

## ANALYTICAL HIERARCHY PROCESS FOR ESTIMATING SUBSCRIBERS' PERCEPTION OF BRAND EQUITY DIMENSIONS ON PURCHASE DECISION OF NIGERIAN MOBILE TELECOMMUNICATION SERVICES

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**Abstract:** Every firm that wants to compete in providing similar services, like those provided by the Nigerian mobile telecommunication firms must take brand equity seriously. By focusing on major telecom service providers in Nigeria, this study estimates subscribers perception of brand equity. To do this, a three-stage Analytical Hierarchical Process goal, criteria and sub-criteria were developed in order to weigh both the criteria and sub-criteria. In gathering data, a cross-sectional survey design was used. The primary data were collected from subscribers of Global System of Mobile Communication in Lagos state. The collection of data was enhanced by a well-structured Analytical Hierarchy Process questionnaire. In the same vein, a pairwise comparison of subscribers judgment, as it relates to how brand equity influences their decisions was done. This, as shown from the analyzed data, allowed customers to prioritize criteria and sub-criteria, in favour of their purchasing choice and satisfaction. Analyses of data were done. The values of the data were obtained for the consistency index and ratio, local rating and global ranks for each criteria and sub-criteria. What results, as this study demonstrates,

is that the data have practical implications on marketing and organizational strategies of the mobile telecommunication industries. Important as well, the study finds that the data will positively strengthen the industry's general sustainable business performance.

**Keywords:** Analytical Hierarchy Process, Brand Equity, Telecommunication, Marketing Strategies.

**MSC:** 40C10, 80A22.

## 1. INTRODUCTION

There is no denying the fact that telecommunication companies in particular and firms in general greatly enhance product/service brands. The reason being that brand equity has been rightly described as one of the most important assets of any firm, closing following customers (11). For firms that compete for the provision of similar services, the need to enhance brand equity so as to attract and retain customers who make up the primary reasons and, indeed, the existence of most private firms, is of huge importance. In this connection, within the context of service-based industry, such as that of mobile telecommunication, it is particularly vital to manage brand. Thus, this study's intervention lies in estimating the influence of subscribers' perception of brand equity on purchasing decision and customers' satisfaction, within the context of Nigerian mobile telecommunication service providers. The model deployed to explain this estimation is the Analytical Hierarchy Process (AHP). In deploying this model, the four major dimensions of brand equity—perceived quality, brand awareness, brand association and brand loyalty, were examined. The examination of these dimensions of brand equity is done within the framework of a hierarchical model. It is also done by engaging in a pairwise comparison of the dimensions and alternatives, as they influence subscribers' purchasing decision and satisfaction, especially as it concerns the Nigerian mobile telecommunication network. It is interesting to note as well that the four dimensions are based on how customer-based brand equity operates (2).

In 2013, the Mobile Number Portability (MNP) began to be implemented in Nigeria. With this implementation, subscribers became acutely aware of the inherent opportunities that lie in the option. MNP, among other advantages, allows subscribers the opportunity to switch/port network providers, while retaining their mobile numbers. With this advantage, there is the observation that every slight change in the business environment translates to new opportunities and invariably walls old ones.

With this, the point should be made that MNP provides telecom subscribers the opportunity to maximize their choice of network provider. The opportunity open to subscribers to choose a network provider presents a unique challenge to service providers on the best way to retain a substantial number of patronages from customers of their networks. The consequence of this is that there is an increased competition and dynamism among mobile telecommunication providers. Even so, there is a bigger burden on network providers to retain the patronage of customers. What follows is that there is a greater need to explain the brand, from

the perspective of subscribers. This is with a view to designing the most effective marketing programs that can enhance customer satisfaction. This is necessary, considering the fact that brands have been considered as playing a vital role in the consumer market by strengthening the relationship between subscribers and telecommunication network providers (3, 4).

The Analytical Hierarchy Process (AHP), developed by Saaty [28], has proven to be a widely accepted multi-criteria decision tool. It allows decision-makers to model, analyse, weigh and prioritise any complex problem, such as brand equity. This, in a hierarchical structure, shows the relationships between goal, criteria and sub-criteria. A typical hierarchy consists of at least three levels: the goal, the criteria and the sub-criteria (alternatives). The point that this study hopes to establish conforms to this hierarchical model.

