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Mobile Telephony and Agriculture Information Communication in Ghana: the Ho West District under Review

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Introduction

The challenge for the Ghanaian government and policy makers is to regain the dynamism in agricultural sector as was evident in the 1970s during the era of *operation feed your self*-revolution. In agriculture, education and access to knowledge creates conditions that enable farmers to acquire and use information for decision making and technical matters effectively. This leads to growth in the adoption of technology; the use of modern inputs like machines and fertilizers improves yield. (Mittal and Mehar, 2012) Passing on information to farmers is a basic fundamental role of any agricultural extension services to effect learning process and social change (Demiryürek, 2008). In fact, the importance of information for effective functioning of any enterprise has been a central concern of economic theory for some time. Information can be generated, processed, transformed and shared through complex processes of coding and decoding, generally known as communication (Röling, 1988). However, the generation of new information and knowledge need new information and communication channels. Therefore, better selection of information and communication channels, ensures the effectiveness of extension programmes in agriculture.

Meanwhile agricultural extension depends to a large extent on information exchange on the one hand and a broad range of other actors on the other (Mabe and Oladele, 2012), ICTs therefore can be used as a medium in bridging the information gap. Similarly, Greenridge (2003) and Lightfoot (2003) also opined that there is a growing recognition of farmers and members of rural communities who are realizing the importance of knowledge, information and appropriate learning methods in order to move towards agricultural development. Therefore, in order to benefit the rural people, extensionists are grappling with the question of how to harness ICTs to improve rural livelihoods in order to contribute towards better information exchange and access. In this regard, extension practitioners are also interested in experimenting with innovative e-extension initiatives (Saravanan, 2010).

The possession of mobile phones particularly has become a necessity in the contemporary society irrespective of age, status, profession, income groups or place of residence. As

such, mobile phones have been regarded as the widely accessed tool among the farmers for communication and also accessing agriculture-related information particularly for the marketing of produce (Chhachar et al., 2014).

In Ghana, the task of providing agricultural information to farmers is primarily vested with government agencies or the public extension services. The Ministry of Food and Agriculture (MoFA), The Institute for Scientific and Industrial Research (CISR), and Non-Governmental Organizations (NGOs) are responsible for disseminating technologies and agricultural information to the farmers. The information needs of the farming community are partly addressed by the public extension services in District/ Municipal Agricultural Extension Services (DAES) and supported by Development Partners (DPs). Over the past few years, the number of extension agents has also dramatically decreased due to unemployment in Ghana.

In this context, mobile technologies can offer the means for development in developing countries (Rashid and Elder, 2009). ICTs, therefore, offer opportunities to reach more people through easy access to local or global information and knowledge. Hence, with the new emerging paradigm of agricultural development, old ways of delivering important services to citizens are being challenged; traditional societies are also being transformed into knowledge societies all over the world which makes people living in the villages think and do things differently (Meera et al., 2004). For instance, Jabir (2011) reported that ICT-based information delivery has helped the livestock farmers of Uttar Pradesh in India in making significantly better quality decisions on various livestock practices as compared to ICT non-users. Further, the application of ICT among farmers of Madhya Pradesh, Uttar Pradesh and Tamil Nadu of India reported that information acquisition and facilitating transactions in input and output markets by ICT-based initiatives have also helped farmers in reducing transaction cost (Adhiguru and Devi, 2012)

Objective of the Study

The main objective of this study is to identify factors influencing the use of mobile phones in communicating agricultural information among farmers in Ghana.

The specific objectives are to:

1. Identify the socio-economic characteristics of farmers in the study area

2. Find out farmers' frequency of use of mobile phones for agricultural information
3. Determine the types of agricultural information acquired through the use of mobile phones by farmers
5. Factors Influencing the Use of Mobile Phone in Communicating Agricultural Information
5. Find out the relationship between socio-economic factors and farmers' use of mobile phones for agricultural information

Significance of the Study

Despite the fact that the number of extension agents is decreasing in Ghana, there is evidence that most of these agents are poorly equipped in terms of communication gear and lack the necessary knowledge, skills, and experience in using different extension methods. Most agents use individual contact extension methods to communicate and to disseminate agricultural technologies to farmers. This situation undermines the effective provision of relevant and accurate agricultural information on a timely basis and calls for the use of information and communication technologies (ICTs) such as mobile phones to support agricultural extension services. ICTs can be very effective in delivering timely and applicable information to small-scale producers, even those living in remote areas. Although the potential of mobile phones is vast, knowing the actual use of mobile phones in disseminating agricultural information enables us to increase its effectiveness and efficiency in agricultural extension services. Therefore, this study examined the factors influencing the use of Mobile Phones in communicating agricultural information in agricultural extension among Farmers in Ghana.

