

## Determinants of Willingness to Pay for Mobile Telecommunications Services in Nigeria

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### Abstract

Notwithstanding the far-reaching contribution of the mobile telecommunications sub-sector in Nigeria's socioeconomic development, Nigeria is among the countries with the poorest readiness and usage of telecommunications among key economic agents. This study therefore, attempted to ascertain the factors that inhibit consumers access to telecommunications through microeconomic concept of contingent valuation of willingness to pay, using survey data of 5 600 individual consumers. This was estimated with censored Tobit model. The result shows that demand for mobile telecommunications varies considerably with consumers socio-economic factors, while access is limited by network coverage, quality services, interconnectivity, and call tariff. To ensure that productivity gain in telecommunication are passed to consumers, the paper suggested price cap regulation to determine the maximum allowable price increases for operator's services as well as interconnectivity charges. It is also important to facilitate consumers' migration to any network of choice without necessarily changing their existing GSM number.

**Keywords:** Nigeria, Access, mobile telecommunications, contingent valuation, willing to pay, tobit model

### 1. Introduction

The Nigerian Communications Commission (NCC) defined access to Information and Communications Technology (ICT) as having an opportunity to utilize or derive benefits from the particular ICT, (NCC, 2011). Thus, beyond the number of line rollout, access largely revolves around utility maximization and welfare improvements of consumers. This study aims at quantifying individual consumers' utility and appreciation of the value and uses of Global System of Mobile Communications in Nigeria (GSM) referred to here as mobile telecommunications, using consumers' willingness to pay, as well as factors that affect their willingness to pay for mobile services.

The introduction of telecommunications services in Nigeria dates back to nineteenth century (PanAfrican Capital Research, 2011) and (Tella, Amaghionyeodiwe, & Adesoye, 2007). As at that period it was mainly devoted to the promotion of activities of a particular regime in power rather than the socio-economic development of the country. This probably was responsible for the little attention paid to its development. Consequently, in 1960, the country had only 18 724 telephone lines for an estimated population of 45 million people, equivalent to a tele-density of 0.4 telephones per 1 000 people. The telephone network then consisted of 121 exchanges of which 116 were manually operated magneto-type, while the remaining 5 were automatic (PanAfrican Capital Research, 2011). Generally, the pre liberalization era was characterized by slow pace of network rollout, long waiting line for services, consumers limited to only one network provider, and low quality service delivery (Ndukwe, 2005a).

The public sector monopoly of telecommunications in Nigeria, both in terms of investment and management heightened with the establishment of the Nigeria telecommunication (NITEL) in 1985 after the merger with the Nigerian External Telecommunications Ltd (NET), responsible for external telecommunications, common carrier services and the telecommunications arm of the Department of Posts and Telecommunications of government. Though it was far better than the colonial era with attention focused on its socioeconomic development of the economy of Nigeria, the government strong hold resulted to high level of x-efficiency as most Nigerians had little or no access to telecoms services.

With the liberalization of the sector in 2001, Nigeria presents a particular case of successful mobile communications

expansion, ranking as the fastest growing mobile market in Africa and one of the fastest in the world from 35 000 active lines in 1999 to 99 145 013 in March 2012 (Ndukwe, 2005b), (Ndukwe, 2008), and (NCC, 2012a), <http://www.ncc.gov.ng/media-pr/speeches.html>. Available statistics from NCC shows that tele-density figure as at the year 2001 was put at about 0.73 lines per 100 inhabitants, while the first quarter of 2012 estimate indicated that Nigeria had recorded a tele-density of about 70.8 lines per 100 inhabitants with an active subscriber base of about 95.9 million lines. Telecoms have become the first means of access for many Nigerians irrespective of where they live and what they do. It is also reported as a major the fastest growing sector and the driver of the Nigerian economy (NBS, 2012).

The sector, essentially the Global System of Mobile Communications (GSM) sub-sector has contributed positively in boosting socioeconomic activities in Nigeria through its impact on the improvements of health outcomes, income generation, and enhancement of productivity. When measured in terms of employment generation, reduction in the incidence of poverty, and as a catalyst in promoting social interaction, the record is phenomenal (Ndukwe, 2008) and (Urama & Oduh, 2012). It has promoted business transactions, enhanced financial sector growth and stimulated rapid economic transformation in many sectors. Generally, the citizenry have been enriched, information and communication is now widely spread, and promoting entrepreneurship and industry. Subscribers now enjoy services like mobile TV, POS (electronic payment), internet services, mobile tracking services, cheaper international calls, internet banking, and mobile banking.