AHP enables decision-makers to derive ratio scale priorities or weights, as opposed to arbitrarily assigning them. It does not only support decision makers by enabling them to structure complexity and carry out evaluation, but also allows them to incorporate both objectives and subjective considerations in the decision-making process [4, 13]. The AHP is applied here to weigh the criteria and the sub-criteria in the hierarchical model, in order to prioritize the importance of brand equity dimensions to subscribers decision to purchase.

Several studies have made substantial efforts to highlight the effects of brand equity on customer satisfaction. However, there have been limited studies which have deployed operations research model, such as the AHP, to engage a pairwise comparison of the effects of brand equity dimensions on subscribers satisfaction. To be precise, an intervention in this regard, particularly as it relates to the ever-expanding Nigerian mobile telecommunication market, hardly exists. Some studies that have attempted to make critical statements on subscriber satisfaction focus only on other markets and other methods of analysis. The studies have not applied the AHP model which is capable of producing better and reliable results from any problem dealing with taking decisions involving complex human problems (25, 29).

By electing to use the AHP model, this study hopes to provide relevant stakeholders in the telecommunication industry with a better understanding of subscribers view of brand equity dimensions. It hopes as well to highlight the contribution of brand equity dimensions on subscribers purchasing intention and satisfaction, with regards to mobile telecom services. It should be noted here that for over two decades, brand equity is one of the most popular and important marketing concept that is usually discussed by scholars. The reason for this discussion is that brand equity plays a strategic role in helping firms to gain competitive advantage [15, 23]. Based on this point, it is hoped that the outcome of this study will enable managers to formulate and implement appropriate marketing and organizational strategies, for retaining subscribers and for sustaining business development.

## 2. LITERATURE REVIEW

The relevance of a research-based customer perspective on the activities of an organization is steadily increasing. This will remain so long as customers provide

arguably the only economic and social incentive for the survival of a business. It was Drucker [12] who rightly observed that the sole purpose of every business is to create customer, not to lose the customer to other competitors. Thus, to remain in business, telecommunication firms will require the patronage of subscribers in order to make profit and to remain in business.

The concept of brand equity became widely used in the 1980s by advertising practitioners [6]. Notable figures who contributed to developing this concept throughout the 1990s were: Aaker [1], Srivastava and Shocker [30], Kapferer [17] and Keller [19]. In spite of the insights provided by these scholars, it is still difficult to achieve a universally-accepted brand equity content and meaning [18, 33]. Difficult to achieve also is the measure to be used for achieving brand equity [Washburn Plank, 34]. Most of the views on brand equity consider the value added to a product by emphasizing consumers associations and perceptions of a particular brand name [7, 35]. It can, in a sense, be considered as an incremental utility or the value added to the brand of a product, often believed to contribute to a firms long-term profitability [16]. For his part, Gunawardane [14] reasoned that brand equity can be evaluated through brand loyalty, brand awareness, perceived quality, brand association and other proprietary dimensions of brand assets. He clarifies further that models help in managing brand equity. Gunawardane also consider sensitive value to make informed decisions on brand-building activities. To him, brand equity and sensitive value are very important to purchasing, considering the way they can influence customers and compete with the competitors attraction.

Customer-based equity plays a strategic role in determining customers purchase decisions. Usually, it is considered as the most important concept in business and academic research [21]. A positive customer-based equity can help firms to generate greater revenue, lower the sourcing or manufacturing costs, and increase profit. It can also enhance the firms ability to charge more and premium prices, which can ultimately lead to the attainment of brand extensions [20].

Aaker [1] avers that brand equity is a multidimensional concept, comprising perceived quality, brand loyalty, brand awareness, brand association and other propriety assets. He submitted that brand loyalty can be compared to the level of devotion a consumer has to a brand. On the other hand, brand awareness is the ability of a potential buyer to identify a brand of a product category in which the contribution to brand equity has been concluded. This will assist him/her to reply in the strength of the brands presence as in the customers mind [5]. Perceive quality deals with the consumers perception of the brands total quality or superiority. Similarly, brand association is anything that is connected to a consumers memory, regarding the brand. The other proprietary brand assets refer to patents, logos, registered trademarks and identities. The present study employs brand equity, based on Aakers [1] model of four dimensions, which have been reviewed earlier in this section of this paper.

Perceived quality is defined as the customers perception of the overall quality or superiority over a product or service, with respect to its anticipated purpose and other alternative products or services [37]. In the same vein, Aaker [1] defines perceived quality as the customers perception of the overall quality or superi-

ority over a product or service, with respect to its intended purpose relative to alternative products or services in the market. The consumers opinion about the products quality and its attributes, with regard to its expected performance forms the measurement scale indicator of the brand quality perceived by individuals [27]. Perceived quality lends value to a brand in several ways: high quality gives consumers a good reason to buy the brand and allows the brand to differentiate itself from its competitors, to charge a premium price, and to have a strong basis for the brands extension [1]. In this way, a brand with high quality perceptions tends to benefit from higher customer preferences, repurchase intentions and equity [5].

