

An Empirical Study on Consumers Preference for Mobile Telecommunication Attributes in Nigeria

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Abstract

This study examined application of conjoint analysis to customer preference for mobile communication firms in Nigeria with a view to assessing the consumer attitude towards the attributes of mobile telecommunication since a firm must determine the needs and wants of its consumers and then deliver products or services that satisfy it more efficiently than its competitors in order to meet organizational goals. The source of data is primary through 200 dedicated mobile phone users which were conveniently sampled in Yaba and Akoka environs of Lagos state for the conjoint study. They ranked telecommunication services profiles with eighteen combinations using 1 and 18 to indicate highest and lowest preference respectively and different combinations of attributes to their preferences. Ranked data provided by the respondents were analyzed with the use of ordinary least squares (OLS) regression. The result shows cost attribute, the adjusted part-worths for the low, moderately and high levels, respectively, as follows: $-2.396 - 10.204 = -12.600$; $12.99 - 10.204 = 2.785$; and $10.205 - 10.205 = 0$ which was consistent with economic theory, the mobile telecom users in the study area prefer a mobile service with a lower cost to a higher cost. We therefore recommends that telecom service providers in Nigeria should make more effort at improving services where the customer preferences lies (affordable service, wide coverage followed by clarity of call) been the most desirable attributes by consumers rather than undirected promotional strategies that hardly aids loyalty of customers to their network only but also involved huge cost.

Keywords: Conjoint, preference, telecommunication, products, attributes, part-worths

1. Introduction

Telecommunication in Nigeria received a boost in 2001 with the deregulation of the sector which allows for private Global System of Mobile communication (GSM) service providers to come into the country to support the existing national operator NITEL. Two private companies MTN of South Africa and ECONET of Zimbabwe were licensed by NCC to operate GSM in addition to NITEL, the country owned telecom company. These two

41 companies alone increased the mobile telephone line from 300,000 in 2001 to 1,660,000 in
42 2002. In 2003 another private provider, GLOBACOM, entered the market with its mobile
43 service Glo-mobile (OECD report, 2003/2004).

44 Thus, it is truism that mobile telecommunication popularly called GSM have come to stay
45 after Nigerian has battled with inefficiency of the only one service provider (NITEL) prior to
46 year 2001 and can now choose among multiple service providers due to the successful
47 deregulation and globalization of Nigeria telecommunication industry. Nigeria now has five
48 major service providers; Airtel, MTN, Globalcom, Etisalat and less functioning M-tel.

49 However, in order to meet organizational goals, a firm must determine the needs and wants
50 of its consumers and then deliver products and services that satisfy those needs and wants
51 more efficiently than its competitors (Kotler, 1984). In today's telecommunication services,
52 with its advances in communication technology, delivering services that appeal to consumers
53 should be easier than in the past. An important task therefore is to determine, with some
54 reasonable degree of precision, what consumers want or prefer from telecom service
55 providers.

56 The deregulation and expansion of telecommunication products and service offerings have
57 prompted many changes in mobile telecommunication service delivery and have impacted
58 the competition for the hitherto inefficient telecommunication markets in Nigeria. The
59 increased menu of products and services offered by emerging telecommunication firms and
60 the increased competition has forced the market participants to evaluate how they can
61 differentiate their products and services from their competitors. If a telecom firm can
62 determine what is important and what is not important to a customer, such an operator will
63 have the potential to become more competitive by segmenting the market and providing the
64 desired products and services to the segmented customers.

65 Understanding exactly what modern telecom mobile users require or desire from their service
66 providers is a challenge for many operators. Currently there is dearth of literature on both the
67 importance telecom mobile users place on the various attributes involved in the provision of
68 telecommunication services and conjoint analysis can be used to measure such importance.
69 Conjoint analysis has been found to be useful in estimating the importance of attributes and
70 attribute levels through decomposition of consumers' ranking of alternative attribute
71 combinations. Thus, a main objective of this study is to fill the research gap and, hence,
72 contributes to the literature on consumer preference for telecom attributes and to investigate
73 the attributes telecom users seek when they desire telecom mobile service using conjoint
74 analysis.

