

THE ECONOMIC IMPACT OF MOBILE PHONE SERVICES ON RURAL HOUSEHOLDS IN NIGERIA: THE CASE OF KATSINA STATE

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Abstracts

This study empirically analyzed the impacts of mobile phones services on rural households in Katina state. Data were collected through questionnaires from a sample of 385 mobile phones owners/users and non-owners/users from six rural communities in the state. Logistic regression was employed for the analysis. The findings indicated that mobile phones features/service have significant socio-economic impact on respondents-through improving their access to social assets, financial assets, human assets as well as management of their vulnerability context situations: that is mobile phones adoption facilitate regular contact with friends and family members in the city, serves as the cheapest sources of entertainment among rural dwellers, improve love life, increase support from family members, facilitate arrangement of social events such as marriage ceremony, facilitate remittance flow and improved respondents ability to deal with emergencies situations such as sickness, injury, deaths, conflict and robbery. The study recommended that basic and technical literacy of rural households should be improved and mobile phones services network should be extended to rural communities that are not currently covered.

KEY WORDS: *Economic, Households, Services, Rural and Mobile Phone*

BACKGROUND OF THE STUDY

Global mobile telecommunication industry had experienced unprecedented growth and development over the past few decades due to series of policies and regulatory reforms; increased in private sector investment as well as customers driven technological innovation. This is manifested in the way and manner that mobile phone services coverage and adoption have cut across both rich, poor and urban-rural population divides around the globe. For instances,

by the end of 2016 there were about 4.8 billion unique mobile subscribers¹ and 7.9 billion SIM connections worldwide (GSMA Intelligent, 2017). In Nigerian, data from Communication Commission (NCC, 2017) indicated about 154.529 million mobile SIM subscriptions with a teledensity of over 110.38 percent as at the end of 2016 and about 40 percent of rural Nigeria are covered with mobile phones services networks.

Theoretically, positives networks externalities of mobile telecommunication infrastructure and the potential of cellular phones to reduce information asymmetry among economic agents if use appropriately, could be supported by economic argument. Since positives spillover effects of telecommunication infrastructures across different sectors of the economy and improve access to and uses of information as input in decision making by economic agents, have the potential to increase efficiency, productivity and overall outcome of economic process thereby, promoting economic growth and development of a country.

Souter, et al, 2005; Goodman, 2005; Onwuemele , 2011 and Baro & Endouware, 2013. Thus, this penetration of mobile phones among mostly poor rural population around the globe is hypothesized to help facilitate their development drives, through lowering transaction cost, promoting better informed choices, facilitating discovery of new opportunities for working, studying and for selling products, helps in building and maintaining social capital. A number of attempt to investigate the extent to which mobile phones technology adoption could help improved living conditions of rural dwellers in different part of the world are well documented.

The introduction of global system of mobile telecommunication in Nigeria, following deregulation of the industry in 2001; the total number of subscribers has increased rapidly over the past decades; for instance at the end of 2005 there were 19,519,154 subscribers, however by the end of December, 2016 the numbers of subscribers has grown to 154,529,780 with a teledensity of over 110.38 percent (NCC, 2017). The year on year growth rate of subscribers has been steady since 2001. Of all the subscribers, a total of 93,554,076 had an internet subscription with one of the four carriers of Airtel, Etisalat, Globacom and MTN as at September 2016. This means that of all the active GSM lines, 61.21 percent had an internet subscription.

¹ Unique mobile subscribers represent an individual that can account for multiple SIM connections.

A breakdown of subscribers' base on state of registration indicated that Lagos state accounted for the largest share of active voice subscriptions with 19.04 million or 12 percent of the total, followed by Ogun State with 8.53 million subscribers or 5.7 percent, Kano State with 7.81 million or 5.25 percent. Oyo State with 7.53 million subscribers or 5.06 percent of the total, then FCT and Rivers State with 6.03 million (4.05) percent and (5.84) 3.93 percent respectively. On the other hand, Bayelsa 1.11 million, Yobe 1.40 million, Ekiti 1.42 million and Ebonyi 1.43 million had the smallest number of active voice subscribers as of Q1 of 2016. While, Katsina State that is of much interest to this study had about 3.449 million subscribers which is approximately 46.66 percent of (7,390,772) the State projected population in 2011, indicating somewhat significant penetration of mobile phones, even though majority of the subscribers reside in the urban centers of the state.