In the submission of Aaker [1] and Keller [20], brand awareness is based on both brand recognition and recall. Aaker further expressed the view that the ability of the potential buyer to recognize and recall that a brand is a member of a certain product/ service category is brand awareness. Moreover, consumers' ability to identify the brand of different conditions, as reflected by their brand recognition or recall performance, was the interpretation of Kotler and Keller [22] of brand awareness.

Aaker [1] defined brand association as anything related to memory and to a brand. He argued that a brand association has a level of strength. Aaker added that the link to a brand (from the association) will be stronger when it is based on many experiences or exposures to communications and when a network of other links supports it. Brand associations may reflect the characteristics of the product. Product associations and organisational associations are taken as the two most-discussed categories of brand association typology of Chen, [9]. The sub-criteria used in the hierarchical model of this paper covers both topologies.

The attachment of customers (subscribers) to brand a product or service refers to brand loyalty [1]. Two different levels of loyalty are thus identified: behavioural and cognitive loyalty [19]. Behavioural loyalty manifests by a number of repeated purchases by customers' [19], or commitment to re-buy the brand as a primary choice [24]. Cognitive loyalty refers to the consumers intention to buy the brand as the first choice [19, 36]. Another indicator of loyalty is the customers willingness to pay higher price for a brand in comparison with another brand offering similar benefits [1, 8, 31].

AHP estimation of brand equity influence on customer-purchases decision and satisfaction is imperative. It is imperative because it is not always straightforward to assess customer-based brand equity. This is owing to largely intangible and complex concept embedded in it, whereas other methods may not accurately capture the relative importance of the factors. The AHP does combine tangible and intangible or qualitative and quantitative factors. This may be difficult for a customer to contrast all the service offerings of various telecommunication firms in the market. As far as researchers are aware, there is no empirical study that has applied the AHP model in estimating the problem of complex purchasing decision. Moreover, Jalilvand, Samiei, Mahdavinia [16] submitted that, despite the rich conceptual and operational definitions and models for brand equity, there is a marked scarcity of quantitative research examining its constructs, based on solid empirical data. This limitation is what the present study hopes to fill the gap.

The need for AHP in this study can further be justified by the submission of Saaty, [28], as a flexible and easy-to-understand way of analyzing complicated problems, such as brands of telecommunication firms providing similar services. It is a multiple criteria decision-making technique that allows subjective and objective factors to be considered in decision-making process (see figure 1). It allows the active participation in decision-makers (subscribers) who are the essence of the existence of most telecommunication firms, in reaching agreement. AHP also gives managers a rational basis upon which the decisions can be made on how to satisfy subscribers for mutual benefits. As a model, it is based on the following three principles: decomposition, comparative judgment, and synthesis of priorities. To actualise these three principles stated, Taylor III [32] proposed five step procedures. They are presented below and are used in this study as the summary of the mathematical steps for arriving at the AHP decision:

1. Develop a pairwise comparison matrix for the criteria.
2. Compute the normalized matrix by dividing each value of each column of the matrix by the corresponding column sum.
3. Develop the preference vector by computing the row averages for the normalized matrix.
4. Compute an overall score of each decision alternative by multiplying the criteria preference vector (from step 3) by the criteria matrix (from step 2d).
5. Rank the decision alternatives, based on the magnitude of their scores computed in step 4.

### 3. RESEARCH METHODS

Based on the quantitative research methodology, this study employs a cross-sectional survey design. It identifies brand equity dimensions already exposed in the literature. Since the major players (MTN, Airtel, Glomobile and Etislat) in the Nigerian mobile telecommunication compete by providing similar services in the same market to subscribers, especially in major cities such as Lagos, Nigeria, the goal in the hierarchical model is to determine subscribers purchasing decision and satisfaction. Similarly, the four brand equity dimensions are the criteria. Sub-criteria are only used as alternatives, as illustrated in figure 1, based on the AHP knowledge developed by Saaty [28]. The pairwise comparison method of AHP is used to determine the weight of each criterion. Data for the study were collected from students, staff (teaching and non-teaching) and people operating businesses across the two Universities in Lagos state: the University of Lagos, Akoka and the Lagos State University, Ojo. The choice of these two campuses is premised on the need to give researchers the opportunity of meeting large number of subscribers, from different socio-demographic characteristics (literacy level, income and age). The choice of students is based on an assumption that it is largely realistic, for it recognizes an average University student as GSM services users and sensitive to the trends in the industry. The choice of Universities in Lagos is further premised on meeting all classes of people from different income groups, cultural and religious backgrounds, which is a good representation of the Nigerian society. These