Literature Review

Mobile Phones Ownership and Distribution

Mobile phones nowadays spreading very fast in developing countries and most of the people are getting benefit from this technology with any hurdle and problem. In many rural areas of developing world, farmers are using mobile phones to obtain agricultural information (Aker and Fafchamp, 2011; Gakuru, Winters, and Stepman, 2009). However, Mobile phone ownership shows varying levels in most of region in Asia and Sub-Saharan Africa. Digital wireless phones have great potential to bridge gap between —haves and the —have-nots, given their accessibility, affordability, and fast infrastructure implementation. As TE (2014) report in Ethiopia mobile subscribers had more than 25 million users, with rural telecom access within 5 km radius service had reached 96% in 2013. Mobile phones require basic literacy, and therefore are accessible to a large portion of the population and also mobiles enjoy some technical advantages that make them particularly attractive for development (Aker, 2011; Jensen, 2010; Molony, 2008).

The introduction of mobile phone coverage had effects on agricultural markets in developing countries. Several studies concluded that the expansion of mobile phone coverage had significant reduction in dispersion of prices across markets, as well as a decline in waste, with improved access to information via mobile phones; farmers are better able to take advantage of spatial arbitrage opportunities, thereby improving allocate efficiency (Jensen, 2007; Aker, 2010). However, the effect is stronger for those market pairs with higher transport costs, namely; those farther apart and linked by poor quality roads.

Mobile phones are providing information on market prices and link farmers to buyers are helping them to assess and realize the economic potential of new technologies. Various studies have examined the role of mobile phones in facilitating access to information. Several assessments concluded that mobile phones had reduced search times and costs (Jagun, Heeks, and Whalley, 2007; Overå, 2006; Bayes, von Braun, and Akhter, 1999) as well as information asymmetries (Overå, 2006). The growth of mobile phone coverage induces greater market participation of farmers in remote areas. However, some evidence suggests that the use of mobile phones to obtain price information has induced producers to move to other markets (Aker and Fafchamp, 2011; Jensen, 2007).

Mobile phone has generated a great deal of speculation and optimism regarding its effect on economic development in Africa. The use of mobiles could increase the efficiency of farmers by affordable access of communication technologies in rural areas of developing countries. The study conducted in Bangladesh indicated that use of mobile phones increased access of information among men and women and improved their living standard (Bhavnani, Chiu, Janakiram, and Silarszky, 2008; Corbett, 2008; Aker, 2008; Galperin and Mariscal, 2007; Jensen, 2007; Abraham, 2006). A study in Peru observes that the introduction of mobile phones had raised agricultural profitability by increasing the value that farmers received for each kilogram of agricultural production and by reducing agricultural costs (Beuermann, 2011).

Mobile phones without doubt are amongst the main instruments that can help agriculture community especially to ease the communication process so in agriculture; community must be encouraged to utilize it wisely. There is an assumption that use of mobile phone has an influence among smallholder farmers accessing and disseminates agricultural information. This in turn makes the user get easy in touch with other business partners (Jensen, 2007). There are some evidences of this belief, especially the well-known stories of the farmers checking price, finding suppliers or buyer customers through mobile phones (Bauer, Barnes, Reichard and Neumann, 2005).

The wide ranges of the communication technologies have given good approach for introduce their production in different market and get good price from market (Mittal, Gandhi, and Tripathi, 2009). There has been a remarkable progress in the use of mobile phones in African agriculture; especially in the area of farmers 'access to market information, though little studies have been done to explore how mobile phones effect on agriculture among farmers in rural areas are a promising new field of research and application in the emerging field of agriculture.

Role of Mobile Phone in Agricultural Information

In many parts of the developing world, the most common way of obtaining information remains personal travel which is costly both in terms of time and money (Aker and Mbiti, 2010). Information may also be asymmetrically distributed. The reasons for information asymmetrically distributed, lack of information and high cost to participate in marketing

(Stiglitz, 2007). A better access to agricultural information is expected to improve farm productivity, reduce cost, and encourage market participation by farmers. Therefore, the development of reliable and timely market information is vital for the development of rural areas, and provides a basis for farmers to make informed marketing decisions (LMIS, 2011; Muto and Yamano, 2009; Hudson, 2006).