Active internet subscriptions followed the same pattern with active voice subscription, Lagos State accounted for the largest share of active internet subscribers with 12.62 million or 13.65 percent of the total, followed by Ogun State with 5.62 million subscribers or 6.09 percent, Oyo State with 4.90 million subscribers or 5.31 percent of the total, then Kaduna and Kano State with 4.23 million (4.57) percent and 4.13 million (4.47) percent internet subscribers respectively. On the other hand, Yobe State 0.69 million, Bayelsa 1.73 million and Ebonyi 0.79 million had the smallest number of active internet subscribers as at Q1 2016. Also, Katsina State had about 1.89 million internet subscriptions (NBS, 2016).

The penetration of mobile phones among mostly poor rural population around the globe is hypothesized to help facilitate their development drives through lowering transaction cost, promoting better informed choices, facilitating discovery of new opportunities for working, studying and for selling products, help building and maintaining social capital.

It is against this backdrop that the study seeks to empirically analyse the economic impact of mobile phones services on rural households in Katsina State.

LITERATURE REVIEW

A number of studies have investigated the impact of mobile phones at micro level by both foreign and domestic authors. For instances, Samuel et al (2007) assessed the socio-economic impacts of mobile communications on households, rural communities, and small businesses in South Africa, Tanzania, and Egypt, using quantitative survey of mobile phone users

(individuals and businesses). The authors found that mobile phones were reducing travel needs; assist in job searching, improving access to business information, and contacts with families and friends.

Souter et al (2005) assessed the economic impact of telephones on rural livelihoods in Mozambique, Tanzania, and India. Employing quantitative surveys of phone users in the villages studied. They found that, the impacts of telephones on peoples' livelihoods were more evident in emergencies, social networks, and saving costs and time. Based on quantitative case study, (Malik, Chaudhry & Abbas 2009), studied the socio-economic impact of using cellular phone in the urban and rural areas of Deragazi Khan Districts of Punjab provinces (Pakistan). They used logit regression model with primary data sets and found that respondents in the rural areas derived more benefits in using cell phone as it is the main sources of information to them compared to the urban areas respondents.

Duncombe (2016) undertook a systematic review of literature on mobile phone used for agricultural and rural development, he discovered a rapid expansion of research in recent years and growing number of primary research studies that have developed rigorous methodologies for data collection and analysis, he also identified areas where future research priorities may lie to include: the provision of agricultural data sources that can provide the basis for effective planning and policy making, potentials for financial market integration and the assessment of information and services needs that take into account gender difference and the potentials for user involvement in the design of service provision.

Folayi & Adedokun, (2014) analyses the demand for smartphones among students in university of Ibadan, using survey research design of ex-post-facto type they argued that price, students perception and smart phones designs and features determine the demand for the smart phones among the sample studied. Two studies explicitly assessed the social and economic impacts of mobile phones on Nigerian households. Onwuemele (2011), examine the impact of mobile phones on rural livelihoods assets in Nigeria, a case study of Ovia North East local government Area of Edo State, using logit regression model and survey data, He found that mobile phone has significant impacts on social and human capital livelihood assets of rural households. Baro & Endouware (2013) examine the effects of mobile phones on livelihoods of rural residents in the Niger Delta region, interviewed 129 respondents and call centers operators. He found that mobile phones have socio-economic impact on the rural households through increasing contacts with urban family and

friends, reduce cost of travel by sending recharge cards from urban relatives and call center operators became self-employed. In sum mobile phones is proving its usefulness in improving the socio-economic life of peoples around the world, however consistent evidence across the globe are required to make definite claim about the role of mobile phones in economic development, this established the basis argument for our study

Theoretical Frame Work for the Study

This research combines the diffusion of innovation theory and sustainable livelihood framework. The diffusion of innovation theory helps us to understand the reasons for mobile phones adoption, usage patterns and communication objectives that rural households might achieved, through mobile phones ownership/usage. While, the sustainable livelihood framework is used to study and analyses the channels through which mobile phones ownership/usage could benefit rural households.