75 **1.1 Statement of the problem**

76 In utilizing the vast telecom market available in Nigeria, service providers ventured into
77 promotional activities of several related services, rather than focusing on a specific service
78 targeted at a particular segment of customers. However, in order to justify such service
79 provision strategy, it is imperative to ascertain that the service been provided is preferred and
80 desirable by consumers of mobile telecom service. Besides, Kim, Lee and Koh, (2005)
81 reveals that consumers' preference is the most important factor in determining business
82 success and the direction of government policy because a fairly large part of the development
83 of IT products has been dominated by the pull of demand rather than the push of technology.
84 Therefore, market strategies and policies for promoting the telecommunications industry have
85 to be mapped out based on consumers' needs and preferences. OECD (2006) also emphasizes
86 the need for studies that analyze consumers' demands and usage patterns of mobile phones
87 and contents. These are what brought about the research on the subject.

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90 **2. Literature Review**

91 According to Green and Srinivasan (1978; 1990), conjoint analysis is one of the most popular
92 statistical techniques used in marketing to elicit preference functions at both individual and
93 aggregate level. Conjoint analysis (CA) is a methodology based on several steps starting from
94 designing the experiment, collecting data, estimating the model and, finally, using the results
95 for market segmentation or product positioning. The technique has known a wider diffusion
96 in different applicative fields, ranging from trading to health, from agriculture to food
97 industry, among others, since the 1970s.

98 CA addresses the question of which attributes are important to consumers and how important
99 they really are. When taken in combination, it is possible to use individual product attributes
100 to describe an entire product. CA determines the combination of product attributes that
101 consumers most prefer. Conjoint analysis, when applied to product, service, and
102 communications projects identifies which product and service attributes, or which
103 communications messages are most preferred and are best combined to produce maximum
104 effect.

105 The research into the mathematics of the psychology of conjoint measurement brought about
106 the idea of conjoint analysis. Green and Wind (1975) stated that conjoint measurement is
107 “concerned with measuring the joint effect of two or more independent variables on the
108 ordering of a dependent variable. The output of conjoint measurement comprises of the
109 simultaneous measurement of the joint effect and separate independent variable contributions
110 to that joint effect, all at the level (asymptotically) of interval scales with common unit.”

111 According to Green and Wind (1973), “from the standpoint of multi-attribute choice making,
112 conjoint measurement can sometimes be used to decompose overall evaluation into implicit
113 utilities for components of the multicomponent alternatives”

114 In layman’s terms, conjoint analysis:

- (i) identify the attributes important in a choice decision,
- (ii) identify the way the attributes are combined to make the decision, and
- (iii) determine the utility value to each of the levels of each of the attributes considered in the decision.

Green, Wind and Jain (1972) further point out that the method of conjoint analysis used represents the different theories of how people choose between multi-attribute alternatives. Conjoint analysis may jointly identify the composition model for decision choices and at the same time estimate the utility value of the attributes that are important in the choice decision. The analysis of choices enables the researcher to predict choice share for different product configurations that may be introduced into the competitive marketplace.

However, in today's rapidly changing market, demand for a product which determines an enterprise strategy is often influenced by customer preferences (Fornell, 1992). Since products and services are closely related to their providers, the product preference can be regarded as the enterprise preference, that is, when a customer decides to consume a given product or service he/she actually has preferred the producer or provider of that specific product or service. In other words, the preference of a product by a customer can be defined along with the concept of brand preference. According to (Hellier et al, 2003), brand preference is the extent to which the customer favors the designated service provided by his or her present company, in comparison to the designated service provided by other companies in his or her consideration set. As Cao and Ramani (2010) opined that 'a customer's preferences for a product can be viewed as a reflection of his or her inner world'. Hence, it is the customers' attitudes and perceptions toward a product or company which determine their preference. Thus, the subject of concern for many business establishments is customers' demands and preferences of different products and services.

3. Research methodology

This study was carried out in Yaba and Akoka environs of Lagos state located in southwestern Nigeria. Convenient samples of 200 dedicated mobile phone users were asked to rank 18 attributes according to their own preferences. They were asked to provide demographic information and responses to several survey questions, as well as to participate in a conjoint analysis study. For the survey, respondents were asked to assess the importance of the following attributes: cost, customer service delivery, SMS delivery, call quality, and coverage. A preliminary interview of several telecom users conducted revealed that the respondents consider these attributes in their mobile technology usage decision. In the survey, each attribute was rated as important, not important and moderately important.

The frequency distribution of responses (Table 3.1) obtained from respondents indicate that mobile technology users consider call quality, coverage, cost and customer service as very important attributes and SMS delivery as not important. This finding, however, does not imply the relative importance of attributes of the mobile technology. For example, is coverage, the most important attribute because the greatest number of the mobile telecom users said it was very important? If so, how significant is coverage relative to cost or to call quality? If the mobile technology has the desired coverage, will users not mind so much if the call quality is obscure?