To meet up with growing demand, investment in the sector continued to be astronomical. From \$50 million in 1999 to \$6.08 billion in 2004 and \$18 billion in 2009 out of which about \$12 billion is from Foreign Direct Investment FDI- most of it in the mobile sub-sectored (NCC, 2012a). Nigerians are now enjoying low call tariff as the competitive landscape of Nigeria's telecom sector forced operators to roll out new infrastructure to improve coverage and quality, which has resulted in a surge of subscription growth and usage. The mobile peak period off-net tariff has fallen from ₦50 in 2001 to average of ₦43.32 in 2009, while cost of SIM dropped from ₦14 500 in 2001 to about ₦200 in 2009 (NCC, 2012b). Although demand is impeded by theft and destruction of costly network infrastructure, which has contributed to declines in service quality, investment by respectively operators in mobile services continued to benefit the entire industry. The sector as a whole is expected to expand at a rate of 5.9% in dollar terms between 2011 and 2016 (Ronda, Zelezny-Green, 2012); while the total telecoms installed capacity as at the first quarter of 2012 is about 176.7 million (NCC, 2012a).

### *1.2 Problem statement*

Notwithstanding the far-reaching achievements in the telecoms sector, Subscribers are faced with some constraints which militate against their deriving maximum returns from the use of telephones, ranging from call tariff to poor quality services. After more than 10 years of the liberalization of the mobile ICT sub-sector, it is currently facing some challenges of worsening quality of service which needs to be addressed in order to achieve pervasive service availability and ultimately, improved quality of service (Juwah, 2012). As a result mobile lines are increasingly becoming inactive as consumers abandon their lines to switch from one network to the other in search of quality services. Statistics from NCC website shows that the growth rate of total active lines declined from 53.2% in 2008 to about 8.5% in 2011. The regulatory body quantify the cost of the inactive lines to be in the neighbourhood of N35.7 billion as at the first quarter of 2012 (Adeyemi Adepetun, 2012). Cross connections and dropped calls are now very common. For example, the average monthly cross connection where calls are routed in error to a GSM user different from the intended person is about 3 (NTG, 2011), while the total call traffic in minutes dropped from 48.5% in 2007 to 30.7% in 2008 and to a negative growth rate of -15.6% in 2009 (NCC, 2012b). That is from 25 182 407 253 total call traffic in 2006 to about 37 396 927 974 in 2007 and from 48 877 104 685 in 2008 to about 41 230 257 326 in 2009.

There is also the problem of uneven spread of access between the rural and urban dwellers. Faced with problem of infrastructure decay, especially in the power sector, the mobile ICT providers are clustered around the urban area where returns to their investment are fast and guaranteed. Of the 63.9% recorded access to mobile ICT in 2011, the (NBS, 2011) report shows that about 84% of them are in the urban areas, while the remaining 16% are in the rural areas. This is a far cry if ICT will facilitate poverty reduction in the rural area, given that they are the vulnerable in the society.

Of a more serious concern is the global ranking of Nigeria in global information technology reports by World Economic Forum Report. Consecutively for nine years, from 2003 to 2011, Nigeria is rated among the countries with the lowest regulatory and infrastructure environment; poor readiness and usage of telecommunications among key economic agents and stakeholders (WEF, 2003-2012), measured with the Network Readiness Index (NRI). Networked Readiness Index is the propensity for countries or economies to take advantage of ICT and other new technologies to increase their growth and well-being. It is a composite of three components/ sub-indexes: environment of ICT (Market, political and regulatory, infrastructure environment), the readiness (individual readiness, business, and government readiness), and usage of ICT (individual usage, business, and government usage). The 2011 report shows that Nigeria was ranked 104 out of 138 countries surveyed in 2010; and in 2011 was ranked 112 out of 142 countries, behind Paraguay (WEF, 2012). Details of Nigeria's NRI ranking from 2003-2011 are in table 1 (Appendix A).

The problem of access to telecoms is a reoccurring decimal and a great concern to the telecoms regulatory body in Nigeria and it has not failed to express it. For example, in 2005 the former Executive Vice Chairman/CEO of the Nigerian Communications Commission (NCC) acknowledged that there was need for improvement in the sector in terms of serving the consumer interest; supporting universal access to ICT services at affordable cost; securing effective competition and the competitiveness of the industry as a whole; promoting quality, plurality, diversity and choice in services. Again in 2012 the current Executive Vice Chairman Eugene Juwah stated that one of the problems with the mobile GSM is poor quality service (Ndukwe, 2005c) and (Juwah, 2012). Also in (Adebayo, 2012), the same problem was discussed.