categories of respondents are regarded as experts to assess brands of GSM service providers. They were also considered because of their experiences over time, having being subscribers to one or three GSM service providers. The choice of the subscribers to use multiple SIMs is majorly based on portability, as pointed out by Oyatoye, Adebisi and Amole [25, 26].

The population of the study was defined as the totality of all mobile telecommunication subscribers in two universities. It comprised students, staff (teaching and non-teaching) and operators of phone call business as at January 2016. All mobile telecommunication subscribers in the selected Universities formed the population of the study. The population of the subscribers is large. Hence, Cochran's (1963) method was used to determine the sample size thus:

$$n_o = \frac{Z^2 p(1-p)}{e^2}$$

where:  $n_o$  is sample size,  $Z$  is the abscissa of the normal curve that cuts off an area at the tails (e.g., 1.96 for a 95 percent confidence level),  $e$  is the acceptable sampling error,  $p$  is the estimated proportion of an attribute that is present in the population, and  $q = 1 - p$ . Therefore, the subscribers sample size of the study at 95 percent confidence level and 1 percent precision is denoted by;  $Z = 1.96$ ,  $p = (0.5 \text{ maximum variability assumed})$  since actual variability in the proportion is not known,  $q = 0.5$ ;  $e = 0.05$ . Hence, the sample size of the study is computed as follows;

$$n_o = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384.16$$

The sample size for this study, as determined through Cochran formulae is 384 subscribers across two Universities in Lagos. In order to guide against incomplete entries/low response rate, which is the main disadvantage of questionnaire as an instrument of data collection, the authors administered 210 copies each to telecom subscribers in the selected universities. A non-probabilistic sampling technique (convenience sampling) was used to select 420 subscribers from the study's population. Data collected were analysed by using appropriate software for AHP implementation.

The AHP methodology steps are as follows;

1. The main goal or objective is clearly defined. In this study, AHP will be used to estimate the determinants of subscribers' purchase decision and satisfaction.
2. After the construction of objective, the criteria used to satisfy the overall goal is identified. They are: perceived quality, brand awareness, brand association and brand loyalty. For specifying a suitable solution, the alternatives were identified with third level in a hierarchical structure (see figure 1).
3. Elements of the problem were paired with respect to their common relative impact on a property and then compared. Therefore, pairwise comparisons were constructed.

Table 1 Sum of entries along column for the first individual respondent

Goal	PQ	BA	BAS	BL
PQ	1	1/3	1/5	1/3
BA	3	1	1	3
BAS	5	1	1	1
BL	3	1/3	1	1
Column Sum	12	8/3	19/6	16/3

Table 2 Normalized matrix of criteria in respect of the goal for the first individual

Goal	PQ	BA	BAS	BL	Priority Vector
PQ	0.083333333	0.125	0.06303507	0.0625	0.083467
BA	0.25	0.375	0.31517533	0.5625	0.375669
BAS	0.41666667	0.375	0.31517533	0.1875	0.323585
BL	0.25	0.125	0.30661428	0.1875	0.217279

Eigenvalue method is used to estimate the weights of decision elements (brand equity dimensions). Furthermore, consistency of the judgment was checked by computing the Consistency Index (CI) and Consistency Ratio (CR). To compute the Consistency Index, the following procedure was followed, using the response from individual respondents:

1. Normalized matrix: To obtain the normalized matrix for individual respondent, the entries in each column of the comparison matrix were added. Then, each entry along the column was divided by the total of the column, as shown in Table 1.
2. Priority vector: The priority vector for each matrix, with respect to the main goal, was obtained by finding the average of the values in each row of the normalized matrix (that is, dividing the sum of the values along each row by the number of entries along the row).
3. Measuring the inconsistency in the respondent judgment First the weighted sum matrix of the individual respondent was computed by multiplying each weight in the pair-wise comparison matrix by each of the priority vectors. Dividing all the elements of the weighted sum matrices by their respective priority vector elements we obtained:

$$\frac{0.3458333333}{0.083467} = 4.1433540597,$$

$$\frac{1.601492}{0.375669} = 4.2630400698,$$

$$\frac{1.333868}{0.323585} = 4.1221564658,$$

$$\frac{0.916488}{0.217279} = 4.2180238311.$$

We now compute the average of these values to obtain  $\lambda_{max}$ .

