Role of Mobile Phone Use in Enhancing Agricultural Productivity of Farmers in Etche Local Government Area, Rivers State.

Harry A.T & Stanley, O
Department of Agricultural Extension & Rural Development
Rivers State University, Port Harcourt

ABSTRACT

The study assessed the role of mobile phone use in enhancing agricultural productivity of farmers in Etche Local Government Area, Rivers State. Specifically, describe the socio-economic characteristics of the farmers in study area, ascertain the awareness of mobile phone use for agricultural information study area, examine the areas of mobile phone to communicate agricultural information in the study area, identify the benefits of mobile phone use to communicate agricultural information in the study area and identify the constraints associated with the use of mobile phone in the study area. Purposive random sampling technique was used to select a sample of 144 farmers. The collected data were subjected to descriptive and inferential statistical analysis. The hypothesis was tested using correlation analysis and the result shows there was significant difference between role of mobile phone use and socio economic characteristics of the farmers as the coefficient of the correlation(R) was 0.896 indicating 89.6% of strength relationship between the variables. The results showed that most of the respondents are married (41.67%). Majority of the respondents are involved in mixed farming. Some of the constraints faced include inadequate or poor infrastructure (x=2.65), poor network signal (x=2.69) and high cost of mobile phone and running (x=2.84). Extension agents should be used to create more awareness on mobile phone use among the farming communities and to identify the barriers preventing farmers to use new information sources and to educate them on the use of modern agricultural information as source of improving their productivity.

KEYWORDS: *Mobile, Phone, Enhancing and Agricultural Productivity*

INTRODUCTION

1.1 Background of Study

Sustainable agricultural systems require research-based agricultural practices that rely on advanced mobile phone technology to share and transfer agricultural knowledge. Using suitable tools to disseminate information is vital to sustainable agricultural development in the 21st century (Ashraf et al., 2018; Kumar and Karthikeyan, 2019). It has been showed that illiteracy is one of the big problems among rural farmers to use mobile phone especially smart phone, most of the farmers do not have any knowledge and information about how to use their touch screen and enter the digits. Similarly, farmers do not use mobile for getting the latest information about marketing, weather and use of proper pesticides in their field. Farmers can use the short message

service (SMS) and voice message delivery system to get the information regarding agriculture issues and problems in different regions. It is easy to use for the farmer, but same time uneducated farmers are not using this service while it is possible that this problem can be solved through training the farmers about use of mobile phones and short message services(SMS). In a study conducted in the North Senatorial zone of Kaduna State of Nigeria showed that around 78% of the respondents asked the main problem of high cost of subscription charges, poor quality of mobile phone and its accessories and power problem, to be major constraints. While other issues were also identified such as high cost of maintenance, poor network and inadequate skill for its operation. However, it was revealed that due to lack of knowledge and information about the agriculture marketing information of sell of their product most of the farmers sell their product at low price in developing countries such as Pakistan, Bangladesh and in India. Farmer's link with different sources likes as traders, processors and traders farmers sell their agricultural products to buyers at wholesale price. While after getting the product at lowprice, traders and buyers resell the products to processors at higher price. Therefore, mobile phones are one of the best sources to communicate directly with market and get latest information of their product and sell it at good price.

Nowadays farmers are using different methods and technologies to increase their productivity and trying to reduce traditional methods. In the perspective of the China in the growth of economy farmers are also playing an important role in the contribution of Grass Domestic Product GDP of the country. To improve and increase the agriculture produce farmers are accessing and getting more information from different sources of technologies like an internet mobile phone and find location using Global Positioning System (GPS). Furthermore, china has invested lot of amount on information communication technologies to provide best opportunities to farmers and spread more information around the country.

It was showed that ICT especially mobile phone has played an important role in various sectors of the society and has increased the information system in different communities. Information technology in agriculture is also more popular where farmers can easily get latest information of weather by using internet and directly check the market information of different crops. In developing countries such as Pakistan India, Bangladesh and South African countries, agriculture is a major contributor of economy and the Gross Domestic Product (GDP). Nowadays farmers are more aware about communication technology tools such as computer, Internet and mobile phone and improving their living standard. Mobile phones have decreased the cost of expenses in rural people. However, it was showed that mobile phone has given different opportunities, knowledge and information regarding different agricultural issues, problems and its solutions for agriculture development and knowledge among farmers. Furthermore, mobile phone use in agricultural extension services has provided information of market, weather, transport and agricultural practices to communicate with related department. Mobile phone will provide higher interactive potentials for farmers to develop their individual, intellectual and creative ability. In cognizance of the aforementioned facts, the researcher would want to fill the gap by seeking answers to the following research questions: What are the socio-economic characteristics of farmers in the study area? Are the farmers aware of mobile phone use in enhancing agricultural productivity in the area? What are the areas of mobile phone use in the study area? What are the benefits of mobile phone use in the study area? And what are the factors associated with the use of mobile phone in the study area?