These problems have the potentials of inhibiting the productivity gain in telecommunication from passing to consumers, as well as truncating the role of ICT as a catalyst in championing the socioeconomic transformation of the economy – more access is good for productivity and growth, but sustainability is better for long term growth. According to (Badasyan, Shideler, & Silva, 2011), high speed access to telecoms enhances prosperity, socioeconomic development and global competitiveness. As such, the indicators used in measuring achievements in ICT diffusion are composite of adoption/spread, speed/quality, affordability, and availability.

### *1.3 Objective of study and Research question*

From what has been discussed above, it is obvious that the achievements recorded in the mobile sub-sector notwithstanding, the country is still vulnerable to poor access to telecommunications which poses a serious challenge to the sustenance of the progress made so far. It is not unlikely that market rivalry by operators, especially price wars may have jeopardized the delivery of efficient and quality of services to consumers. Consequently, it is important to identify who the users of mobile ICT are, and the characteristics/predictors or the probability of their having continued access to ICT. This is vital as part of the processes to understanding the socio-economic impact of ICT. This view was equally expressed by (Sciadas, Lyons, Rothschild, & Sey, 2012), that understanding who the users of access ICT are, and subsequently their usage are indispensable before any attempts to assess the impacts. On the other hand, it will be revealing to compare the reserved call tariff of consumers with the price telecoms operators charge. This will illuminate on whether the core problems of the consumers is price reduction or combination of factors. Thus the willingness to pay approach will reveal the important findings that will address the need of both the consumers and producers of telecoms. The study by (Hanemann, 1991) opined that information about willingness to pay for private good is important for the survival and success of the company, as well as provides information on consumer surplus.

The question that this study attempted to address are: what value do consumers attach to mobile ICT? what factors determine this perceived value? what factors inhibit access to mobile telephony in Nigeria? The study investigates consumers' willingness to pay for mobile ICT as a measure of the value they attach to it; the average maximum amount subscribers will willingly pay to have mobile ICT services; factors that influence the decision to expend on mobile telephony; and the factors that influence consumer's choice of network.

## **2. Methodology and Data handling**

### *2.1 Sample design*

Five mobile ICT consumer categories are identified: individual consumers, small businesses, large firms/enterprises, government ministries, departments and agencies (MDAs), and non-governmental organisations (NGOs). But for the

purpose of this study, the main focus of analysis is the foremost and the most important economic agents, the consumers – the household. To this end we extracted the socio-economic and demographic information from the survey that relate to the subject matter of the individual consumers under study.

A representative national sample size of 5 600 was pre-determined for the study and covers all the six geopolitical zones (North-central, North-east, North-west, South-east, South-south, and South-west). The 36 states and FCT, Abuja within each geopolitical zone were also covered. In every state, one urban and one rural local government area was selected in line with their relative shares in the mobile communications consumption. The national urban-rural ratio of use of mobile telephone is estimated to be urban 65% and rural 35%. The urban area is the state capital. In order to ensure adequate and functional representation, the sample covers the entire spectrum of potential and actual users of mobile phones. Consumers were selected to cover the different socio-economic groups – high, middle and low.

The sampling design and allocation of sample across states was purposely based on the relative shares of states in the use of mobile phone as contained in the National Bureau of Statistics (NBS) Core Welfare Indicator Questionnaire (CWIQ) Survey of 2006. The cluster distribution of the respondents is as follows: (1) business/industrial 1 089 (2) educational 193 (3) Market 183 (4) residential 4 101, and (5) others 34.

## 2.2 Data set

Respondents were offered two different scenarios in their utility space – one with the availability of mobile telecommunication and the other without. They were then asked how much they will be willing to pay to have mobile services of the network providers each minute they made call in future. The consumers were offered three start prices. The first start price was ₦50 which is what is currently charged by the providers per minute or in seconds billing equivalent for making calls. The second start price was ₦65 and the third start price was ₦85 representing 30% and 70% mark-up on the original start price of ₦50, both randomly selected.