Mobile phones can play a role in improving access to information by reducing the cost of searching for and transmitting information, but also allow for more regular, reliable and timely access to information, and thereby influencing the existing communicative ecologies (Aker, 2011; LMIS, 2011; Jagun, Heeks, and Whalley 2008; Adel, 2005; Tacchi, Slater, and Hearn, 2003; Verheye, 2000). The information obtained via mobile phones is useful in freeing a farmer from sending his produce to the market blindly, by allowing them to know whether to divert his crops elsewhere for minimum profit more locally instead of increasing loss (Aker, 2008). Aker 's study on the use of mobile phone on grain market performance in Niger found that the primary effect of mobile phones was a reduction of information search costs.

Mobile phones used to transmit different types of information, including information on farmers' needs, information used in farming and marketing. In Uganda, Martin and Abbott (2011) also conclude that farmers used their phones for a range of farming activities, especially to coordinate access to agricultural inputs (such as training, seeds or pesticides) (87% of farmers), accessing market information (70%), requesting agricultural emergency assistance (57%), monitoring financial transactions (54%) and consulting with expert advice (52%).

Mobile phones can play a central role in the assessment of the suitability and risk of a technology. Looking at the use of mobile phones in agriculture more specifically, Furuholt and Matotay (2011) assessed how farmers took advantage of mobiles throughout the farming cycle; they found that mobile phones affected all stages of the cycle. Overall; farmers felt that mobile phones had helped to raise incomes by improving their ability to deal with risks and take advantage of income opportunities.

The economic role of mobile phone in rural areas was more evident. Several studies found that mobile phones reduced transportation costs where trips for social and business purposes and in emergencies, social networks and saving costs and time (Balasubramanian

et al., 2010; Sife *et al.*, 2010; Molony, 2008; Boadi *et al.*, 2007; Frempong *et al.*, 2007; Overå, 2006; Samuel *et al.*, 2005; Souter *et al.*, 2005). With another study in Tanzania, building on the utility of mobile phones as recording tools, listening devices, and catalysts for dialogue are incorporating mobile technology into programming and it is being used for advisory services in agriculture (Gakuru *et al.*, 2009). Mobile phones were also thought to have reduced operational costs, increased the profitability of rural businesses (Esselaar *et al.*, 2010; Boadi *et al.*, 2007; Frempong *et al.*, 2007).

Mobile phone can be used to facilitate social learning by offering platform to exchange information. Mobile phone technologies have provided a good platform for farmers to share their knowledge and information among each other on the time. Various studies concluded that mobile phone was being used to maintain social networks and provide access to information on socio-economic opportunities (Kameswari *et al.*, 2011; Gakuru *et al.*, 2009; Munyua, 2007, Lehr, 2007; Goodman, 2005). Through mobile phones farmers directly communicate with buyers and customers for sell their produce in good price. Speed of communication allowed for more efficient information flows within the network of value chain actors, which in turn, saved time and reduced transportation costs. This led to better matching of supply and demand, and improved monitoring of compliance within the terms of trading contracts (Overa, 2006).

Mobile phone use was a basic communication device enabling farmers to communicate more effectively within their networks. Molony (2007) also concludes that trust in economic relationships does not exist independently of social ties and these tend to be embedded in personal interaction which necessitates face-to-face communication, whilst Masuki *et al.* (2010) found that the complex nature of interactions between service providers and farmers largely mitigate against use of mobile phones.

The greatest role of phone usage was enables rural farmers to access better markets and prices for their produce and were able to overcome the problem and making relevant knowledge accessible to the farming community helps improve production, productivity and brings higher returns (Kameswari *et al.*, 2011; Lokanathan *et al.*, 2011; Mittal *et al.*, 2010; Molony, 2008). Another study in Nigeria concluded that mobiles had in fact entrenched the role of intermediaries with little change in the geography of supply chains

(Jagun *et al.*, 2007). However, mobile phones have made important role to improve rural households which have the potential to amplify the speed and ease, and to introduce new modes with which information is communicated.