1.3 Objectives of the Study

The broad objective of the study was to assess the Role of Mobile Phone Use in Enhancing Agricultural Productivity in Etche Local Government Area of Rivers State. The specific objectives of the study were to;

i. describe the socio-economic characteristics of the farmers in study area.

ii. ascertain the awareness of mobile phone use for agricultural information study area.

iii. examine the areas of mobile phone to communicate agricultural information in the study area.

iv. identify the benefits of mobile phone to communicate agricultural information in the study area.

v. ascertain the constraints associated with the use of mobile phone in the study area.

1.4 Hypothesis

The following null hypotheses were tested:

HO1: There is no significant relationship between the farmer's socio-economic characteristics and role of mobile phone use in the study area.

Methodology

3.1 The Study Area

Etche is one of the 23 Local Government Areas of Rivers State and amongst the 13 federal constituencies representing River State in Nigeria's National Assembly and part of the Rivers East Senatorial District.The local government area covers 774.7km2 and a population density of 453.4km2 according to 2016 Census. It lies within latitude 4045'N – 5017'N and longitude 6055'E – 7017'E. There are 19 political wards in Etche local government. Etche believe Igbodo to be their ancestral home while the first community to have access to electricity in Etche was Okoroagu. The people of Etche are mostly engaged in agriculture, earning the nickname 'the food basket of the state'. Etche is one of the host communities of the government owned multi-billion naira palm oil production company Risonpalm, as well as Delta Rubber Production Company

3.2 Research Design

The study adopted the non-experimental design of sample survey in which data was collected from a sample of population characteristics based on the opinion and experience of the respondents in the study area.

3.3 Population of the Study

The population of this study comprised all registered farmers in Etche Local Government Area of Rivers State. The registered farmers will be the set of respondents from which research data

was obtained. Total number of registered farmers in Rivers State Agricultural Programme(ADP, 2021) is 184 farmers.

3.4 Sampling Procedures and Sample Size

Purposive random sampling was used to select 144 registered farmers (ADP) from the study area. The total number of respondents used for this study was one hundred and forty four(144). Two (2) communities were selected from each of the clan, making a total of ten (10 communities.

Table 3.1 Sample Size for the Study

Clans	Selected Communities	No of Respondents Per Community
Ozuzu	Ajah	20
	Ogbaku	20
Igbo	Chokocho	12
	Egwi	12
Umuselem	Ulakwo	20
	Nihe	20
Mba	Obite	10
	Umuoye	10
Okehi	Akwukabi	10
	Igbodo	10
Total	**10**	**144**

Source: *Field Survey, 2021*

3. 5 Method of Data Collection

The instrument used for data collection from was the questionnaire. The data was collected from the respondents through questionnaire and interview. The questionnaire was divided into five (5) sections soliciting information based on the study objectives. Section A was based on the socio - economic characteristics of the respondents, section B ascertain the awareness of mobile phone use for agricultural information study area, section C was on the areas of mobile phone to communicate agricultural information in the study area, section D identified the benefits of mobile phone to communicate agricultural information in the study area, section E obtained information on the constraints associated with the use of mobile phone in the study area.

3.6 Validation of Instrument

The validity of the instrument was established by subjecting the research to a reviewed by the researcher's supervisors for critical appraisal using face and content validity. The necessary correction was effected before final questionnaire was structured for the study.

3.7 Reliability of Instrument

The reliability of the instrument was achieved by subjecting the instrument to a test retest method. This was achieved by administering the questionnaire to five (5) respondent not included in the sample size. After the interval of two weeks of administration, the same sets of instrument were re-administered to the same group of respondent and the resulting test scores were correlated using Pearson Product Moment Correlation coefficient 'r'. The result showed a reliability coefficient of 87%.