On retrieving the responses, three categories of consumers were identified for analysis. These are the effective demand consumers, non-effective demand, and protest zeros consumers. The effective demand consumers are those psychological economics referred to as being willing, ready, and able to purchase mobile services; the non-effective consumers of ICT are those who said that they are ready, willing, but not able to pay for the services; while the protest zeros constitutes those who are not ready, not willing, and not able to pay.

Within the concept of WTP, income is considered the most important factor because willingness to pay is constrained by an individual wealth. Unfortunately, the income variable generated from survey data is for several reason, particularly measurement errors, often unreliable. Analysts often have to rely on proxy variables or sometimes use expenditure per capita to mirror income. In this study information was collected on household ownership of a set of durable goods including cars, TV, pressing iron, radio, decoders, refrigerators, etc. These were used to construct the wealth index score for each household using the method of Principal Component. The asset score of each household was then used as a measure of the standard of living of the household. Furthermore, households were categorized into five quintiles using their score in the wealth index. Similarly, mean expenditures on Mobile Phone services were categorized into five quintiles corresponding to the five quintiles of the asset index score. The first quintile represents the lowest average expenditure quintile while the 5th quintile represents the highest expenditure group, table 2 (Appendix A).

## 2.2 Methodology

The total benefits derived by consumers are expressed through the sum of the maximum amount individuals are willing to pay to use it, rather than forego it. This value is computed by applying a contingent valuation method, CVM of willingness to pay. Thus willingness to pay (WTP) value measures the maximum reservation price a person is willing to pay in order to receive goods or services or in order to avoid some undesired phenomenon (Marchenko, 2012).

There are several formats for eliciting information on the WTP values. These include the iterative bidding technique, dichotomous choice format (also referred to as the referendum approach), contingent ranking technique, and stochastic payment card approach (SPC). This study used the dichotomous choice approach because it is less demanding on data and easier to estimate. Because of the censored nature of the dependent variable – consumers who place value on ICT and those who do not place value on ICT censored Tobit model was used with invalid WTP

censored at 0 and valid WTP at 1.

### 2.2.1 Model specification

Total value individual consumer of mobile telecoms is expressed as  $wtp\_50$ , while  $x$  is the vector of socio-economic and demographic factors that can affect the total value placed on mobile ICT services. The model is specified as:

$$wtp\_50_i = x\alpha + \mu \quad (1)$$

Where  $wtp\_50$  is the threshold or the minimum amount each consumer is willing to pay in order to obtain GSM services, while  $x$  is the vector of factors that determine the minimum value consumer place on mobile ICT services such as sex, household size, age, wealth, level of education attainment, expenditure on mobile calls (call tariff), employment status, and location;  $\alpha$  is the parameter; while  $\mu$  is the normally distributed error term. The  $wtp\_50$  is a dichotomous variable such that:

$$wtp\_50_i > 0; wtp\_50_i = 0 \text{ otherwise} \quad (2)$$

The vector of the determinants of willingness to pay comprises two sets of variables, categorical and non-categorical variables. The categorical variables are variables whose interpretation is based on the omitted variables. The categorical variables include (1) sex (male and female) (2) education attainment (elementary/primary, secondary, higher education, and no education) (3) employment status (paid-employment, self-employed, unemployed, and student) (4) location (urban and rural).

## 3 Analysis of Result

### 3.1 Consumer valuation of GSM services

The result identified three groups of respondents: (1) individuals who said they will pay nothing either because they feel they do not need it or because they want government to subsidize the cost of telecommunications in the country, or similarly reasons; (2) those who are willing to pay, but cannot afford it; and (3) household who are willing and able to pay. About 46.3% of respondents say they are not willing to pay, while about 53.7% of them (second and third category) say they are willing to pay. Analyses of the results are as follows:

#### 3.1.1 Not willing to pay for ICT services

This group constitutes what is generally referred to as protest zeros. That is, respondents who said they will pay nothing either because they feel they do not need it or because they want government to subsidize the cost of telecommunications in the country, or similarly reasons. Figure 1 (Appendix A) is a summary of the various reasons respondents gave for not being willing to pay. It shows that 65% of the respondents are not willing to pay because they felt it is not worth the cost at the price of N50 per minute, while about 20% said they could consider demanding for GSM services if Government subsidizes it. This is very informative and worrisome because it is possible this category of Nigerians suffer from what (Meso, Musa, & Mbarika, 2005) called ICT marginalization of end-users. According to the study, digital device suffers from poverty-centric problem, as a result perception of mobile ICT's reliability, and constraints that limit access to mobile ICT, has the potentials of marginalizing some end-users from enjoying the benefits of ICT. On the other hand it shows the extent of work to be done to ensure, not only wider penetration, but effective price regime that will guarantee more access to mobile telephony.