Factors affecting Use of Mobile Phone for Agricultural Information

The low rates of mobile phone technology adoption in developing countries have been well-documented, and there is widespread theoretical and empirical literature attempting to identify the determinants of mobile phone technology adoption in different contexts (Brynjolfsson and Hitt, 1995; Duncombe and Heeks, 2001; Conley and Udry, 2010). There has been some general consensus on the determinants or constraints to technology adoption, particularly in the agricultural context. This includes levels of education, expected returns and access to information (Djankov *et al.*, 2001). Other study results found that use of mobile phones to communicate agricultural information was highly influenced by income levels. Such finding showed a positive correlation between incomes and mobile phone technology adoption (Chowdhury and Wolt, 2003; Gillwald, 2010).

Rural people mostly live sparsely and this would make provision of infrastructure, usage of mobile phone is very difficult to deploy in rural areas. Therefore, access to the full range of communication services and found low usage patterns. It was argued that their initiatives were scattered and uncoordinated and summarized the main challenges and factors that influence the use of mobile phones as; weak institutional arrangements with a shortage of technical capacity and high cost of available technologies, and low skill of using mobile phones, poor connectivity, and language barriers (Munyua, 2008; Gillwald, 2010; Calandro *et al.*, 2010). Endalew *et al.* (2014) reported, the main challenge and factors that influence use of mobile phone in eastern Hararghe zone was age, years of education and participation in trainings were significant determinants of mobile phone usage.

Mobile phone is used to provide an organized flow of information to enable and support the rural households. Access of sufficient and on time information is essential for the proper functioning of the agricultural market which is used to facilitate agricultural practices and marketing, potentially bringing higher incomes (Islam, 2010; de Silva, 2008; Ashraf *et al.*, 2005). Other studies concluded that educational attainment, social and cultural constraints are factors which affect the likelihood of an individual having the necessary skills to use

different technologies optimally(Gillwald *et al.*, 2010; Hafkin and Odame, 2002; Hafkin and Taggart, 2001). Based on panel data from Uganda, Muto and Yamano (2009) found that the total value of assets and the education level of households are directly related to possession of mobile phones.

The role of mobile phones supports access to information about agricultural technologies. There are several challenges associated with the use of mobiles. Various studies found, that education determines the level of both access and use of mobile phone, higher level of education could have higher access and use of mobile phones than those of lower levels. This implies that education affect mobile usage, because probably more educated people are more aware of mobile phone use, and how to use it (Frempong *et al.*, 2007; Ashraf *et al.*, 2005; Alampay, 2003). A study of mobile phone users in South Asia also highlighted perceptions among users, concluded that mobile phones had increased the efficiency of daily activities due to greater contact ability and ability to obtain information, although the link between efficiency gains and cost saving were not necessarily perceived by the users (de Silva and Zainudeen, 2007).

Several studies have highlighted the importance of risk and supply-side constraints as barriers to agricultural technology adoption. By reducing communication costs, mobile phones could assist risk-averse farmers in identifying potential buyers for their products over larger geographic areas and at crucial moments, thereby price risk and potentially increasing the net benefits of the technology. Similarly, improved communication between farmers and traders could also facilitate the provision of inputs to rural areas, potentially reducing their cost (Foster and Rosenzweig, 2010). Klonner and Nolen (2008) assess the effect of mobile phone coverage on rural labour market outcomes in South Africa. Similar to other countries in sub-Saharan Africa, South African labour markets are characterized by low wages, high rates of under- and unemployment and significant search costs. They find a significant shift in occupational patterns: with the availability of mobile phone coverage, employment shifts away from agricultural occupations.

METHODOLOGY

Study Area

This study was carried out in the Volta Region. The rationale for selecting region as a study area is its proximity to Accra, the capital city of Ghana.

Ho West District is located on the Hohoe-Saviefe road of the Volta Region of Ghana. With its capital as Dzolo-Kpuita it thrives primarily on Agriculture and the sales of these products. Ho West District has a large stretch of fertile Agricultural land favourable for the production of food crops like roots and tubers, cereals vegetables and legumes. The land is also favourable for the large scale production of Cocoa, hence the establishment of COCOBOD seed production center at Saviefe-Agorkpo to provide improved cocoa seedlings to farmers within its catchment area. The District also has a number of markets in almost all the communities and the local District Assembly is making efforts to develop these markets to improve on the living standards of the people and improve its own revenue generation. Health of the people is of great importance hence the establishment of Community Health Improvement Services (CHIPS) centers. The district also has community health centers in Abutia, Hlefi, Dzolo Kpuita, Dzolo Gborgame, Vane, Kpedze etc. There is a well-equipped Clinic at Saviefe-Agorkpo, which was established by the Catholic Diocese of Ho with funding from a German charity organisation. There is also a government established clinic in Tsito. Ho West has numerous basic schools and about eight government assisted senior high/technical schools.