It might be contended that if the required information is relative importance of attributes, then the sampled respondents should have been asked to rank the attributes according to importance. Even though such an approach could produce an ordinal ordering of the attributes, it still could not offer a measure of how important an attribute is relative to others. Such a measure is valuable because it will allow telecom providers to make strategic decisions related to mobile technology service delivery. Thus, the issue confronting telecom providers who aspire to provide maximum satisfaction to customers

is whether to increase coverage and sacrifice call quality, or ensure call quality first and foremost. Will telecom users prefer a telecom provider that has wide coverage to a narrow one that has clarity of call? The response depends upon knowing how much more important coverage is relative to call quality. This type of information may be obtained with the use of conjoint analysis.

Table 3.1: Users Rating of Importance of Telecom Service Attributes

Attribute	Degree of Importance			Total
	Important	Moderately important	Not important	
Call quality	156	21	23	200
Coverage	142	39	19	200
Cost	139	44	17	200
Customer service	58	106	36	200
SMS delivery	13	24	163	200

Source: Data analysis, 2012

3.1 Estimates of conjoint analysis

Mobile telecom was described in the conjoint study as having the five attributes that users assessed in the survey: call quality, coverage, cost, customer service, and SMS delivery. Each of these attributes has either two or three levels, as shown in Table 2.

Table 3.2: Attributes and levels used in mobile technology conjoint study

Attributes	Levels
Call quality	Clarity
	Obscurity
Coverage	Wide
	Narrow
Cost	High
	Moderate
	Low
Customer service	Good
	Fair
	Bad
SMS delivery	Fast
	Slow
	Poor

With two attributes, each with two levels, and three attributes, each with three levels, there are 108 possible attribute combinations—a number that may be too large for respondents to evaluate and rank. This constraint was solved by using an experimental design called an orthogonal array, in which only a subset of the total number of combinations is chosen. Addelman (1962) developed several basic plans for generating orthogonal arrays for different numbers of attributes and their levels. The plan that is suitable to this particular study contains 18 combinations, which are shown in Table 3.3

Table 3.3: Orthogonal Array of Combinations of MTN Telecom Attributes

Attributes					
Number	Call quality	Coverage	Cost	Customer service	SMS delivery
1	Clarity	Wide	High	Good	Fast
2	Clarity	Narrow	High	Good	Slow
3	Obscurity	Wide	High	Good	Poor
4	Obscurity	Narrow	Moderate	Fair	Slow
5	Clarity	Wide	Moderate	Fair	Poor
6	Clarity	Wide	Moderate	Fair	Fast
7	Clarity	Narrow	Low	Bad	Poor
8	Obscurity	Wide	Low	Bad	Fast
9	Clarity	Wide	Low	Bad	Slow
10	Obscurity	Wide	High	Good	Poor
11	Clarity	Narrow	High	Good	Fast
12	Clarity	Wide	High	Good	Slow
13	Clarity	Wide	Moderate	Fair	Fast
14	Obscurity	Wide	Moderate	Fair	Slow
15	Clarity	Narrow	Moderate	Fair	Poor
16	Clarity	Wide	Large	Bad	Slow
17	Clarity	Wide	Large	Bad	Poor
18	Obscurity	Narrow	Large	Bad	Fast

Eighteen stimulus cards were prepared. Each card contained a combination of attributes from the orthogonal array. The 200 respondents were also asked to rank the eighteen combinations using 1 to 18, with 1 indicating highest and 18 indicating lowest preferences, respectively. Ranked data provided by the respondents was analysed with the use of ordinary least squares (OLS) regression. Several researchers (such as, Bard, Craig and Boehlje (2002); Wittink and Cattin, 1981) found that OLS is an appropriate estimation method in conjoint analysis.