3.8 Method of Data Analysis

The data collected was subjected to descriptive and inferential statistical analysis. The descriptive statistics include frequency count, percentage and mean statistics. Objectives 1 and 2 were analyzed using percentage, and objective 3, 4 and 5 will be analyzed using mean statistics. Any value equal to or above 2.50 means that mobile phone is useful to the farmers but any value below 2.50 means that mobile phone is not useful to the farmers.

Model Specification

In implicit form, the model is specified thus:$Y=f(X_1\ X_2\ X_3\ X_4\ X_5\ X6)$

Where Y = Roles of mobile phone use (Independent variables)

X_1-X_6 =Socio-economic characteristics (Moderating Variables)

Where: X_1= Age (years) = Age

X_2= Educational Levels (in years spent) = EDU

X_3 = Marital Status (Married=1; Single=2, etc) = MARITAL

X_4 = Household Size (persons) = HHOLD

X_5 = Farming Experiences = FEXP

X_6 = Monthly Income = INCOM

Thus:

$$ROLEMP_{(t)} = \beta_0 + \beta_1 AGE_{(It)} + \beta_2 EDU_{(2t)} + \beta_3 MAR_{(3t)} \beta_4 + HHOLD_{(4t)} + \beta_5 + FEXP_{(5t)} + \beta_6 + INCOM_{(6t)} + \mu_t \quad (1)$$

RESULTS AND DISCUSSION

In this chapter, socio-economic characteristics of the respondents are presented in a tabular form.

Table 4.1: Summary of Response on Socio-economic Characteristics of the Respondents

Variables	Frequency	Percentage	Mean
Age			
Below 20 Years	20		13.89
32			

20-30 Years	60			41.67		
31-40 Years	28		19.44			
41-50 Years	36			25.00		
Total	**144**			**100**		
Educational Qualification						
Non formal	28			19.44		
Primary School		41			28.47	
Secondary School	36		25.00			
Tertiary Education	39		27.09			
Total	**144**			**100**		
Marital Status						
Single	37		25.69			
Married		69		47.92		
Divorced	9		6.25			
Widow/Widower	29		20.14			
Total	**144**			**100**		
Household Size						
1-5 Persons	58		40.27		9	
6-10 Persons	25			17.36		
11-15 Persons	39			27.08		
16 Persons and above	22			15.29		
Total	**144**			**100**		
Farming Experience						
1-10 Years	32			22.22		18
11-20 Years	53			36.81		
21-30 Years	44			30.56		
31 Years and above	15		10.41			
Total	**144**		**100**			
Monthly Income (N)						
1000-10000	14		9.72		2,170	
11000-20000	42		29.17			
21000-30000	60		41.67			
31000 and above	28		19.44			
Total144		**100**				

Field Survey 2021

Table 4.1 contains the summary of response on socio-economic characteristics of the respondents. Ages of the respondents examined and presented in Table 4.1, showed that majority(13.9%) respondents were below 20 years of age; 41.7% indicated that they were between 21- 30 years; 19.4% indicated that they were between 31 - 40 years; 25.0% indicated that they were between 51 - 60 years, and the main age of the respondents was 31.68. This study is in consonance with the findings of Salaau, Bello and Alanji (2013) and that of Ekerete and Ekanem (2015); that over 60% of the respondents fall within the age of 21-40 years. The implication of the findings is that majority of the respondents belong to the class of active population and so can afford and take decisions on the utilization of mobile phone use in the

area. It is also equally presumed that the respondents have the ideal knowledge of the problem under investigation.

Similarly, For educational qualification, Table 4.1 showed that majority (19.4%) of the respondents indicated that they did not attend any Formal Education but gained farming knowledge and skills through parents, friends or associates; 28.5% indicated that they completed Primary Education; 25.0% indicated that they had Secondary School Education; 27.1% indicated that they had Tertiary Education. The study aligns with the findings of Nenna (2014) that majority 80.0% of cassava farmers were literate while 20.0% had no formal education. It equally collaborates with findings of Oyekanmi and Okeleye (2017) that high percentage of cassava farmers in South West and North West agro-ecological zones are literate. The implication from the educational status of the respondents showed that literate individuals are keen to get information and utilize it effectively. As asserted by Olaniyi, Adetumbi and Adereti (2013) the literate level of the respondents could afford them the opportunity of learning new things and make use of research findings.