Research Method

The study adopted a descriptive survey research design to gather information from a representative sample of the population under study. The study population consist of 9,650 number of registered farmers in the Ho West District of the Volta Region, Ghana. Proportionate stratified random sampling technique was adopted for the study and the sample size comprised 4% of each community in the District. In all, a total of 387 farmers in Ho West District constitute the study sample size. This is considered appropriate for generalisation based on Nwana (1981) who affirmed that if a population is in hundreds, one needs a sample size of 20%. But if a population is in thousands, one needs a sample size of 10% to 5% or less. This procedure for selection was based on the fact that each of

the ten wards has equal chance of being included in the sample. The questionnaire consists of two sections. Section A elicit the socio-economic characteristics of the respondents like age, gender, marital status, years of farming experience, educational background, farm size and farming experience. While section B contained farmers' use of mobile phones for agricultural information.

Data collection and analysis of data

Structured questionnaire was prepared and administered to the sampled respondents, by face to face interviews. The researchers collected the data from June, 2012 to July, 2016. Data was presented in the form of frequency and tables and statistical software SPSS version 20.0 was used in analysing the data.

RESULTS AND DISCUSSION

Socio-economic characteristics of farmers in the study area

Results in Table 1 showed that, out of a total of 170 respondents interviewed, 64.7 percent and 35.3 percent were males and females respectively. This shows that majority of the respondents who were farmers were males. With respect to the age distribution, majority of the respondents (35.3%) fall within the 31- 40 age group, followed by those within 20-30 age groups (25.3%). Those within 51-60 age group followed with 18.2%, followed by those within 61 years and above age group (11.8%) and 41-50 years formed 9.4% of the respondents. This suggests a young adult population who are the major source of human capital and key agents for socio-cultural, economic and technological innovation worldwide. On the educational attainment of the respondents, it was found that majority of the respondents (86.7%) had formal education, while 13.3% also had no formal education. The results indicate that, the respondents have the ability to use mobile phones to the fullest potential. Table 1 also shows that experience varies among the respondents. A total 44.7% of the respondents had between 31-40 years of farming experience, 17.6% had 1-5 years of farming experience, while 29.4% had 16-20 years of farming experience and 8.3% had farming experience of between 11 and 15 years. The mean number of years of pineapple production in the study area is 18 years. Experience is the basis of progress

and success in business (Johl & Kapur, 2001). In the presence of a lack of experience, it is likely to result in low production and income for farmers (Adekoya, 2005).

Table 1: Socio-economic characteristics of farmers in the study area

Characteristics	Frequency	Percentage
<i>Gender</i>		
Male	110	64.7
Female	60	35.3
<i>Age (Years)</i>		
20–30	43	25.3
31– 40	60	35.3
41 –50	16	9.4
51– 60	31	18.2
61 years and above	20	11.8
<i>Educational level</i>		
Non formal Education	20	13.3
Primary/JHS education	74	40.0
Secondary education	76	46.7
<i>Years of experience</i>		
1 - 5years	30	17.6
6 - 10years	76	44.7
11 - 15years	14	8.3
16 - 20years	50	29.4

Source: Field survey, 2017

Farmers’ frequency of use of mobile phones for agricultural information

The rate of usage of voice calls, sending text message, accessing internet, accessing emails and video calls was one of the findings this study sought to find. From the study, the results in Table 2 indicate that, the most frequently service used by respondents was voice calls in which all the respondents (100%) used for communicating. The reason may be attributed to the simplicity of the procedure to make a call as hinted by Kwakwa, (2012). Similarly, 52.4% of the respondents use their mobile phone for sending text message to friends for

information. This result did not conform to the study of Deribe, Zebedayo and Sife (2018) who concluded that SMS for agricultural purposes in the study area is not preferred because texting is regarded as a poor way of expressing one’s ideas fully. Again 36.5% also indicated that they use the internet on their mobile phones to seek information about pests and diseases, agro-chemicals and all that it takes to go into farming. All the respondents (100%) have never used their mobile phone for video calling and emails. Also, there may be little knowledge on how to use the mobile phone for this purpose. The main reason is to communicate and arrange with agricultural input sellers when they want to purchase seeds and pesticides from local dealers, governmental and non- governmental agriculture extension agents. Because some of the respondents use the Mobile phone to communicate with agricultural inputs sellers, it shows that the farmers are making productive use of their mobile phones which will enhance their livelihood.