Diffusion of Innovation Theory

According to Rogers (2003), diffusion of innovations theory can be used to expand understanding of reasons for adoption, usage patterns, and communication objectives that are and can be met by the mobile phone in a developing country like Nigeria. This includes how and why an innovation is adopted, and especially the unique reinvention of an innovation to the changing needs of the individual. Understanding an innovation's perceived attributes and especially the perceived relative advantage, the compatibility, constraints and the reinvention of an innovation to the local circumstances, will uncover uses capable of dealing with a greater spectrum of needs.

Like all previous technological devices, mobile phones may have a differential impact on people and societies. While much has been written on the global digital divide between rich and poor countries, considerably less is known about the local digital divide within poor countries and constraints to effective and efficient utilization of mobile phones (Jensen, 2007). Rural households, due to low levels of education, high rates of illiteracy, and lack of assets (such as credit and agricultural inputs), constitute the majority of the world's poorest (Forum for Agricultural Research in Africa, 2009). These factors may delay the capabilities of rural dwellers to access and use mobile phones. Additionally, earlier adopters of innovations tend to be leaders and have more heterogeneous networks (Rogers, 2003). However, it seems that majority of

rural population are increasingly adopting and using mobile phone, as a result of increase innovation and competition that bring down the cost of mobile phone acquisition and usages. But, the question still remain does rural household possess the capacity to fully exploit the potentials offer by mobile phone to better their living conditions.

The Sustainable Livelihoods Framework

This frame work was developed by the British Government Department for International Development (DFID). It is a versatile tool for rural development practitioners and researcher that offers a framework about livelihoods that helps order complexity and makes clear the factors that affect livelihoods. Sustainable livelihoods analysis is concerned with the range of assets which individuals, households and communities' access and use in order to sustain themselves. This is illustrated in the diagram below.

Figure1: The Sustainable Livelihoods Framework



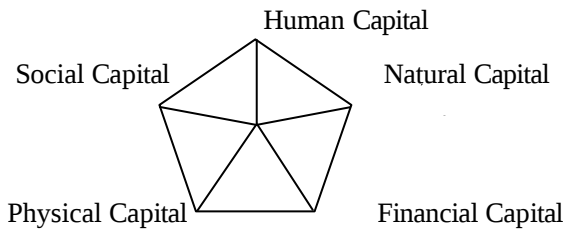
Source: DFID, 1999

The starting point is the 'Vulnerability Context' within which individuals and households live. People's lives, particularly those of the poor, are strongly affected by three groups of factors which make them (and their assets) vulnerable and which are outside their control. These are:

- i. Trends (such as population change, national and international economic trends and technological change);
- ii. Shocks (such as natural disasters, epidemics, civil conflict and economic crises);
- iii. And seasonality (variations in prices, costs, production, food supply, economic opportunity, etc.).

These factors can drastically affect (though not necessarily reduce) people's assets and options. Within this 'Vulnerability Context', people access and use a variety of assets to achieve positive livelihoods outcomes. The sustainable livelihoods approach organizes these assets into five categories, usually illustrated as a pentagram (below).

Figure 2: The Sustainable Livelihoods Pentagram



Source: DFID, Sustainable Livelihoods Guidance Sheets

These five categories are:

- i. Human capital, that is, skills, knowledge and the ability to work/produce;
- ii. Social capital, that is, networks, participation in social/productive groups and mutually beneficial relationships;
- iii. Natural capital, that is, natural resources; such as land.
- iv. Physical capital, that is, buildings, infrastructure (including power and water), productive tools etc.; and
- v. Financial capital, that is, funds available for investment, production and consumption.

People's access to these assets, and their freedom of choice in how they can deploy them, are strongly influenced by a third main component of the

livelihoods analytical framework: the policy and institutional environment;

government policy on health and education, for example, significantly determines opportunity to enhance human capital; institutions such as the market, land tenure and the judicial system can either constrain or facilitate acquisition, enhancement and productive use of the various capital assets. Policies and institutions also interact with the vulnerability context: ineffective markets contribute to the risk rural households' face in investing in cash crop production, while lack of transparency and accountability within local government can leave people vulnerable to arbitrary decisions which favor the politically well-connected.

Livelihood strategies are the approaches people adopt using the assets they have available to secure sufficient income and welfare to protect them against vulnerabilities and achieve other goals (such as sufficient food, education for their children, adequate shelter, medicine and other improvements in their quality of life). The options that are available to them are again influenced by the vulnerability context, by the extent and quality of the assets at their disposal, and by the policy and institutional environment. Successful livelihood strategies can lead to further improvement or increase in assets or reduced vulnerability.