#### 3.1.2 Willingness to pay (WTP)

There are two categories of household in this group. Respondents who said they are willing and able to pay for telecommunication services at ₦51 per minute and those who are willing to pay the same amount, but cannot afford it. This is about ₦1 higher than the ₦50 that the service providers presently charge for the same service. In other words, consumers still enjoy some consumer surplus of about ₦1 which shows the importance and the value consumers attach to the developments in telecommunications services in the country. Figure 2 (Appendix A) shows the reasons for choice of network for the category that constitutes effective demand for telecommunications services. That is respondents who are willing and can afford the services of mobile telecoms.

### 3.2 Determinants of consumers demand for mobile ICT

In table 3 (Appendix A) we present result of the influencing factors on household willingness to pay for telecoms services, while table 4 (Appendix A) shows the marginal effects of these factors. The interpretations of the

categorical variables are made with reference to the omitted variables. For sex the omitted variable is male; education attainment the omitted variable is no-education; employment status the omitted variable is student; and for location the omitted variable is rural area.

### 3.2.1 Gender determinants of expenditure on mobile ICT

Sex in the regression result is a categorical variable and the omitted category is the male category. And since the coefficient on the female category is negative, it indicates that the probability of being willing to pay ₦50 decreases as we switch from the male to the female category. Though considerable proportion household income is spent on GSM, the level of expenditure varies by sex (men generally spend more than women), age group, (40-60 years) age bracket has the highest mean expenditure on GSM services.

### 3.2.2 Household size

There is almost an endless literature that tried to link poverty with family size. They argued that per capita income, per capita expenditure, and per capita savings decreases as family size increases. They tend to spend more on non-durables, particularly food and less on durables. The implication of these studies as it relates to demand for telecoms is that increase in family size which mirrors extent of poverty should bring about decrease in the demand for ICT. This probably accounts for the negative relationship between household size and the probability that they will pay an amount equal to or higher than ₦50 for GSM services as shown in table 3 (Appendix A).

However, Nigeria presents a particular case that runs against this theoretical and intuitive reasoning, because available data from the NBS shows that middle class families have large families and that they spend more on both food and durables than the lower class families. This also looks plausible because affluence in Nigeria is usually associated with high dependants and obligations; thus level of expenditure is expected to positively correlate with family size. The NBS Nigeria Living Standard Survey (NLSS) report in 2005 stated that: “interestingly there is a steady decrease in poverty from one person household size to more than 20 persons household size. Such decrease increases as the household sizes increases but dropped slightly for more than 20 person household size”. The statistics shows that the average family size of those above the relative poverty line is more than five, while that of those below the relative poverty line is about three. Given these two view points and the outcome of our result, there may be need for further research to understand the demographic characteristics of demand for ICT in Nigeria.

### 3.2.3 Age

Age is negatively correlated with the probability of being willing to pay for telecoms services. Expectedly, following the theory of technology adoption which points to age as a factor that influences when and how an individual adopts new technologies. Studies on cyberphobia indicate that older people tends to exhibit higher phobic levels. Consequently, these individuals tend to adopt new technologies much more slowly than younger users, hence the negative relationship between adoption of technology and age (Appelbaum, 1990). The importance of age in the demand for mobile ICT in Nigeria is at variance with the two-country cross section analysis by (Meso, Musa, & Mbarika, 2005) where they concluded that age, gender, and education level had no effect on mobile use or on the perception of use of mobile ICT.

### 3.2.4 Income

As shown in table 3 (appendix A), the wealth index score is positive and statistically significant. The significance of wealth index implies that respondents who earned higher income have the propensity to pay more than those with lower income earners. Richer households express greater willingness to pay for the use of mobile telecommunication. At the price of ₦50, the positive sign implies a direct relationship between WTP and level of affluence.

The relationship between wealth of consumers and their willingness to pay is also verifiable in table 2 (Appendix A) where we showed the quintile distribution of consumers' average monthly expenditure on mobile ICT. The first quintile represents the lowest average expenditure quintile while the 5th quintile represents the highest expenditure group. It shows clearly the high level of correlation between quintiles of asset score and quintiles of average expenditure on mobile phones.