Table 2: Frequency of services usage

Service	Frequency	Percentage
Voice calls	170	100
Send text message	89	52.4
Access the internet	62	36.5
Access email	0	0
Video calls	0	0

Source: Field survey, 2017

Types of agricultural information acquired through the use of mobile phones by farmers

Table 3 shows the types of agricultural information that are acquired by farmers in the study area using the mobile phones. About 98.8% of the respondents noted that they acquire information on fertilizer, weedicide and pesticide information using the mobile phones. Similarly, 98.2% indicated that they receive information on storage practices of agricultural produce. Likewise, 97.1% of the farmers specified that receive information on availability of new crop varieties through mobile phones while 92.9% also receive information on pest and disease control on crops and animals. Equally, 91.8% of the farmers in the study area indicated that they obtain information on credit sources and

transport information respectively. It is evident from the above findings that 87.6% and 87.1% of the farmers from the study area get information on training from Agricultural extension services and labour availability in the communities through the use of mobile phones. Multiple responses from Table 3 indicate significant variations in the type of messages received through mobile phones. The study findings show that of the 170 farmers in the study area who received phone calls, 79.4% reported receiving calls on Market information; 75.3 % on weather updates; 72.4% general agricultural news such as areas of drought, new technologies, government interventions and 65.9% crop production practices with 52.3% receiving information on new breed of animals. It is evident from the above findings, that not all information needs of the farmers can be met through mobile phones. Those information needs that are less practical oriented are those usually disseminated through the mobile phones. These are usually information that farmers can process without the extension agents physical presence.

Table 3: Types of agricultural information acquired through the use of mobile phones by farmers

Type of agricultural information	Frequency	Percentage
Availability of new crop varieties	165	97.1
Credit sources	156	91.8
Crop production practices	112	65.9
Fertilizer, weedicide and pesticide information	168	98.8
General agricultural news	123	72.4
New breed of animals	89	52.3
Labour availability	148	87.1
Market information	135	79.4
Pest and disease control	158	92.9
Storage practices	167	98.2
Training from Agricultural extension services	149	87.6
Transport information	156	91.8
Weather updates	128	75.3

Multiple responses

Source: Field survey, 2020

Factors Influencing the Use of Mobile Phone in Communicating Agricultural Information

Respondents identified factors influencing use of mobile phones in communicating agricultural information to include sex, education level, incomes, mobile phone ownership, type of farming practiced, type of agricultural information needed, and network coverage. Table 4 illustrates the results. This results showed that education was a factor for owning and using mobile phones. However, as indicated in the chi square results ($\chi^2 = 3.278$, and $\rho \leq 0.194$) literacy levels of respondents had no statistical significant influence on mobile phone use in communicating agricultural information. These results contradict with those of Alampay (2003) who found that, education determines the level of both access and use of ICTs. According to him, people with tertiary level of education could have higher access and use of public telephones and cellular phones than those of lower levels. Furthermore, of the 170 respondents who owned mobile phones, most, (76.3%) mentioned to earning income less than a dollar per day, while (19.3%) indicated to getting incomes greater than a dollar per day. A chi-square test revealed that respondents' average daily income had a high statistical significant influence on mobile phones use in communicating agricultural information ($\chi^2 = 18.636$, and $\rho \leq 0.01$). Although mobile phone ownership was also common among respondents with low incomes, the study results found that use of mobile phones to communicate agricultural information was highly influenced by income levels. Such findings match with earlier studies which showed a positive correlation between incomes and mobile phone technology adoption (Chowdhury and Wolt 2003).

