	Prompt delivery of complete message	Late delivery of complete message	Prompt delivery of incomplete message
Pooled average composite priority	0.6755	0.1971	0.1274
Relative preference ranking	1	2	3

Source: own elaboration.

Table 4 reveals the pooled average composite priority and the relative rank of preference for the three alternatives under prompt message delivery. Subscribers most preferred a message delivery system that allows complete text message delivered to receivers, followed by message delivery late but still complete, while prompt incomplete message delivery was least preferred. This rating reveals that the rapid and complete message delivery enhances customer satisfaction and encourages customer retention.

TABLE 5. Analysis of alternatives with respect to the well-known number

Decision alternative of well-known number	Widely spread mobile number	Long in use number
Pooled average composite priority	0.7956	0.2044
Relative preference ranking	1	2

Source: own elaboration.

Table 5 reveals the pooled average composite priority and the relative rank of preference for the two widely known number alternatives. Subscribers ranked a phone number that has been contacted by a large number of callers highest. The lowest ranking was associated with the period of time since a phone number was assigned (in other words., one may be using a number for a long time, but only few people contact that number). Preference for a mobile number that has been reached by a large number of callers is consistent with business sense, because mobile numbers spread through advertisements to many people help subscribers and therefore, subscriber retention.

TABLE 6. Analysis of alternatives with respect to the good complaint management

Decision alternative of good complaint management	Prompt response by customer agent	Late response but effective
Pooled average composite priority	0.8167	0.1833
Relative preference ranking	1	2

Source: own elaboration.

Table 6 shows that mobile subscribers ranked prompt responses to customer complaints over late responses. This implies that when an average GSM subscriber calls the customer agent of the network provider (customer centre), he/she has little or no time to waste listening to music and not been attended to. When the issue meant to be resolved is not attended to and the productive time of customers are wasted (listening to uncomplimentary music or advert of the company) in waiting for customer agent, subscribers do get annoyed. Thus, customer ranked the prompt response by customer agent first. This will engender mutual respect, benefits as network operator cannot survive without profitable customer, and thus, the need to satisfy customer telecommunication needs and want in order to get maximum profit cannot be compromised.

TABLE 7. Analysis of alternatives with respect to the frequency of promotion

Decision alternatives of frequency of promotion	Frequent free internet data	Frequent free calls services	Free SMS
Pooled average composite priority	0.5638	0.3251	0.1111
Relative preference ranking	1	2	3

Source: own elaboration.

Table 7 shows that, regarding alternatives to the frequency of network provider promotional activities, subscribers ranked frequent free internet data highest, followed by free calls, with free SMS being least preferred. Since most of the survey respondents are college students the results indicate that promotions targeting this group of subscribers should include bonus data/internet access rather than free calls or free SMS. It should be noted that different groups (subscribers) can differently rank the alternatives.

TABLE 8. Analysis of alternatives with respect to the efficient internet plan

Decision alternatives of efficient Internet plan	Sufficient data / low cost	Inefficient- affordable data plan
Pooled average composite priority	0.8720	0.1280
Relative preference ranking	1	2

Table 8 displays the two alternatives to an efficient internet plan in connection with customer retention. Respondents ranked sufficient data with low cost higher (with a pooled composite priority of 0.8720) and inefficient affordable data plan second (with a composite priority of 0.1280). Thus, internet plan is efficient to customer if it is sufficient in 87.20 per cent for data/internet requirements. Service providers should strive to meet these data criteria to influence retention decisions.

TABLE 9. Analysis of alternatives with respect to the attractive rates

Decision alternatives of attractive rates	Low cost of calls	Low cost of text messages	Low cost of data plan
Pooled average composite priority	0.6764	0.1422	0.1814
Relative preference ranking	1	3	2

Source: own elaboration.