$$\lambda_{max} = \frac{4.1433540597 + 4.2630400698 + 4.1221564658 + 4.2180238311}{4} = 4.1866436066.$$



$$\begin{aligned}
 &0.083467 \begin{bmatrix} 1 \\ 3 \\ 5 \\ 3 \end{bmatrix} + 0.375669 \begin{bmatrix} 1/3 \\ 1 \\ 1 \\ 1/3 \end{bmatrix} + 0.323585 \begin{bmatrix} 1/5 \\ 1 \\ 1 \\ 1 \end{bmatrix} + 0.217279 \begin{bmatrix} 1/3 \\ 3 \\ 1 \\ 1 \end{bmatrix} \\
 &\begin{pmatrix} 0.083467 \\ 0.250401 \\ 0.417335 \\ 0.250401 \end{pmatrix} + \begin{pmatrix} 0.125223 \\ 0.375669 \\ 0.375669 \\ 0.125223 \end{pmatrix} + \begin{pmatrix} 0.064717 \\ 0.323585 \\ 0.323585 \\ 0.323585 \end{pmatrix} + \begin{pmatrix} 0.0724263333 \\ 0.651837 \\ 0.217279 \\ 0.217279 \end{pmatrix} = \begin{pmatrix} 0.3458333333 \\ 1.601492 \\ 1.333868 \\ 0.916488 \end{pmatrix}
 \end{aligned}$$

Table 3: Random Consistency Index (RI)

n	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

We now find the Consistency Index as follows:

$$CI = \frac{(\lambda_{max} - n)}{(n - 1)} = \frac{(4.1866436066 - 4)}{(4 - 1)} = 0.0622145355$$

From Table 3 Random index (RI) for matrix size of four is RI = 0.9, thus the Consistency Ratio (CR) is given by

$$CR = \frac{CI}{RI} = \frac{0.0622145355}{0.9} = 0.0691272617.$$

The ratio of the Consistency Index and Random Index (RI) is derived and the decision rule is to consider a matrix consistent, if the result of the ratio is less than 10 percent. The Random Index value is fixed and is based on the number of evaluated criteria, as shown in Table 3. This procedure was followed in analyzing the responses to all the 392 respondents. For the few matrices that were not consistent, revised judgment procedure, as suggested by Saaty [28], was obtained and those that satisfied the condition that  $CR < 0.1$  was included in the responses analyzed. Thereafter, the average of the comparative matrices that was used in the individual respondent analysis was pooled. The normalized matrix was obtained from it and was analyzed in the same manner to make sure that it satisfied  $CR < 0.1$ . The same procedures were used in analyzing respondents comparison matrices of the sub-criteria in respect of each of the criteria (That is, sub-criteria for perceived quality, brand awareness, brand association and brand loyalty, respectively).

- Moving downward through the hierarchy, hierarchical structure is used to combine the weight vectors to obtain the global and local relative priorities of each element.

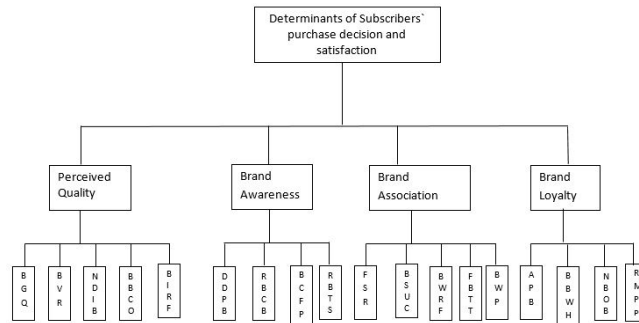


Figure 1: Proposed hierarchical model for Brand equity perception of purchase decision and satisfaction in the Nigerian mobile telecommunication

Keys;

BGQ = Brand is of good quality

BVR = Brand is very reliable

NDIB = No difficulty in finding information about the brand

BBCO = Brand is better, compared to other brand(s)

BIRF = Brand is risk free

DDPB = Difficulty in deciding on a particular brand

RBCB = Recognition of brand of competing brands

BCFPD = Brand comes up first in my mind whenever I need to make a purchase decision

RBTS = Remember a brand whenever you need telecom services

FSR = Firm is socially responsible.

