



Sustainable Information Exchange and Market Access: Use of Mobile Phone in the Marketing of Food Crops by Farming Households in Rural South East Nigeria

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Abstract

The place of information in addressing market access and participation limitation, which hinders farmer's welfare and poverty reduction efforts in many developing countries, cannot be over-emphasized. This study therefore examined the use of mobile phone in the marketing of food crops among farming households in rural south east, Nigeria. A multi stage sampling procedures was used in the selection of location and 180 farming households sampled for this study, from which data were collected. The data were analyzed using probit regression model and Z – statistic procedure. Result of the analysis showed that knowledge of the GSM technology, quantity of crops produced, farm size, perceived need for information, distance to markets and income were major determinants of mobile phone use among the respondents. The result of the Z-test statistics also showed that among the selected socio-economic characteristics, educational attainment and age of the respondents had significant differences between users and non-users of mobile phones. The study calls for enlightenment campaign in order to sensitize the rural people on the importance of GSM technology in the transaction of their businesses, improvement in the services provided by the mobile phone service centers/ providers among other things.

Keywords:

Food crop,
GSM mobile
phones,
Marketing,
Probit

1. Introduction

The concept of agricultural transformation and commercialization has attracted a lot of attention in Africa, nay Nigeria in recent times. This is predicated on the successes and example of other nations that have experienced improved household welfare such as Malawi. In addition, evidence have shown that commercialization of household agriculture is a smooth conduit to increasing productive capacity of smallholder farmers to reduce poverty; economic recovery, growth and development (Adesina, 2012). This justifies the findings of Peter (1999) that the process of agricultural commercialization generally led to an increase in per capita household incomes in less developing nations, although the greatest benefits are more evident in better-off households.

Agricultural commercialization involves the transition from subsistence farming to increased market-oriented production. According to Von-Braun et al. (1994) it entailed the outcome of a simultaneous

decision making behavior of farm households in production and marketing. This decision relies on the expectation of household participation in market, since such participation are laced with greater economic and social opportunities (see, Barrett, 2008). Unfortunately, the decision to complete market orientation and participation is often hindered by lack of access to efficient marketing system and markets infrastructure among other constraints. Numerous studies have identified lack of access to market and market infrastructure as a pressing development challenges of most developing countries (see Adejobi et al., 2006; Zamasiya et al., 2012; Ohen et al., 2013). Furthermore, farmers lack access to reliable market information as well as information on potential exchange partners (Key et al., 2010). From investigations, rural people, especially the poor, often cite difficulties of market access as a major challenge to improving their economic well-being. Evidences have shown that linkages to marketing centers contribute to rural households efforts to escape from

poverty (Krishana, 2004; Minot, 2007). Accordingly, Barrett (2008) had noted that accessing markets allows smallholder farmers buy inputs and sell surplus of their subsistence and semi subsistence agriculture to enhance household incomes.

To reduce poverty in rural areas, rural communities need to be linked with markets so that they can receive high and stable returns to their agricultural products (Yamano and Arai, 2010). Therefore improving market infrastructure by providing more and better markets and making it easier for farmers to access them is also deemed necessary for increasing the level of commercialization, especially in developing countries (Shilpi and Umali-Deininger, 2008).

In markets where traders link farmers to market, farm gate price can be thought of as the outcome of a bargaining process between food crop farmers and sellers (Yanagizawa, 2009). This is especially relevant in the presence of high search and travel costs, as is the case when farmers must physically travel to markets to learn about prices.

Marketing of agricultural produce consist primarily of moving crops from production sites (farm-gates) to points of final consumption (households) by the interaction of the marketing system. A marketing system is a network of individuals, groups, and/or entities directly or indirectly through sequential or shared participation in economic exchange that creates, assembles, transforms, and makes available assortments of products, both tangible and intangible, provided in response to customer demand (Rogers, 2007). Marketing system plays an active role in this regard as mechanism for exchange and for the coordination of that exchange (through price signal which reflect and shape producer and consumer incentives in supply and demand). If small scale domestic producers are to take advantage of the projected domestic demand growth, then marketing systems in the supply chains linking producers to consumers must be able to support low cost production and timely delivery of the products (Andrew et al., 2008).