### 3.2.5 Education attainment effect

Similarly, all the parameters of education, elementary/primary, secondary, and higher education have positive sign and significant for all the categories. Like sex, education is a categorical variable with reference to the omitted

category which is the category of households without any form of education. In particular expenditure on GSM services varies directly with the level of education. It shows that as one enrolls as a student (i.e. from one education level to another), the probability that he or she will be willing to pay for mobile services increases – the value placed on ICT increases.

### 3.2.6 Call tariff

The price effect of willingness to pay is mirrored with consumers' total expenditure on GSM. At the price of N50, increase in the total amount expended on GSM reduces the propensity for consumers to pay for telecoms services as shown in table 3 (Appendix A). The negative sign implies an inverse relationship between WTP and the offered price – GSM call tariff. It follows that at a higher offered price, the respondents would be discouraged from using mobile telecommunications. With reference to table 4 (Appendix A) the price effect of willingness to pay is expected to be more noticeable on those at the bottom of the latter of income distribution, the first quintiles. That is, the effects of call tariff on total expenditure on mobile decreases as one moves from the first to the fifth quintiles.

### 3.2.7 Employment status

Employment status is also shown to be a critical element in consumers' decision to demand for GSM services. Three categories of employment were used, employed (wage-employed), self-employed, and unemployed. As a categorical variable, the omitted category is student and as in table 3 (Appendix A). Being unemployed, like other levels of employment increases the probability that one pays to have GSM service. The impact of employment status on mobile is understandable because aside communication with relatives and friends, telecoms generally increase the chances of getting information for job (including the frictionally unemployed) search and subsequent employment.

### 3.2.8 Rural-Urban effect

The income effect of the use of GSM also explains the predominance of the use of mobile GSM in the urban areas where income is higher and where most of the network providers concentrate their resources. Many rural dwellers are not covered by the services of network providers because of the problems highlighted earlier on. But even if they are covered, many cannot afford investment in the ownership of GSM hardware and the subsequent expenditure in the recharge consumables.

Table 3 (Appendix A) shows that there is the probability that those in the urban areas will be willing to pay for GSM services than those in the rural area. This is evident from the positive sign, given that urban area is a categorical variable with the omitted variable being rural. What it means is that as one moves from rural to the urban area, the probability that one demand for GSM services increases.

### 3.2.9 Interconnectivity and Network coverage

Consumers identified network related problems as serious challenges to their having access to mobile ICT. It is believed that the larger network providers in an attempt to increase their market share create artificial bottlenecks against competitors to the detriment of the welfare of consumers. This results to unhealthy price wars and subsequent network congestion, instead of improving on operational and market efficiency. As part of individual effort to enhance their welfare, consumers resorted to either having more than one network, based on their perception of the network coverage and how easily it is to have successful calls routed to other networks.

It is important to emphasise that though consumers see this as a way out of the network coverage and interconnectivity dilemma, there is a cost associated with interconnectivity problem in particular, the implicit cost of numbering. A numbering problem arises because in an attempt to have all the available networks a consumers of telecoms will have to change his or her telephone number to be able to migrate to another network. As it is there is no system currently in Nigeria whereby a consumer can use one telephone number to be able to migrate to another network. This is also one of the reasons why telephone calls in UK was expensive as shown in (Doyle & Smith, 1998). Besides the estimated determinants of willingness to pay in table 3 (Appendix A) respondents identified four most important factors that inhibit their access to mobile ICT, figure 2 (Appendix A). These are network coverage, customer services, interconnectivity, and call tariff.

## 4. Conclusion and Policy recommendation

### 4.1 Conclusion

The study stressed the importance of mobile ICT in the socioeconomic development of Nigeria. The exponential

growth in the use of GSM services has eclipsed the services of the government owned Telecommunications (NITEL) which was the sole provider before 2001. From less than 500 lines prior to 2000, the country now has in excess of 30 million lines, thus credited as the fastest growing ICT market in Africa and one of the fastest in the world. This is a clear testimony to the efficacy of the deregulation and liberalization in this sector. There is however concern about the imminent danger of short-circuiting the gains, particularly its welfare benefits so far. Nigeria is one of the countries with the lowest propensity to exploit the opportunities offered by information and communications technology because of poor market, political and regulatory, infrastructure environment, poor readiness and usage of ICT among key economic agents and stakeholders.