BSUC = Brand is safe from use/consume

BWRF = Brand is well regarded by my friends.

FBTT = Firm brand is very trustworthy in all transactions

BWP = Brand is well priced.

APB = I will always patronize the brand

BBWHP = I will definitely buy this brand even when its price is higher than competitors

NBOB = I will not buy other brands, when this brand had network problem.

RMPP = Recommend my mobile service provider to other people.

#### 4. RESULTS AND DISCUSSION

A total of 420 questionnaires were administered to subscribers of GSM services in the two Universities in Lagos state, Nigeria. Of these, 420 were returned, while 397, represent 94.52 percent response rate. Out of the questionnaires returned, 392 representing 93.33 percent of the total questionnaire administered, were properly completed and found valid for the analysis of this study.

Table 4.1: Combined final computations of weights and priority vectors of criteria to Goal

Determinants of Purchase Decision and Satisfaction	Criteria to Goal										
	PQ	BA	BAS	BL	WEIGHT	AW	AW/W	Lambda Max	RI	CI	CR
PQ	1	1 5/8	1 4/5	1 4/7	0.35289	1.43504	4.06646	4.0559	0.9	0.01863	0.02069
BA	3/5	1	1 5/7	1 1/3	0.26186	1.06644	4.07261				
BAS	5/9	4/7	1	1 2/5	0.19951	0.80612	4.04054				
BL	5/8	3/4	5/7	1	0.18574	0.75111	4.04389				
Column sum	2.7975	3.9693	5.2568	5.2941							

Table 4.2: Combined final computations of weights and priority vectors of alternatives to criteria

Perceived Quality	Alternatives to criteria											
	BGQ	BVR	NDIB	BBCO	BIRF	WEIGHT	AW	AW/W	Lambda Max	RI	CI	CR
BGQ	1	1 1/4	1 1/2	1 5/8	1 1/4	0.247544	1.284747	5.1899	5.1638	1.12	0.0410	0.0366
BVR	1 1/3	1	2	1 5/7	1 1/4	0.268125	1.389789	5.1834				
NDIB	2/3	1/2	1	1 4/9	1 1/9	0.171069	0.874797	5.1137				
BBCO	3/5	4/7	2/3	1	1 1/7	0.14711	0.755454	5.1353				
BIRF	4/5	4/5	8/9	7/8	1	0.166152	0.863454	5.1968				
Column sum	4.4471	4.1628	5.9436	6.6639	5.7425							
Brand Awareness	DDPB	RBCB	BCFP	RBTS	WEIGHT	AW	AW/W	Lambda Max	RI	CI	CR	
DDPB	1	1 1/4	1	1 1/4	0.27886	1.128723	4.047628	4.0438	0.9	0.014587	0.016208	
RBCB	4/5	1	1 1/3	1 3/4	0.289267	1.17166	4.050445					
BCFP	1	3/4	1	1 2/3	0.254629	1.028934	4.04092					
RBTS	4/5	4/7	3/5	1	0.177244	0.715365	4.03605					
Column sum	3.5488	3.5416	4.0100	5.6957								
Brand Association	FSR	BSUC	BWR	CBTT	BWP	WEIGHT	AW	AW/W	Lambda Max	RI	CI	CR
FSR	1	1 1/3	2 1/9	1 2/5	1 1/4	0.273372	1.430465	5.2327	5.1920	1.12	0.0480	0.0429
BSUC	1 1/3	1	2 1/7	1 1/3	1 2/3	0.27188	1.425142	5.2418				
BWR	1/2	1/2	1	1 2/7	1 4/9	0.160321	0.81577	5.0883				
CBTT	5/7	3/4	2/3	1	1 1/4	0.16679	0.863767	5.1788				
BWP	4/7	3/5	2/3	2/3	1	0.127637	0.666084	5.2186				
Column sum	4.1249	4.1468	6.5931	5.6664	7.3964							
Brand Loyalty	APB	BBWH	NBOB	RMPP	WEIGHT	AW	AW/W	Lambda Max	RI	CI	CR	
APB	1	1 3/4	1 5/8	1 1/2	0.350252	1.424483	4.067029	4.0513	0.9	0.0171	0.0190	
BBWH	4/7	1	1 1/2	1 2/5	0.25464	1.033525	4.058773					
NBOB	3/5	2/3	1	1 2/5	0.210174	0.84821	4.035755					
RMPP	2/3	5/7	5/7	1	0.184935	0.747774	4.043446					

A total of 1960 comparison matrices were constructed from the responses to 392 telecom subscribers through administered questionnaires. For AHP analysis, respondents comparison matrices of criteria, with respect to the main goal (objective) and sub-criteria in respect of each criterion, must be reduced to one (1) matrix for each level of the hierarchy. Therefore, the 1960 matrices analysed individually and found consistent were later reduced to five (5) comparison matrices by finding the average of each matrix, as explained in the research methods section. The combined final computations for the criteria against the goal and the sub-criteria in respect of each criterion are contained in Tables 4.1 and 4.2.