Also, as shown on the table 4.1, 25.7% of the respondents indicated they are single; 47.9% indicated that they are married; 6.3% indicated that they aredivorced; 6.3% indicated that they are divorced; 20.1% indicated that they are widow. The implication from the marital status revealed that greater proportion of the respondents (married and widow/widowed) manage their homes and so have reasonable family labour that could help in farming activities.

Table 4.1, indicates that most (27.1%) of the respondents were farmers; 22.9% indicated they are traders; 22.2% indicated that they are civil servants; 27.1% indicated that they are self-employed; 0.7% indicated to be a student. The implication from the occupation data revealed that most of the respondents have primary occupation in addition to farming. There is possible of affording and utilizing mobile phone in the study area. Majority(40.3%) of the respondents had household size of 1-5 persons, some(17.4%) had 6-10 persons, 27.1% had more than 11-15 persons and 15.3% had 16 and above persons. Greater proportion of respondents indicated a high number of household sizes. This finding is in line with Nenna (2014). The implication of this findings shows that the respondents had reasonable family labour that could help in farming activities. As asserted by Ani (2004), household size in traditional agriculture determines the availability of labour and level of production. The household size can also affect the possibility of acquiring mobile phone. For farming experience of the respondents, 22.2% indicated that they had farming experience within the range of 1-10 years; majority (36.8%) of the respondents had 11-20 years; 30.6% indicated 21-30 years and 10.4% had 31 years and above. This is an indication that the respondents had acquired a wide range of farming experience. This finding is in consonance with the study of Ezeh (2013) which found that the higher the farming experience, the more farmers would have gained more knowledge and technological ideas on how to tackle farm production problems and the higher the output and income.

The result in the Table 4.1, revealed (9.7%) indicated that their monthly income fell within 1000-10000; 29.2% earned 11000-20000; majority(41.7%) of the respondents earns 21000-30000 and 19.4% indicated 31000 and above. This conforms to the findings of Ekerete and Ekanem (2015) that most of the agro processors had monthly income of 21,000 – 30,000 naira per month. It therefore shows that agro processing is a worthwhile enterprise for rural dwellers.

4.2 Awareness of Mobile Phone Use for Agricultural Information in Etche LGA.

Table 4.2: Level of Awareness on Mobile Phone Use to communicate agricultural information (n=144)

Level of Mobile Phone Awareness	High Aware	Aware	Low Aware	Not Aware	Mean (x)
Mobile phone is used to source for improved farming practices	58	45	33	8	3.06
Mobile phone helps to build up market linkage	15	20	51	58	2.08
Mobile phone helps to get agricultural information that will increase productivity or yield	40	61	22	21	2.83
Mobile phone saves time due to timely procurement of inputs	39	51	39	15	2.83
Improves social relationship among farmers and business community	23	47	32	42	2.37

Mean Score ≥ 2.50 = Aware; ≤ 2.50 = Not Aware

Source: Field Survey, 2021

The level of farmer's awareness towards mobile phone use is presented in Table 4.2. The respondents agreed to the following awareness; Mobile phone is used to source for improved farming practices($\bar{x}$=3.06), Mobile phone helps to build up market linkage($\bar{x}$ = 2.08), Mobile phone helps to get agricultural information that will increase productivity or yield($\bar{x}$ = 2.83); Mobile phone saves time due to timely procurement of inputs($\bar{x}$ = 2.83) and improves social relationship among farmers and business community(2.37).

4.3 Benefits of Mobile Phone Use in Communicating Agricultural Information in the Study Area

Table 4.3: Response on the Benefits of Mobile Phone Use in Etche Local Government Area.

Benefits of Mobile Phone Use	Strongly Agreed	Disagreed	Strongly	Mean (x)

	Agreed		Disagreed		
Helps in quick selling of farms produce	57	33	46	4	2.94
Helps to contact extension agents	35	49	7	53	2.83
Reduction in production cost of agricultural productivity.	28	34	49	33	2.39
Saving of time due to timely procurement of inputs	63	24	38	19	2.91
Provides new approach to farmers to make decisions much more easier	29	38	31	36	2.35
Improves social relationships among farmers and business community	57	46	30	7	2.94
Helps to get information on Improved farming practices	50	38	10	46	2.83
Helps to get information on higher productivity or yields	67	24	38	15	2.91

Source: Field Survey, 2021

The benefits derived from mobile phone use are presented in Table 4.3. Foremost among this benefits are; helps in quick selling of farms produce($\bar{x}$=2.91), helps to contact extension agents ($\bar{x}$=2.83), saving of time due to timely procurement of inputs(($\bar{x}$=2.94), improves social relationships among farmers and business community($\bar{x}$=2.39) and Helps to get information on Improved farming practices (x=2.83).