Gender, household size, age, wealth, education attainment, call tariff, employment status, and location (urban-rural) are the key predictors of demand for telecoms services. This explains the predominance of the use of mobile GSM in urban areas where income is higher and where there is concentration of infrastructure. The most important factors identified as challenging to having access to mobile telephony include network coverage, customer service, interconnectivity, and call tariff. For those that can afford it, the amount they are willing to pay is higher than the amount that is currently charged by operators, thus raising concern whether consumers are spending so much on telecommunication simply to satisfy the long years of communication starvation? It is possible that the enthusiastic embrace of the GSM providers and their services will sooner than later decline. The tolerance for poor services that characterize the services which consumers seem to overlook for now will by then run out.

#### *4.2 Policy recommendation*

In spite of the enthusiastic embrace and the unqualified approval most consumers seem to give to the services of the providers, it is important that the providers themselves must brace up to the challenges of providing quality services to their subscribers. Furthermore, it is critical to encourage the formation consumer protection societies or groups in this sector. This is because of the level of information asymmetry that prevails in the sector where many do not understand their rights and obligation in their contract with the network providers. More importantly, there is need for price cap regulation to determine the maximum allowable price increases for a regulated operator's services as well as interconnectivity charges for a specified number of years. This will checkmate the dominance of the market by giant providers who tend to use their market power to dominate, and dictate to the pace of development in the sector. The importance of this is to guide against unhealthy market competition and rivalry that will lead to poor quality service delivery. This study recommends that such practices should be discouraged through regulation.

The identification of cost related problems as reasons for not being willing to benefit from the all obvious important telecoms is a serious challenge in using telecoms to improve welfare. It is obvious that those that are willing to pay also have wealth as the driving force because the most constrained factor of willingness to pay is income. The implication of about 46% of the respondents not willing to pay mirrors lost market value to the operators, and there is need to simultaneously address the problems of cost and efficient service delivery. The telecoms regulators can introduce a policy whereby operators pay fines for welfare loss in terms of wrongly routed calls, drop calls, over network congestions arising from wrongly timed promotional sales, non-competitive prices that increases demand for telecoms services without commensurate improvements in quality services etc.

The incidence of non-usage in the rural areas clearly calls for urgency the need to expedite action on more rurally affordable means of telecommunication such as the rural telephony project of the Federal Government. This will help bridge the communication gap between the rural and urban dwellers. For this to be realized there should be incentives such as tax reduction/holidays for operators who increased their coverage of the rural areas. This is necessary because the cost of setting ICT infrastructure in the rural area is relatively high, especially given the poor infrastructural development in the rural areas. Finally, in view of governments concerns about local contents, the welfare benefits of mobile ICT to Nigerians could also be enhanced if GSM network providers are quoted in the Nigerian stock market so that Nigerians could be part owners of these firms.

Finally, the problems of interconnectivity needs to be addressed because operators, especially those with large market share (Market share of the mobile operators in Nigeria published by the Nigerian Communications Commission as at December 2011 are: MTN Nigeria communications (46%), Globacom Limited (22%), Airtel Limited (22), and EMTS – Etisalat (12%), (<http://www.ncc.gov.ng/industry-statistics/68.html>.) MTN Nigeria, Globacom and Airtel are using it as advantage to monopolize the market either by restricting calls from other network providers or increase the cost of accessing them. This is important so as to balance between regulated access



charge (promoting a healthy competition in the GSM retail market) and ensuring high-quality services. This will be complemented by addressing the issue of numbering to facilitate consumers' migration to any network of choice without necessarily changing their existing GSM number.

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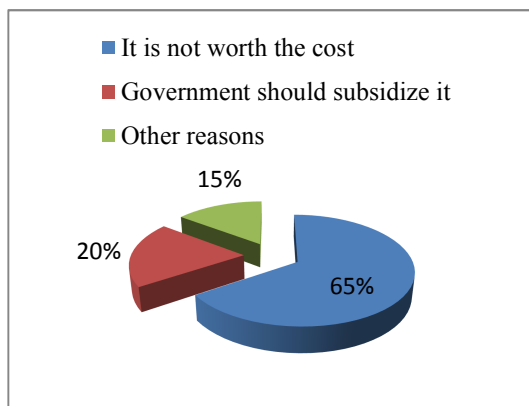
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**APPENDIX A: Reference data and regression results of analysis**