Table 4.1 shows the combined computations of the four criteria, with respect to the main goal while table 4.2 shows four sections are the computations of the sub-criteria, with respect to each criterion. The values of column sixth of the first part of Table 4.1 are the priority vectors of the criteria, with respect to the goal. The priority vectors of the sub-criteria, with regard to each criterion appears under the weight column of Table 4.2. These values have a direct physical meaning in interpreting an AHP result. They determine the participation or weight of those criteria relative to the goal (or sub-criteria relative to a criterion). This basically is to determine the contribution to each criterion to the subscribers purchase decision or satisfaction with a brand of network provider in Nigeria. Considering

the criteria, perceived quality of services provided a brand is the most significant determinants of subscribers decision to purchase network services in Nigeria. It has a priority vector of 0.3529, meaning 35.29 percent of the brand equity criteria are accounted for by the subscribers perceived quality of services delivery by the mobile network providers. Thus, subscribers satisfaction, more than other factors, is influenced more by the way they perceived the quality of services delivery of market. This is followed by brand awareness, with a relative importance of 26.19 percent, brand association 19.95 percent and brand loyalty is the least factor that influences their subscribers satisfaction, with 18.57 percent. Following the procedure of AHP, there is the need to check for decision inconsistencies. The main objective is to capture enough information so as to determine whether the subscribers have been consistent with their choices. The inconsistency index is based on maximum lambda value ( $\lambda_{max}$ ), which is calculated by summing the product of each element in the eigenvector (weight), by the respective column total of the original comparison matrix. The maximum eigenvalues are presented in either the ninth or tenth columns of Tables 4.1 and 4.2, while the Consistency Ratios (CR) in either of the last two columns depends on the size of the matrix considered. The Random Index value is fixed and based on the number of evaluated criteria, as shown in Table 3.

In the case of the determinant of subscribers purchase decision and satisfaction with brand equity criteria in the Nigerian telecommunication industry, the Consistency Ratio of the 4 by 4 matrix is calculated as follows:

$$CR = \frac{CI}{RI} = \frac{0.0196}{0.9} = 0.0218 = 2.18\% < 10\%$$

Since its value is less than 10 percent, the matrix is considered to be consistent.

Therefore, in considering eigen vector values/priority weights of the brand equity criteria, it is evident that the perceived quality of services is the highest determining factor of subscribers purchase decision, with 35.29 percent influences. This almost doubles the relative importance of brand loyalty with 18.57 percent.

In considering the alternatives to perceived brand quality criteria (Table 4.2), the eigenvector priority weight shows the contribution to each sub-criterion influence on perceived brand quality in determining subscribers purchasing decision and satisfaction in the Nigerian telecommunication industry. Based on the sub-criteria of perceived quality, reliability of the brand is most favoured and considered by subscribers in judging a network service provider to be of good quality. That is, brand that is very reliable (BVR) has the highest weight of 26.81 percent, among five competing sub-criteria. This was closely followed by brand is of good quality (BGQ) network services, with a priority vector of 0.2475. The next to the sub-criterion is branding that subscribers have no difficulty in getting information about (NDIB) with 0.1711 priority vector. An average subscriber favoured brand that is risk frees (BIRF) with priority vector of 0.1662, while subscribers also favoured comparison between subscribers as the least in considering quality of mobile network services and its delivery, with priority vector 0.1471. A positive evaluation on these factors revealed that subscribers do not find comparisons of

service providers by brands of network services, as a fashionable means of measuring the quality of service delivery. This may be as a result of non-uniqueness of the brands of mobile network providers available in the Nigerian market or owing to the usage of multiple SIMs as complements for the generally below the average performance of telecom service providers in Nigeria, by the study done by Oyatoye, Adebisi Amole, [26].