4.4 Constraints to Role of Mobile Phone use in the Etche Local Government Area.

Table 4.4 Responses on the Constraints to Role of Mobile Phone Use in the Study Area. (n=144)

Constraints	Strongly Agreed	Agreed	Disagreed	Strongly Disagreed	Mean (x)
Inadequate or poor Infrastructure	39	41	39	25	2.65
Low digital literacy	7	10	61	66	1.71
Poor network signal	38	39	52	15	2.69
High cost of mobile phone and running	47	46	31	19	2.84
Lack of availability of timely and accurate information	10	13	72	49	1.89
Lack of mobile friendly and locally relevant digital content in local languages	52	21	60	11	1.78
Lack of knowledge on the importance of agricultural information	46	42	38	18	2.81
Lack of servicing centres	12	5	53	69	1.65

Source: Field Survey, 2021

The constraints associated to the role of mobile phone use are presented in Table 4.4. The major constraints include: inadequate or poor infrastructure ($\bar{x}$ = 2.65), poor electricity supply ($\bar{x}$ = 2.81), poor network signals($\bar{x}$ = 2.69), No strong internet coverage in the area ($\bar{x}$ = 2.79), high cost of mobile phone and running ($\bar{x}$ = 2.84) and lack of knowledge on the importance of agricultural information($\bar{x}$ = 2.81). Other studies by Bolarinwa and Oyeyinka (2011; Singh, 2012) had similar conclusions that unaffordable cost is largely blamed and that governments and mobile companies are to be held responsible for the cost and service failure. Furthermore, cost is recognized as having one of the most significant negative impacts on behavioural intention to use (Chong *et al.*, 2011; Luarn and Lin, 2005; Wei *et al.*, 2009; Yu, 2012).

4.5 Correlation between the Socio-Economic Characteristics of the Respondents andRole of Mobile Phone Use in the Study Area.

Table 4.5: Showing the Correlation relationship between socio-economic characteristics and roles of mobile phone use in the study area

	ROLEMP	AGE	EDU	MARITAL	HHOLD	FEXP	INCOME
Pearson Correlation	1	.894	.990	.398	.887	.726	.199
Sig. (2-tailed)		.041	.010	.602	.018	.031	.047
N	6	5	4	4	4	4	4
Pearson Correlation	.894	1	.837 .163	.767	-.751	.479	.298
Sig. (2-tailed)	.041			.233	.249	.521	.702
N	5	5	4	4	4	4	4
Pearson Correlation	. 990	.837	1	.318	-.969	192	.540
Sig. (2-tailed)	.010	163		.682	.031	.808	.460
N	4	4	4	4	4	4	4
Pearson Correlation	.398	.767	.318	1	-263	.397	-.283
Sig. (2-tailed)	.602	.233	.682		.737	.603	.717
N	4	4	4	4	4	4.	4
Pearson Correlation	.887	.654	-.463	-.032	1	.053	-.378
Sig. (2-tailed)	.018	.249	.031	.737		.947	.622
N	4	4	4	4	4	4	4
Pearson Correlation	.726	.479	.192	.397	.053	1	.567
Sig. (2-tailed)	.031	.521	.808	.603	.947	.567	.433
N	4	4	4	4	4.	4	4

Pearson Correlation	.199	.298	.540	-.283	-.378	.567	1
Sig. (2-tailed)	.047	.702	.460	.717	.622	.433	
N	4	4	4	4	4	4	4