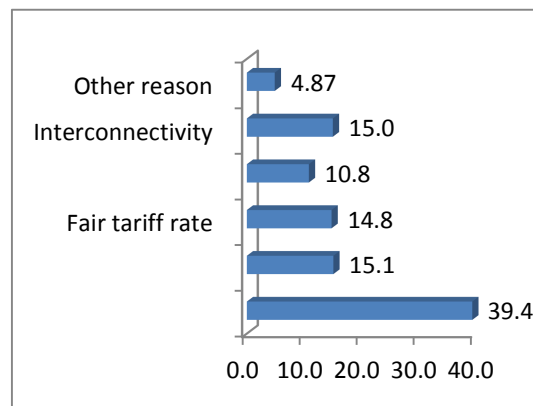
Table 1: Networked Readiness Index (NRI) ranking of Nigeria, 2002-2011

Year	NRI ranking	Number of countries ranked
2002	75	75
2003	79	102
2004	86	104
2005	90	115
2006	88	122
2007	94	127
2008	90	134
2009	99	133
2010	104	138
2011	112	142

Source: WEF Report various issues



**Figure 1: Reasons given by the protest zeros being willing to pay for GSM services**



**Figure 2: Percentage distribution of consumers for not being willing to pay for GSM services**

Source: Survey of individual consumers of telecoms in Nigeria

**Table 2: Variation of average expenditure on Mobile Phones with asset index score**

Quintile	Score	Average monthly Expenditure on Mobile Phones (₦)	Standard Error
Quintile 1		2008.81	91.31393
Quintile 2		3033.98	106.7426
Quintile 3		4070.39	115.2546
Quintile 4		4980.62	127.7976
Quintile 5		7022.78	171.9137

**Table 3: Tobit estimation of predictors of willingness to pay (WTP) for GSM services**

LR chi2(12) = 281.53; Prob > chi2 = 0.0000; Log likelihood = -4357.2928; Pseudo R2 = 0.0313

WTP_50	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Female	-.197964	.0317481	-6.24	0.000***	-.2602067 -.1357212
hh_size	-.0109286	.0052912	-2.07	0.039*	-.0213021 -.000555
age	-.0211118	.0101989	-2.07	0.038*	-.0411132 -.0011228
income	.0853636	.0179051	4.77	0.000***	.0502602 .120467
primary	.5735211	.1472597	3.89	0.000***	.2848154 .8622269
higher edu	.6415965	.1429408	4.49	0.000***	.3613581 .9218349
secondary	.5722653	.1396786	4.10	0.000***	.2984226 .846108
exp.gsm	-5.03e-06	1.85e-06	-2.71	0.007**	-8.66e-06 -1.40e-06
paid-employ	.342373	.0473573	7.23	0.000***	.2495281 .4352179
self-employed	.2431635	.0480044	5.07	0.000***	.1490499 .337277
unemployed	.9628608	.0892167	10.79	0.000***	.7879497 1.137772
Urban	.1067349	.0335462	3.18	0.001**	.0409669 .172503
_cons	.0831236	.1507987	0.55	0.582	-.2125204 .3787675
/sigma	.8614182	.0150284			.8319546 .8908817

Obs. summary: 0 left-censored observations; 2193 uncensored observations

2084 right-censored observations at WTP\_50>=1; Legend: \*p<.05; \*\*p<.01; \*\*\* p<.001

**Table 4: Marginal effects of willingness to pay (WTP) for GSM services**

y = Pr(WTP\_50>1) (predict, pr(1,.)) = .40938521

variable	dy/dx	Std. Err.	z	P> z	[ 95% C.I. ]	X
female*	-.0881908	.01392	-6.34	0.000	-.115474 -.060908	.316811
hh_size	-.0049301	.00239	-2.07	0.039	-.009609 -.000252	4.74795
age	-.0095269	.0046	-2.07	0.038	-.018544 -.00051	4.12743
income	.0385096	.00808	4.77	0.000	.022682 .054337	.159213
pry.edu*	.2603608	.06336	4.11	0.000	.13617 .384552	.068506
high edu*	.2806694	.05928	4.73	0.000	.164477 .396862	.551321
sec. edu*	.2576778	.06141	4.20	0.000	.137319 .378037	.370587
exp.GSM	-2.27e-06	.00000	-2.71	0.007	-3.9e-06 -6.3e-07	6057.31
paid-emp*	.1550955	.02136	7.26	0.000	.11324 .196951	.369885
self-emp*	.1101297	.02173	5.07	0.000	.06753 .152729	.381108
unemploy*	.4086468	.02935	13.92	0.000	.351113 .46618	.040917
Urban*	.04784	.01492	3.21	0.001	.018592 .077088	.696516

(\*) dy/dx is for discrete change of dummy variable from 0 to 1

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