Table 9 shows the priority of rate alternatives, as respondents preferred calls to be less expensive than low cost text messages and low cost of data plan. Subscribers rank low call cost of calls highest among the three alternatives. As indicated in the table, the costs of calls contributed 67.64 percent of what customers view of pricing by network providers, while the costs of data plan contributes 18.14 per cent and cost of text messaging contributed 14.22 per cent. Thus, subscribers ranked the costs of call as the most important factor in deciding if a network provider has a good rate, followed by a low cost data plan, while the cost of text messaging was least important.

TABLE 10. Analysis of alternatives with respect to the quality of calls

Decision alternatives of quality of calls	Clarity of calls	No call drop
Pooled average composite priority	0.8485	0.1515
Relative preference ranking	1	2

Source: own elaboration.

Table 10 shows the composite priority and relative ranking of alternatives with respect to call quality. Respondents ranked clarity of calls highest, followed by no call drop, with an 84.85 and 15.15 percent impact, respectively in their assessment of the quality of calls. Thus, network providers will maintain loyal customers by providing a high quality of calls and minimizing call drops. This result is consistent with the studies of Oyatoye and Okafor [2011], who employed different methodology (simulation), in finding that call drops is a factor affecting service delivery in Nigerian telecommunication companies. This AHP result supports a need to focus on the quality of calls.

Table 11 reveals the composite priority and ranking of our seven criteria. It shows that quality of calls is the most important customer retention factor, with a 0.2262 priority over other factors. Competitive rates came second with a priority of 0.1878, closely followed by efficient internet plan with a priority of 0.1716. Survey respondents ranked frequency of promotional activities fourth (0.1182), and good complaint management fifth (0.1005). Prompt message delivery was sixth (0.0976) and widely spread/known number seventh (0.0976).

TABLE 11. Composite priorities of the criteria determining customer retention in the Nigerian telecommunications industry

Decision criteria	Quality of calls	Competitive rates	Efficient internet plan	Promotions/ bonuses frequency	Good complaint management	Widely known numbers	Prompt message delivery
Pooled average composite priority	0.2262	0.1878	0.1716	0.1182	0.1005	0.0976	0.0982
Relative preference ranking	1	2	3	4	5	7	6

Source: own elaboration.

Conclusions

The study supported Douligeris and Pereira's notion that "AHP is as an appropriate tool to be used in the evaluation of quality of telecommunication services or for the choice of the most suitable networking technology" [1994, p. 249]. Our results show that quality of calls is the most important customer retention factor, followed by competitive rates, efficient internet plan, frequency of promotional activities, good complaint management, prompt message delivery, and widely spread/known number (see Figure 2. in Appendix). These results were comprehensive enough to reveal customers. They should therefore also serve as a benchmark against which the priorities of network operators should be aligned, if they seek to maximize customer retention.

Recommendations

(i) GSM operators should improve service quality through an appropriate mix of
(ii) retention drivers to increase market share.
(iii) Network operators should consider use of the Analytic Hierarchy Process model to discern customer, rather than make data base driven predictions.
(iv) Mobile telecommunication services providers should strengthen service delivery focusing on highly ranked alternatives in order to increase customer loyalty.
(v) Regulatory agencies should monitor the delivery of services by network providers in Nigeria, in line with priorities set by stakeholders/experts to improve industry performance.
(vi) There is a need for the National Communications Commission (NCC) to develop a mechanism that captures important customer retention criteria, as revealed by the AHP, in assessing telecommunication services delivery.

Notes

[1] Author's e-mail address: lanre18april@gmail.com
[2] Author's e-mail address: eoyatoye@unilag.edu.ng
[3] Author's e-mail address: okuye@unilag.edu.ng

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Appendix

TABLE 12. Reduced matrix for quality of calls alternatives

Quality of calls	Clarity of calls	No call drop	Weight	λ_{max} = 2.0001
Clarity of calls	1.0000	5.6016	0.8485	CI = 0.0000
No call drop	0.1785	1.0000	0.1515	CR = 0.0000

Source: own elaboration.