According to Bard *et al.*, ‘conjoint analysis is based on decomposition approach where respondents react to a set of “total” profile descriptions, and the part-worth for the individual attributes, given some type of composition rule (for example, an additive one)’. That is to say an individual’s utility for a product or service is decomposed into some combination of part-worth utilities defined for the relevant characteristics or attributes of the product. For a choice alternative described in terms of a set of characteristics,

$Z_k = (Z_1, \dots, Z_k)$, the utility function for an individual is specified in terms of a combination rule, W , and a set of functional forms, w_k , (one for each of the attributes) as:

$$W(w_1(z_1) \dots w_k(z_k))$$

According to Bard *et al.*, “the combination rule, W , for the utility function is generally a choice between additive and quadratic models. While an additive model captures only the main effects of the attributes, the quadratic form additionally captures two-way interaction effects between attributes”. The mathematical expression of the utility of the individual product characteristics may take a linear vector form, a quadratic form or a piecewise linear form. The original form of the part-worth model as earlier established by previous researchers’ is $w_k(z_k) = w_{zk}$. This form appears to be the most flexible for the estimation of a particular utility level for each attribute level. However, the choice of functional form depends on the relationship between a particular attribute’s at different levels as a mixture of models across a product’s attributes may sometimes be required. Adapting the methodology for conducting conjoint analysis stated in Green and Srinivasan (1978), we have the following steps:

- Selection of the preference model (the combination rule or underlying functional form).

- Design of the experiment – this includes identifying the data collection method, and determining the attributes and attribute levels to analyze, the manner in which the product profiles are presented, and the measurement scale of the dependent variable.
- Selection of the estimation method for the part-worth utilities and thus the overall utility.

For this study, the Ordinary Least Square model used to estimate the part-worths is specified explicitly as;

$$Y_{im} = \beta_0 + \beta_1 X_{1im} + \beta_2 X_{2im} + \beta_3 X_{3im} + \beta_4 X_{4im} + \beta_5 X_{5im} + \beta_6 X_{6im} + \beta_7 X_{7im} + \beta_8 X_{8im} + \varepsilon_{im}$$

Where

Y_i = rank assigned by the m^{th} respondents

β_0 = intercept

$\beta_1, \dots, \beta_8$ are the parameters to be estimated

X_1 = Call quality

X_2 = Coverage

X_3, X_4 = Cost

X_5, X_6 = Customer service

X_7, X_8 = SMS delivery

The X s are expressed as dummy variables with the use of effects coding. For the three-level attributes (cost, customer service, and SMS delivery), the coding is (1, - 1) for the first level, (1, 0) for the second level, and (0, 1) for the third level. For the two-level attributes (call quality and coverage), the first and second attributes are coded (- 1) and (1), respectively. For example, for the first combination shown in Table 3.3 (that is, clarity, wide, high, good and fast), the predictor variables were specified as follows:

$$X_1 = -1, X_2 = 1, X_3 = -1, X_4 = -1, X_5 = -1, X_6 = 0, X_7 = 1, \text{ and } X_8 = 0.$$

The specification of the model indicates that average part-worths are to be estimated. This method allows for easy explanation of the basic method of estimating part-worths and interpretation of the conjoint analysis results. Conjoint utilities or part-worths are scaled to an arbitrary additive constant within each attribute and are interval data. The arbitrary origin of the scaling within each attribute results from dummy coding in the design matrix. We could add a constant to the part-worths for all levels of an attribute or to all attribute levels in the study, and it would not change our interpretation of the findings. When using a specific kind of dummy coding called effects coding, utilities are scaled to sum to zero within each attribute.

4. Results of the conjoint analysis

The results of regression coefficients are shown in Table 4.1. The part-worths are estimated from the coefficients of the regression results. The derivation of the part-worth for each attribute level is presented in Table 4.2. Because respondents were asked to rank the various combinations of attributes from 1 to 18, with 1 representing the most preferred combination, the raw part-worth that has the lowest value indicates the most important level of an attribute to the consumer. To make interpretation of the values more intuitively appealing, the estimated part-worths for each attribute were adjusted so that the least-desired level has a part-worth equal to zero, and the most-preferred level has the highest adjusted part-worth. This was accomplished by getting the absolute value of the difference between each raw part-worth and the part-worth of the least-desired level. To illustrate, for the cost attribute, the adjusted part-worths for the low, moderately and high levels were derived, respectively, as follows: $-2.396 - 10.204 = -12.601$; $12.99 - 10.204 = 2.785$; and $10.205 - 10.205 = 0$. It may also be seen in Table 4.2 that consistent with economic theory, the mobile telecom users in the study area prefer a mobile service with a lower cost to a higher cost.