Table 4: Factors Influencing the Use of Mobile Phone in Communicating Agricultural Information

Variable	Used mobil phones		Chi-square	
	Number	Frequency	χ^2	P-value
Education level				
Non formal education	20	13.3	3.27	0.19ns

Primary/JHS education	74	40.0		
Secondary education	76	46.7		
Average daily income				
< dollar per day	147	86.5	18	0.000*
> a dollar per day	23	13.5		
Farming activities involved in				
Grow crops	63	37.1	1.03	0.59n.s
Keep animals	13	7.6		
Mixed farming	94	55.3		
Agric information needed				
Better prices	82	48.2	28.2	0.000*
Input supply	38	22.4		
Management practice	26	15.3		
Weather information	24	14.1		

Note= *-Significant at 0.05, n.s = not statistically significant at 0.05, χ^2 chi-square value

Influence of some socio-economic factors and farmers' use of mobile phones for agricultural information

A regression analysis was run to determine the influence of some selected variables on the use of mobile phones to communicate agricultural information. Variables such as respondents' age, sex, marital status, income, and types of agricultural information to be communicated were used. Table 5, shows that with the exception of sex, all other factors were found statistically significant at ($p \leq 0.01$), suggesting that, they influenced respondents' mobile phones use to communicate agricultural information. However, the findings contradict Souter *et al.* (2005) on regard to sex, these scholars found that, on average women tend to be more marginalized than men, and are therefore less likely to make frequent use of mobile phones

Table 5: Influence of some socio-economic factors and farmers' use of mobile phones for agricultural information

χ^2	β	Std error (b*)	ρ -value	95% confident interval	
				Lower	Upper
Age	-.364	0.088	0.000*	-0.537	-0.190
Sex	-.013	0.027	0.164ns	0.066	0.041
Marital status	0.034	0.014	0.016*	0.006	0.062
Income	0.200	0.065	0.002*	0.072	0.0328
Type of Agric. Infor	0.088	0.025	0.001*	0.038	0.137

R² = 0.646, Dependent variable: (χ^2)= Predictor variables *= Significant at 0.05, n.s= not statistically significant at 0.05

Challenges of mobile phone usage in agriculture

Main challenge that the rural communities faced is impeded mobile application due to language barrier and illiteracy. Similar studies by Frempong et al., (2007) and Ashraf et al., (2005) reported that the extent of SMS usage by farmers is lesser due to higher rate of illiteracy. They gave an example of the Drum Net study which revealed that only 9% of the respondents know how to send an SMS for business purposes while the corresponding figure in Ghana was 21%. In the case of this study, a number of trainings were conducted to familiarize the farmers with some important feature that could allow them use the phone appropriately. These include reload airtime and writing, sending and receiving SMS. Training manuals were prepared in vernaculars.

Poor signal of the earlier service provider network in the area was a challenge. MTN was the first phone service provider during the inception of the project, all the phones were connected to its network. Fifty percent of the parishes (Kitooma, Buramba and Mugandu) reported unreliable network as one of the major problems that greatly hindered the optimum performance and utilization of the phones and hence its impact. Assessment of the strength of signals and network from three phone companies (MTN, Uganda Telecom (UTL/MANGO) and CETEL - presently ZAIN) showed considerable variations from parish to parish and in different locations within the parish. For example, Kitooma and

Buramba parishes which had MTN lines were found to have stronger network with CELTEL and MANGO respectively. Currently, the area is well served by ZAIN network which has strong signals in the area. Due to that the project facilitated each Parish with one extra phone which is connected to ZAIN. The farmers also reported some challenges they face in using the technology as high cost per call which most farmers cannot afford; unfavourable locations of the phones to most farmers. There are only two project phones in each parish thus some farmers have to walk long distances to make calls.

Farmers also reported problems in charging the phone batteries for Parishes that are not connected to national grid. The only place with electricity was Rubaya sub-county headquarters (Mugandu Parish) which is relatively far from other parishes. This means that the group had to provide transport and lunch to the person willing to take the phone for charging (1,500/= for transport and 500/= for lunch) in addition to the 500/= for the actual phone charge fee. As a result some phones made very little or no profits and savings for sustainability. This problem was solved by supplying the parishes with solar chargers. The farmers pointed another challenge as inaccessibility: This was attributed to difficult terrain, large parishes with big populations had only one or two functional phones. For example, Kitooma parish with a population of 3,293 persons had only three public phones (two from the project and the other was privately owned).

CONCLUSION

The study noted the role of mobile telephone in agricultural related information is critical to the modern day survival of businesses. The Ho West District of the Volta region of Ghana have employed mobile telephony to their advantage. Despite the seeming usefulness of mobile phone, there are factors that militate against the full realization of this technology. They include but not limited to poor signal strength, farmer knowledge of mobile phone use etc. The study recommended regular training to make the technology a success.

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