TABLE 13. The calculation of the maximum eigen value for quality of calls alternatives

Decision alternative of quality of calls	Clarity of calls	No call drop
Eigen vector/weight	0.8485	0.1515
Column sum	1.1785	6.6016
Maximum eigen value (λ_{max})	λ_{max} = { (0.8485*1.1785) + (0.1515*6.6016) = = 1.0000 +1.0001 = 2.0001	

Source: own elaboration.

TABLE 14. Reduced matrix for competitive rates alternatives

Competitive rates	Cheap calls	Cheap text messages	Cheap data plan	Weight	
Cheap calls	1.0000	6.1281	3.0503	0.6764	λ_{max} = 3.0796
Cheap text messages	0.1632	1.0000	0.9771	0.1422	CI = 0.0398
Cheap data plan	0.3278	1.0234	1.0000	0.1814	CR = 0.06862

Source: own elaboration.

TABLE 15. The calculation of the maximum eigenvalue for competitive rates alternatives

Competitive rates alternatives	Cheap calls	Cheap text messages	Cheap data plan
Eigen vector/weight	0.6764	0.1422	0.1814
Column sum	1.4910	8.1515	5.0274
Maximum eigen value (λ_{max})	λ_{max} = { (0.6764*1.4910) + (0.1422*8.1515) + (0.1814*5.0274) = = 1.0085 +1.1591 + 0.9120 = 3.0796		

Source: own elaboration.

$CI = (\lambda_{Max} - n)/(n - 1) = (3.0796 - 3)/3 - 1 = 0.0796 / 2 = 0.0398$

$CR = \frac{CI}{RI} = 0.0398/0.58 = 0.06862 = 7\% < 10\%$

TABLE 16. Reduced matrix for efficient internet plan alternatives

Efficient internet plan	Sufficient data at low cost	Insufficient- affordable data plan	Weight	$\lambda_{max} = 2.0000$
Sufficient data at low cost	1.0000	6.8101	0.8720	CI = 0.0000
Insufficient- affordable data plan	0.1468	1.0000	0.1280	CR = 0.0000

Source: own elaboration.

TABLE 17. The calculation of the maximum eigenvalue for efficient internet plan alternatives

Efficient internet plan alternatives	Sufficient data at low cost	Insufficient- affordable data plan
Eigen vector/weight	0.8720	0.1280
Column sum	1.1468	7.8101
Maximum eigen value (λ_{max})	λ_{max} = { (0.8720*0.1468) + (0.1280*7.8101) = 1.0000 +1.0000 = 2.0000	

Source: own elaboration.

TABLE 18. Reduced matrix for frequency of promotion alternatives

Frequency of promotion	Frequent free internet data	Frequent free calls services	Free SMS	Weight	
Frequent free internet data	1.0000	2.1619	4.1893	0.5638	$\lambda_{max} = 3.0576$
Frequency free calls services	0.4626	1.0000	3.6419	0.3251	CI = 0.0288
Free SMS	0.2387	0.2746	1.0000	0.1111	CR = 0.0497

Source: own elaboration.

TABLE 19. The calculation of the maximum eigenvalue for frequency of promotions alternatives

Promotions frequency alternatives	Frequent free internet data	Frequent free calls services	Frequent fee SMS
Eigen vector/weight	0.5638	0.3251	0.1111
Column sum	1.7013	3.4365	8.8312
Maximum eigen value (λ_{max})	λ_{max} = { (0.5638*1.7013) + (0.3251*3.4365) + (0.1111*8.8312) = = 0.9592 +1.1172 + 0.9812 = 3.0576		

Source: own elaboration.

$CI = (\lambda_{Max} - n)/(n - 1) = (3.0576 - 3)/3 - 1 = 0.0576 / 2 = 0.0288$

$CR = \frac{CI}{RI} = 0.0288/0.58 = 0.0497 < 5\% < 10\%$

TABLE 20. Reduced matrix for good complaint management alternatives

Good complaint management	Prompt response by customer agent	Late response but effective	Weight	λ_{max} = 2.0000
Prompt response by customer agent	1.0000	4.4552	0.8167	CI = 0.0000
Late response but effective	0.2245	1.0000	0.1833	CR = 0.0000

Source: own elaboration.