The marketing system is necessary in fulfilling the four basic alternative goals - maximizing consumption, customer satisfaction, choice and life quality (Babaita, 2003). However, the realization of these goals is regrettably hampered by poor market infrastructure such as market information linking demand and supply. Poor flow of market information presents real physical barrier in accessing markets. The rural poor are constrained by lack of information about markets, lack of business and negotiating experiences, and lack of a collective organization which can give them the power they require to interact on equal terms with others (IFAD,

2011). The absence of better market access and information results in high transactions costs in the input markets which make agricultural transactions costly (Abel-Ratovo et al, 2012). This is a gap and development challenge which if bridged will improve market orientation, participation and welfare of smallholder farmers. The need to improve the performance of agricultural markets has led to the search for new models of providing agricultural services to farmers. One of the strategies being adopted in line with global best practices by both the public and private sectors is the use of new generation Information and Communication Technology (ICT) tools especially the mobile phones in bridging the gap in communicating market information. The greatest development in communication technology in Africa in the 21st century has been in the area of mobile telephony occasioned by deregulation in the market. The potentials of ICT/GSM in creating socio-economic opportunities and strengthened networks with potency to poverty alleviation have been variously studied (see CAT, 2004; Donner, 2006; Saunder et al., 1994). The adoption of information and communication technologies (ICTs) promise many benefits to the famers, which include among others increasing people's knowledge of market information; improving the coordination of transportation, especially during emergencies; and enhancing the effectiveness of development activities (Saunder et al., 1994).

Sustainable information exchange in agricultural markets, technology, and knowledge is becoming a critical area of agricultural development. In most developing countries like Nigeria, information exchange seems to be given limited priority and in agriculture the bulky load of agricultural information exchange between farmers and agricultural experts and advisors, has been left to extension agents. The effectiveness and efficiency of these extension agents have been declining partly due to limited funding from support organisations like government and donor agencies and the high costs required in maintaining and sustaining the physical movements of these agents between the rural areas where farmers are found and the urban areas where agricultural experts are mostly stationed. With the current need of efficiency in understanding market price trends, accessing inputs and support services, farmers and traders need to use more efficient and appropriate new ICTs to take advantage of the existing opportunities (Sekabira, 2012). Similarly, in Nigeria, Jagun et al (2007) found that although the information can be acquired at a distance, there is not a full-distance relationship through mobile among traders. The significance of this study lies in the fact

that most government agricultural policies concentration are targeted at enhancing agricultural productivity which eventually lead to glut in the agricultural market, causing a high rate of post harvest losses, an example is the e-wallet policy of agricultural transformation agenda in Nigeria. The need to ability to create strong market so as to build a bridge between agricultural productions, marketing, economic growth and reduce hunger and poverty makes this study imperative. The research is anchored on the following objectives to: estimate the determinants of GSM phones use in food crop marketing by farming households in the study area and estimate the differences between some socio – economic characteristics of mobile phone users and non – users in Abia State

2. Materials and Methods

2.1 Study Area

The study was carried out in Abia State, which lies in the south east geo – political zone of Nigeria. Abia state has 17 Local Government Areas and three agricultural zones of Aba, Umuhia and Ohafia. Aba and Umuhia are referred to as urban areas and the rest are either semi- urban or rural areas based on the existing infrastructure. It is bounded on the West by Imo State, on the North by Ebonyi and Enugu States; Cross Rivers and Akwa- Ibom States on the East and River States on the South. The State has a population density of 580 persons per square kilometer and a population of about 2,833, 999 persons (NPC, 2007). The state covers an area of about 5, 243.7 square kilometer which is approximately 5.8 percent of the total land area of Nigeria (INEC, 2008). Agriculture is the major occupation of the people and subsistent agriculture is prevalent and about 70 percent of the population engage in it. The major crops produce in the state include crops such as yam, cassava, rice, cocoyam and maize, while the cash crops include oil palm, robber, cocoa, banana and various types of fruits. Small herds of livestock are also kept (ABSG, 1992). The presence of a good number of agricultural institutions such as National Root Crops Research Institute (NRCRI), Michael Okpara University of Agriculture Umudike (MOUAU), Faculty of Agriculture of Abia State University Uturu etc in the state guarantees an unquantifiable advantage and adds to their capacity in agricultural production.

2.2 Sampling Procedure

The study employed a multistage sampling technique in the selection of locations and respondents. In the first stage, Abia state was purposively chosen from the south east geo-political zone considering the proximity and the fact that about 70 percent of its citizens are engaged in agriculture. In the second stage, three (3) rural Local Government

Areas (LGA) were purposively selected each from the three (3) agricultural zones of the State. In the third stage, random selection of 20 respondents was made from each of the LGA from the list provided by the agricultural extension officers in the study area. This aggregates a total of 180 respondents. In order to accommodate the objective of this study, the sample was further partitioned into two (2), each half (90) was portioned for households that participate in marketing of their produce either through use of GSM and non mobile phone users. This is necessary for ease of comparison.