The focus of this study is to empirically investigate how rural household in Katsina state adopt or uses mobile phone services and analyze its potential impacts on their socio-economic condition, we therefore use the diffusion theory to understand reasons for adoption or usages and sustainable livelihoods framework to analyze its potential impacts via the five livelihood assets (human, financial, social, physical and natural), as well as the overall vulnerability context as outline in the general framework.

RESEARCH METHODOLOGY

We employ a binary logit econometric model, following Malik, Chaudhry & Abbas (2009) to examine the impact of mobile phones on various socio-economic variable groups in terms of binary characteristics.

Given that the generalized equation of bi-variate Logit regression model can be written as:

$$Y_i = \log \frac{p_i}{1-p_i} = \beta_0 + \beta_1 X + U_i \quad (1)$$

Where p_i is the probability of success (mobile phones having impact) of covariate level X ;

Y_i = Dependent binary variables (proxies of socio-economic impacts)
 X = Explanatory variables in terms of binary nature: respondent having cell phone =1, otherwise=0
 β_0 = Coefficient of intercept
 β_1 = Coefficient of explanatory variable Dummy variable
 U_i = Stochastic error term, $I = 1, 2, 3, \dots, n$
 N = number of observations (385 in our sample)

Table 1: Socio-Economic Variables

Independent variables: One (1) for mobile phone owner/user; Zero (0) for non-owner/ user

S/N	Dependent variables	Definitions of	One(1); if there	Zero(0); other
1	SA	Social assets.	1	0
2	FA	Financial assets. e.g.(saving,	1	0
3	HA	Human assets .e.g.(knowled	1	0
4	PA	Physical assets. e.g.(infrastructur	1	0
5	NA	Natural assets.e.g.(Land etc)	1	0
6	VC	Vulnerability context.e.g.(sickness, injury etc)	1	0

Source: compile by author, 2017

The above were chosen base on careful review of literature, they believe to be the likely socio-economic variables groups that mobile phones can impacted upon. To determine the existence of impact on each variable group, a set of questions were asked to each respondent against the variables, if respondents answer yes to at least sixty percent of the questions we index the variable with one (1) meaning mobile phone usage by the respondents has impact on the variables. Otherwise, we index the variable with zero (0) meaning that, mobile phone usage by the respondents has no impact on the variables.

Sampling Technique and Sources of Data

The sampling technique employed was the multi stage sampling design. In the first Stge , the study consider three Local Government areas , one from each of the three senatorial zones of the state .The second stage involves identification of rural communities that have mobile phones services network coverage in the selected local government areas and randomly selecting two rural communities from each of the selected local government, making a total of six rural communities.

The Data used for this study was gathered from primary sources. Structured Questionnaires were used to collect data from a sample of 385 respondents in six rural communities in the state. A proportion of non-owners/users of mobile phones (about 131 out of 385 respondents) is used to check for the comparison impact of “have” and” have not”. The questionnaires were structured to captured respondents’ experiences with mobile phone ownership/usage in relation to the chosen variable of interest.

RESULTS AND DISCUSSION

The table blow presents summary of logit regression results on the six variables used as proxy for socio-economic status. They are social assets, financial assets, human assets, natural assets, physical assets, and vulnerability context.

Table 2: Bi- variate Logit Regression Results for Overall Socio-economic Impacts of Mobile Phone Services

Explanatory PA	N	Variables VC	SA	FA	HA	HA
Constant	- (0.26	- 4.16 (0.7 3)	- (1.00)	- 21.2 3 (3.51 E3) 2	- 21.20 (3.51 E3)	-3.753 (0.584)
MOU	3.563 (0.31 5)	5.21 * (0. 7)	5.33 (1.01 2	E3 1** (3. E3)	21.12 ** (3. E3)	5.289* (0.607)
Odd Ratio{Exp(B)}	35.26	183. 27	206. 9	2.65 E9	1.493 9	198.16
Log-likelihood	385	385	385	385	385	385
Nagelkerke's R ²	- 328.2 3	- 311. 27	- 350. 0	- 336. 31	- 351.7 5	- 265.86
Overall Percentage	0.532	0.584	0.482	0.513	0.400	0.664
	84.7	82.3	74.3	75.1	68.3	87.5

Source: Author Computation Using SPSS 16.0 Version

Note: * Indicate that coefficients are statistically significant at 1 percent level.