TABLE 21. The calculation of the maximum eigen value for good complaint management alternatives

Good complaint management alternatives	Prompt response by customer agent	Late response but effective
Eigen vector/weight	0.8167	0.1833
Column sum	1.2245	5.4552
Maximum eigen value (λ_{max})	λ_{max} = { (0.8167*1.2245) + (0.1833*5.4552) = 1.0000 + 1.0000 = 2.0000	

Source: own elaboration.

TABLE 22. Reduced matrix for well-known number alternatives

Well known number	Widely spread mobile number	Long in use number	Weight	λ_{max} = 2.0000
Widely spread number	1.0000	3.8919	0.7956	CI = 0.0000
Long in use number	0.2569	1.0000	0.2044	CR = 0.0000

Source: own elaboration.

TABLE 23. The calculation of the maximum eigenvalue for well-known number alternatives

Well-known number alternatives	Widely spread mobile number	Long in use number
Eigen vector/weight	0.7956	0.2044
Column sum	1.2569	4.8919
Maximum eigen value (λ_{max})	λ_{max} = { (0.7956*1.2569) + (0.2044*4.8919) = 1.0000 + 1.0000 = 2.0000	

Source: own elaboration.

TABLE 24. Reduced matrix for prompt message delivery alternatives

Message delivery	Prompt delivery of complete message	Late delivery of complete message	Prompt delivery of incomplete message	Weight	
Prompt delivery of complete message	1.0000	4.3178	4.3987	0.6755	λ_{max} = 3.068
Late delivery of complete message	0.2316	1.0000	1.9108	0.1971	CI = 0.034
Prompt delivery of incomplete message	0.2273	0.5233	1.0000	0.1274	CR = 0.0497

Source: own elaboration.

TABLE 25. The calculation of the maximum eigenvalue for message delivery alternatives

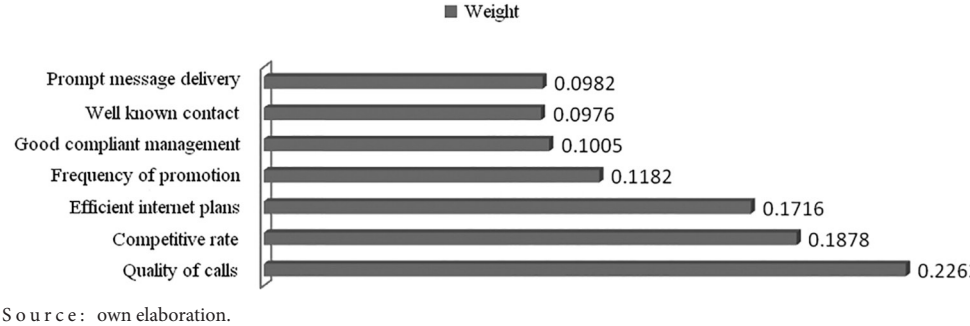
Message delivery alternatives	Prompt delivery of complete message	Late delivery of complete message	Prompt delivery of incomplete message
Eigen vector/weight	0.6755	0.1971	0.1274
Column sum	1.4589	5.8411	7.3095
Maximum eigen value (λ_{max})	λ_{max} = { (0.6755*1.4589) + (0.1971*5.8411) + (0.1274*8.8312) = = 0.9855 + 1.1513 + 0.9312 = 3.068		

Source: own elaboration.

$$CI = (\lambda_{Max} - n)/(n - 1) = (3.068 - 3)/3 - 1 = 0.068 / 2 = 0.034$$

$$CR = \frac{CI}{RI} = 0.034/0.58 = 0.0586 < 6\% < 10\%$$

FIGURE 2. Customers` retention decision criteria



Source: own elaboration.