2.3 Method of Data Collection and Data Analysis

The study employed primary source of data obtained from the questionnaire administered to the respondents selected. Personal interviews and direct observations were also made during the interview. In order to realize the objectives, the study used Probit model and z- statistic. The choice of Probit model was guided by the dichotomous nature of the dependent variable. According to Nagler (2002), Probit model constraints the estimated probabilities to be between 0 and 1. Although this is not peculiar to Probit model alone since it share similar characteristic with logit model. However, the differences in the results of both classes of models are often negligible (Hayden and Porath, 2006). The strength of both over other models is that its significance and the individual coefficients can be tested. Therefore, the stability of the model can be assessed more effectively than in other models. Its most important weakness is that interpretation of the coefficients is not straightforward. This no doubt did not invalidate the findings of this study. The independent variables constitute important factors that consistent with a prior and from literatures that exert influence on participation index. The Probit model is specified as follows:

$$Y_{(i,0)} = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + b_{11}X_{11}$$

Where: $Y_{(i,0)}$ = is the dependent variable, which is the participation index

$Y_1 = 0$ if $y_i^* \leq 0$, and $y_1 > 0$ it follows that probit ($Y_i = 1$) = $P(y_i^* > 0) = p(0)$.

X_1 = knowledge of GSM phones (dummy; aware=1, not aware= 0)

X_2 = highest educational level attained by the farmer/trader (years)

X_3 = quantity of food crops harvested (kg)

X_4 = farm size (ha)

X_5 = perceived need for market information (dummy; have need=1; have no need= 0)

X_6 = electricity source (dummy; yes=1; no=0)

X_7 = distance to the output market (km)

X_8 = households size (number of persons)

X_9 = farming experience (years)

X_{10} = income, X_{11} = age (years)

In the comparison of socio-economic characteristics of mobile phone users and non users, the paired z-test statistic was employed. The formula is stated as:

$$z = \frac{X_1 - X_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

X_1 = Mean value of mobile phone users

X_2 = Mean value of non-mobile phone users

S_1^2 = Sample variance of mobile phone users

S_2^2 = Sample variance of non-mobile phone users.

n_1 = Sample size of mobile phone users

n_2 = Sample size of non-mobile phone users

The above methodologies is consistent with the one employed by Zamasiya et al. (2014); Nwachukwu et al (2010) in their studies.

3. Results and Discussion

Table 1 shows estimates of the factors affecting the use of GSM mobile phones among food crop marketers in the study area. The results indicated that knowledge of the GSM technologies, quantity of crops produced, farm size, perceived need for information, distance to market and income were significant factors. Their coefficients possessed different signs at different probability levels. The coefficient of knowledge of the GSM was positive and significant at 99 percent confidence level. This means that knowledge of the technology had a positive relationship with mobile phone use in the study area. By implication, the more knowledge the marketers have concerning the phones, the more likely they are to use these GSM technologies in the pursuit of their businesses. This is probably because been aware or having knowledge of the technologies could lead to increased access to vital information, regarding markets, social interactions, etc. Sekabira (2012), observed that farmers who had knowledge of existence of ICT groups adopted use of ICTs for market information services more than such farmers who had no knowledge of existence of these ICT groups. This result corroborates with his findings on adaptation of ICT based market information service in Uganda. Quantity of crops produced also had a positive relationship with the use of GSM phones by the marketers at one percent probability level. This meant that as the quantity of crops produced increased, the probability of using GSM phones increases. This is plausible given that the farmer must find a market for his surplus to avoid post harvest losses and also the larger the output, the chances of the farmer making more money to pay for the services. Farm size was significant at one percent probability level. This result is in line with a priori

expectation. From the result, any 0.4 percent increase in farm sizes will most likely trigger off a 1 percent increase in the traders' use of mobile phones in the study area. Land size (farm size) indicates the potential to produce surplus for the market (Martey et al., 2012; Agwu et al., 2013; Olwande and Mathenge, 2010). This result agrees with Okwu and Irokaa (2011) in their study on the assessment of farmers' use of new ICT as sources of agricultural information in Ushongho local government area of Benue state, Nigeria and Warren (2003);) that obtained a similar result. Perceived need for market information had a positive and significant relationship with the use of GSM phones by the farmers; having its significance at one percent probability level. By implication, as those who perceive that there is the need for market information increases, the probability of the use for GSM handsets increases in the study area. Okello (2011) and Abel – Ratovo et al (2012), observed that traders who seek information on price, volume, quality, place of purchase, and place of sales are more likely to use mobile phones. This finding is consistent with these earlier findings.