Table 4.1: Estimated Regression Coefficients

Variables	Coefficients	Standard error
Constant	6.933*	.323
X1	3.754	2.259
X2	-7.185*	-0.970
X3	6.057*	0.410
X4	3.272	2.285
X5	-1.654*	-0.232
X6	0.012	3.050
X7	8.171*	1.339
X8	-4.185*	1.339

Source: Data Analysis, 2012

*significant at 5% level

Table 4.2: Attribute-Level Part- worths

Attributes	Level	Expressed terms in of and coefficient level	Estimated part-worths	Adjusted part-worth
Cost	Low	0-3-4	-2.396	12.601
	Moderately	0+3	12.99	2.785
	High	0+4	10.205	0
Customer service	Good	0-5-6	8.575	0
	Fair	0+5	5.279	3.296
	Bad	0+6	6.921	1.654
SMS delivery	Fast	0-7-8	2.947	12.157
	Slow	0+7	15.104	0
	poor	0+8	2.748	12.356
Call quality	Clarity	0-1	3.179	7.508
	Obscurity	0+1	10.687	0
Coverage	wide	0-2	14.118	13.866

Source: Data analysis, 2012

In conjoint analysis the measure of the attribute utility range is derived by obtaining the difference between the part-worth of the most-desired level and the part-worth of the least-desired level (Table 4.3). For example, the attribute utility range for the cost attribute is derived as $12.99 - (-2.396) = 15.386$ (Table 4.3). Larger value suggests that the corresponding attribute is most important. In order to characterize the relative importance of each attribute, we consider how much difference each attribute could make in the total utility of a product. That difference is the range in the attribute's utility values. We calculated percentages from

relative ranges, obtaining a set of attribute importance values that add to 100 per cent, as indicated in Table 4.3. For the samples respondents, the importance of cost is 35.85 per cent, the importance of price is 33.48 per cent and the importance of call quality is next at percentage level of 17.49 per cent. However, importance depends on the particular attribute levels chosen for the study. For example, with a narrower range of costs, costs would have been less important.

Table 4.3: Relative importance of attribute

Attributes	Level	Estimated part-worths	Attribute utility range	Attribute importance (%)
Cost	High	-2.396	15.386	(15.386/42.916)* 100% = 35.85
	Moderately	12.99		
	Low	10.21		
Customer service	Good	8.575	3.296	7.68
	Fair	5.279		
	Bad	6.921		
SMS delivery	Fast	2.947	2.356	5.49
	Slow	15.104		
	Poor	2.748		
Call quality	Clarity	3.179	7.508	17.49
	Obscurity	10.687		
Coverage	Wide	14.118	14.37	33.48
Utility range total			42.916	

Source: Data analysis, 2012

The conjoint analysis results confirm the survey findings that consumers do give importance to cost but not comparable to the call quality, at least when cost is within the range of telecom costs normally experienced in the study area at the time of the study. Conjoint analysis reveals, however, that call quality is not as important as may be inferred from the survey results that show call quality as the attribute most often rated as very important by respondents.

Knowledge of the relative importance of attributes and their levels will help telecom mobile service providers in managing their operations. The results show that cost is the critical attribute which reflect the level of economic sustainability of most residents of the study

area. This suggests that the telecom mobile service providers' strategic priority in the study area should be to provide affordable service to the consumers in the study area. Ignoring other attributes but cost and coverage, telecom service with a low cost and wide coverage will have a total worth of $15.386 + 14.37 = 29.756$. If the consumer is offered instead a service that is affordable but has a narrow coverage, the worth of that service to the consumer is 15.386. There is a loss of 14.37 because of the coverage changes from wide to narrow. If a widely covered, but costly, network service is presented to the consumer, the worth of that apple would be 14.37. There would be a 15.386 decline in worth compared to the first service rendered because the consumer is getting a service that is widely covered but not affordable. Given these choices, (1) affordable cost and wide coverage, (2) affordable cost and narrow coverage, and (3) narrow coverage and high cost, the consumer would prefer most the first option, and the second option would be preferred over the third.

5. Summary, Conclusion and Recommendations

This paper demonstrated the application of conjoint analysis in assessing the mobile telecommunication service attributes that are important to consumers. Findings from conjoint analysis provide information that may not readily be obtained from sampled respondents on their attribute preferences. Conjoint analysis measures relative importance of each attribute level. These measures are useful in making production and marketing decisions. The findings of this study shows that affordable service, wide coverage followed by clarity of call are the most desirable attributes by consumers in the study area. The conjoint analyses results allow telecom firms to make trade-offs in rendering service to consumers and still offer services that provide consumer satisfaction.

Therefore, telecom service providers in Nigeria should focus effort on where the customer preferences lies (affordable service, wide coverage followed by clarity of call) been the most

desirable attributes by consumers rather than undirected promotional strategies that hardly
aids loyalty of customers to their network only and also come with huge cost.

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