Considering the sub-criteria of brand awareness criterion, recognition of brand of competing brands (RBCB) is the most important alternative to a priority vector of 0.2893. This was closely followed by the difficulty in deciding on a particular brand (DDPB) with a relative importance of 0.2789. The third in ranks of importance of being aware of a brand, is the brand coming up first in the mind of subscriber whenever they need to make a purchase decision (BCFPD), with priority vector 0.2546. To remember a brand whenever subscribers need telecom services (RBTS) came last in their choice of factors determining brand awareness in the Nigerian telecommunication industry, with a priority vector 0.1772. A positive evaluation of these factors shows that recognition of brand of competing brands (RBCB) contributes approximately 28.93 percent of what subscribers regarded as the most important to them when they considered consciousness of network provider. This cumulatively with difficulty in deciding on a particular brand (DDPB) jointly influences subscribers awareness of brand by over 56 percent.

In the case of the sub-criteria of the brand association criterion, firms' that are more socially responsible (FSR) are most favoured by subscribers, with a weight of 27.34 percent relative to the brand association sub-criteria as perceived by subscribers. That is, being socially responsible by telecommunication firms could serve equally as marketing strategy for the firm. This is closely followed by brand that is safe from use/consume (BSUC), with priority vector 0.2719. The third and fourth alternatives (firm brand is very trustworthy in all transactions (FBTT) and brand is well regarded by my friends (BWRF), closely followed each order for their contributions to priority vectors 0.1668 and 0.1603, respectively. Brand is well priced (BWP) contributes 12.76 percent to brand association. A positive evaluation of these sub-criteria revealed that focusing more than necessary on price at the expense of being socially responsible and ensuring brand is safe for use. It can also be taken that consumption may be a bad strategy in the telecommunication industry, since both accounted for well over 55percent of the influence of brand association on subscribers purchase decision.

Considering the brand loyalty sub-criteria, willingness to always patronize the brand (APB) is the most significant alternative that contributes 35.03 percent to subscribers loyalty to telecommunication brand in Nigeria. To definitely buy a brand even when its price is higher than those of competitors (BBWHP), follows with a priority vector of 0.2546, while subscribers not buying other brands, when this brand had network problem (NBOB) has a priority vector 0.2102. Finally, to recommend subscriber's mobile service provider to other people (RMPP) has the least priority vector of 0.1849. Thus, subscribers loyalty or absence of it, to a network provider is influenced more by subscriber's conviction to always patronise

the service provider.

## 5. CONCLUSION AND SUGGESTIONS

This research has evaluated the brand equity criteria and their alternative contributions to subscribers purchasing decision and satisfaction within the context of Nigerian telecommunication industry. It does this evaluation by using the Analytical Hierarchy Process. Results from 1960 pairwise matrices are analyzed to explain their relative importance. They are also pooled to reflect various alternatives to goals, in line with the AHP model. From the analyses of the results, the following conclusion and recommendations were made:

A positive evaluation of brand equity criteria contributions to subscribers purchasing decision and satisfaction in the Nigerian mobile telecommunication industry revealed that perceived quality of network services contributes approximately twice (35.29 percent) more than a positive evaluation of brand loyalty criterion (18.57 percent). From this evaluation, the study concludes that subscribers' loyalty to network provider brands in the market is still low. It concludes also that brand loyalty formed the least determining factor, when considering purchasing decision on mobile network services to spend money on. Brand loyalty takes little below expected one-fourth (25 percent) contribution to subscribers satisfaction, as subscribers considered quality of service delivery as more important to their satisfaction level.

Thus, telecommunication firms in Nigeria should improve on quality of service delivery in order to win subscribers loyalty to their brands. Quality service is a very essential component of brand equity that can enhance customer loyalty. This, in the long-run, affects firms market share and position positively.

The study also concludes that the reliability of services and service providers is the most important attribute of quality service to subscribers. Therefore, service providers should provide more reliable services (calls, texts, internet and other services). Providing these services will ensure a mechanism for measuring and enhancing the reliability of services provided to subscribers (customers) in order to satisfy their telecommunication needs. It will as well ensure that subscribers earn substantial part of the telecommunication expenditures, both in the short and long-run.

Brand association in the mind of subscribers requires telecommunication firms to be more socially responsible, being the most favoured alternative by subscribers. Thus, being socially responsible by telecommunication firms could equally serve as marketing strategy for the firm.

Service provider(s) should develop marketing programmes that can stimulate brand loyalty among subscribers, as referral in the industry is still low, particularly with recommendation of one service provider to other people contributing minimum among other brand loyal alternatives. Subscribers are not convinced enough of recommending their service provider to friends and family, owing to the non-uniqueness of each of the service provider brand with little or no motivation (benefits) to do so.

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