The coefficient of distance to market was significant at 10 percent probability level but had a negative relationship. This implies that the less the distance the farmers travels to the markets, the more likely they are to make use of the mobile phones. The use of GSM in this situation will increase transaction cost, which affects the income of the farmer. This finding contradicts the findings of Kirui et al (2012). However, it is possible that the due to poor infrastructural provisions by the GSM service providers, those who are too far apart from each other may not be able to receive the required calls or services and therefore discourages the use of mobile phones that way. Finally, the coefficient of income has significant at 10 percent level and positively related to mobile phone use among the farmers. This means that as their income increases, the likelihood of using mobile phones also increases. This result agrees with Okoedo-Okojie and Omoregbee (2012), who observed that increase in farmers income determine access to use of ICT. Bolarinwa and Oyeyinka (2011) observed that farmers who use mobile phone earns more income than non-users. An enhanced economic return which may be reflected in income increases is a vital element of livelihood improvement. It is therefore, not surprising that farmer whose income has improved will definitely result to GSM use which could be regarded as an increased welfare component in many poor rural communities. The Log likelihood of the model is – 27.585 and the pseudo R^2 0.7448, implying that 74.48 percent of the variables has been explained in the model.

Table 1. Maximum likelihood estimates of the factors affecting the use of GSM in the study area

Variable	Coefficient	Standard error	Z-test
Knowledge of GSM Tech.	0.00864	0.00276	3.13***
Educational attainment of HH	0.22385	0.20629	1.09
Qty of Crops Produced	0.08099	0.02057	3.94***
Farm Size	0.040263	0.013647	2.95***
Perceived need for market information	0.088388	0.024924	3.55***
Electricity source	0.009602	0.017513	0.55
Distance to output Market	-0.048286	0.023254	-2.08*
Household Size	-0.199956	0.100608	-1.99
Farming Experience	-0.056299	0.0391369	-1.44
Income	0.0000489	0.0000237	2.06*
Age	0.3016765	0.461144	0.513
Constant	-4.27365	1.72053	2.48**

Log likelihood = -27.585 , LR Chi² =66.04, Prob>Chi² =0.0000, Pseudo R² = 0.7448

Note: ***, **, * significant levels of 1%, 5% and 10% respectively.

Table 2. Paired -z- differences in the socio – economic characteristics of mobile phone users and non – users in Abia State, Nigeria

Variables	Mean	Standard deviation	Standard Error mean	95% Coefficient Interval of the difference		z-statistic
				Upper	Lower	
Education	0.70833	1.87615	0.38297	-0.8389	1.5006	1.85*
Age	6.45833	15.2286	3.10853	0.02785	12.8888	2.08*
Households Size	0.5833	2.61960	0.53472	-0.52283	1.6895	1.091
Income	-5.45833E3	18258.96	3727.09	-13168.41	2251.745	1.465

*: denotes 10 % significant level.

Table 2 shows the result of the paired differences of some socio – economic characteristics of farmers users and non – users of GSM phones. The indicated that there were significant differences in the educational attainment and age of the users and non – users of the GSM phones in the study area. They were all significant at 10 percent confidence level. However, the result contradicts with the earlier findings of Bolarinwa and Oyeyinka (2011) whose findings observed that farmers who use mobile phone earn more income than non-users. This means that other factors such as farm size, output level etc may limit the income of a farmer, hence the negative sign.

4. Conclusion and recommendation

The study had shown the determinants of mobile phones use in the marketing of food crops in Abia State. The study therefore recommends that more enlightenment should be embarked upon by relevant agencies to sensitize the rural people on the importance of the GSM technology in the transaction of their business. There is a need for GSM users to expand their current usage beyond social networking.

Government efforts through the Nigeria Communication Commission (NCC) towards regulating the activities of service providers should be intensified. This will encourage the ownership and use of the phones. Improvement of the services by the

providers is also very important. Situations where users do not easily have access to their callers immediately as a result of call drops or bad networks may not encourage the use of mobile phones by the farmers/ traders.

Given that access to good road is a major problem in most parts of the country especially in the rural areas, the increased ownership, use and otherwise of the GSM handsets will no doubt improve the farmer' activities and their welfare.

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