** Indicate that coefficients are statistically insignificant even at 10 percent level

As shown in the table above, mobile phones features/service have significant and positive impact on four of the six variables used as proxy for socio-economic status. First and foremost, mobile phone service has statistically significant positive impact on social assets at 1 percent level with odd ratios of (35.269) which indicate that when there is an increase in mobile phone services usage by one person the odd ratio is 35 times larger and therefore

households' social assets access are 35 times more likely to improve. The

Negelkerke's R^2 of 0.532 indicate a moderately strong relationship between mobile phone services usage and improvement in household social assets. Also overall prediction success was 84.7 percent. Thus, mobile phones features/service have proven useful for rural households in facilitating regular contact with friends and family members in the city or abroad. Creating and maintaining social networks, serves as an easiest and cheapest sources of entertainment among rural dwellers, improve love life, increase support from family members in the city or abroad, increase sociability, facilitate arrangement of social events such as marriage and naming ceremony. These finding support earlier studies (Goodman, 2005; Souter et al., 2005; De Silva and Zainudeen 2007; Sife, Kiodo and Lyimo-Macha 2010; Onwuebele 2011 and Baro & Endouware 2013), which found that mobile phones adoption leads to greater social cohesion decrease the feeling of isolation and improve social relationship.

Financial assets also, has statistically significant positive impact at 1 percent level with odd ratios of (183.727), indicating that an increase in mobile phone service usage by one person has about 184 chances of improving rural households' financial assets access. The Negelkerke's R^2 of 0.584 percent and an overall prediction success of 82.3 percent are indicating a moderately strong relationship between mobile phone usage and improvement of rural households' financial assets. The empirical result imply that mobile phones adoption facilitates access to agricultural inputs, remittances flow to rural households, save transportation cost, improve work efficiency, better information on markets or prices, increase access to clients, facilitate job searching and provide indirect employment opportunities to rural dwellers, this further support the finding of Malik, Chaudhry and Abbas, (2009).

The third important variable is human asset, which has to do with skills, knowledge, and family health. The logit regression estimation for this variable shows that mobile phone service has statistically significant positive impact on rural household human assets at 1 percent level. The odd ratios of (206.939) indicate that an increase of mobile phone services usage by one person has about 206 chances of improving household human assets access. Negelkerke's R^2 of (0.482) percent and overall prediction success of about 74.3 percent, indicate further, the strength of the relationship. Respondents reported the usefulness of mobile phone in improving information on livestock management, information about new products and their uses, improve awareness about politics and improved voters' education.

Furthermore, vulnerability context variable shows statistically significant positive impact of mobile phone services on rural households' vulnerability situations at 1 percent level. The odd ratios of (198.163) indicate that an increase in mobile phone service usage by one person has about 198 chances of improving households' vulnerability context management. Nagelkerke's R^2 of 0.664, which is the highest and overall prediction success of 87.5 percent support, further the existences of significant positive relationship. Thus, respondents reported mobile phones, because of its immediacy, interactivity and ability to secure assistance from a far has improved their ability to deal with emergencies situations such as sickness, injury, deaths, conflict and robbery, this finding was similar to that of (Souter, Scot, Garforth, Jain, Mascararen has and McKerney 2005; De Silva and Zainudeen, 2007; Sife et al., 2010; Onwuemele 2011).

On the other hand, physical assets and natural assets show statistically insignificant positive relationship even at 10 percent level, with respective odd ratios of (2.7) and (1.5); Nagelkerke's R^2 of 0.513 and 0.400 percent as well as overall predictive success of 75.1 and 68.3 percent respectively. This is not surprising, because the two variables are associated with households' access to physical infrastructure, which is mostly lacking in rural areas and access to land resources as well as weather conditions updates.

CONCLUSION AND RECOMMENDATIONS

Following from our analysis and discussion, we conclude that mobile phones features/services have helped in improving rural households' socio-economic status, through improving their access to social assets, financial assets, human assets as well as managing their vulnerability context situations. The study recommended that basic and technical literacy of rural households should be improved and mobile phones services network should be extended to rural communities that are not currently covered.

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