***** Correlation is significant at the 0.05 level (2-tailed).

Table 4.5, shows the relationship between socioeconomic characteristics of the farmers and role of mobile phone in the study area. From the analysis, it is evident that socioeconomic characteristics of the respondents significantly influence the roles of mobile phone use in the study area in terms of age, education and household size. From the hypotheses, the result of Pearson Correlation analysis establishing relationship between the socio-economic characteristics of the respondents and the role of mobile phone use to farmers as presented in table 4.6.1. The result reveals the following age ($r=0.041$; $p<0.05$), the educational qualification ($r=0.01$; $p<0.05$), marital status ($r=0.602$; $p<0.05$), occupation ($r=0.045$; $p<0.05$) and household size ($r=0.18$; $p<0.05$). Apart from marital status that exhibited positive and insignificant relationship. The implication of this result showed that all selected socio-economic variables considered except marital status had a significant on the role of mobile phone use to farmers in the study area. The relationship between the age of the respondents and the role of mobile phone portrayed that as the farmers advance in age, the role of mobile phone use increases. The relationship between the educational qualification and the role of mobile phone use indicates that the higher the qualification of the respondents the more knowledgeable on the mobile phone applications and the more useful of the mobile phone to them. This study collaborate the findings of Nenna (2014) and Aldosari, Al-Shunaifi, Ullah, Muddassir and Noor (2017) that the higher the years of education, the more knowledgeable the farmers will be in the technicalities involved in the use of mobile phone use. The relationship between the marital status and the role of mobile phone use indicates that there is an insignificant relationship. The implication of these findings showed that whether married or not, such status has no significant on the farmers use of mobile phone. The relationship between occupation of the respondents and the role of mobile phone use showed significant relationship. From this finding, it means that the occupation of the respondents has great impact on the role of mobile phone use to the farmers in the study area. The relationship between the household size of the respondents and roles of mobile phone use to farmers indicate a significant relationship. This supports the findings of Nenna (2012) but contradicts the findings of Henri-Ukoha, Chikerie-Osuji and Ukoha (2012). This is an indication that when household increases, there is likelihood of increase in the role of mobile phone use to the respondents.

5.1 Summary

The aim of this study looked into the contribution of mobile phone as an input-of-change for the country to achieve its agriculture and development potentials. Theoretical revealed four theories of communication. The communication and learning theory emphasized the role of information to improve productivity of agriculture in the locality or region. The people centered development

theory suggests that communities should account for their development, control their resources and have access to relevant information. The diffusion of innovation theory explained that even with full farm household information, farmers may subjectively evaluate the technology differently and the social cognitive theory highlighted the need for interventions to change the larger environment. Empirical literature revealed various studies carried out on the use of mobile phone especially in rural areas.

The study was carried out in Etche Local Government Area, Rivers State. The sample of 144 respondents was selected using simple sampling plan. The data collected was analyzed using frequency, percentage and mean. The hypothesis was tested using spearman correlation. The resulted of the data analysis revealed that most of the respondents fall within the mean age of 32 years, 47.9 were married. Furthermore, most respondents indicated to communicate different types of agricultural information at various stages of crop production. For instance, at planning and decision making stages, respondents reported to demand knowledge on what and how to produce, how much to produce, where to sell and the required resources. Unfortunately, this kind of information was found not to be commonly communicated through mobile phones; instead respondents indicated that farmers obtained that information through a word of mouth from extension agents, input dealers, traders and fellow farmers. The roles of mobile phone use on rural farmers has been identified through this study, although the roles of mobile phone use in the study area was constrained by several factors. The test of hypothesis for the study revealed that there is a relationship between socio-economic characteristics of the respondents and roles of mobile phone use in enhancing agricultural productivity

5.2 Conclusion

Nigeria has a larger rural population than the urban and is very agrarian. The agriculture is dominated by smallholder farmers who are positioned to become a key driver of future economic growth and prosperity if the confronting challenges are overcome. The spirit of this study looked into the contribution of mobile phone as an input-of-change for the country to achieve its agriculture and development potentials. This study investigated the extent to which farmers have taken advantage of mobile phone technology and the benefits they have derived from it. In view of these objectives, the study sought and provided answers to the questions raised in the objectives. Mobile phone created many benefits for the smallholder farmers aside from its unique characteristics of being handy, customized content delivery and convenience. As mobile phone providers continue to penetrate their services into the rural communities where farming is predominant, the tendency is that there will be expansion in the adoption of mobile phone and increased use of the product to cover more aspects of agricultural activities. The impact of geographic isolation, high transport costs, time lost to poor road networks and conditions, and the failure to deliver inputs on-time to farmers, or from the farmers to the market when prices are more favourable, can significantly impact revenue, profitability, and the overall social economic wellbeing of the rural communities.

Considering all these issues, the use of the mobile phone technology has reasonably reduced most of these problems. It has assisted farmers to gain easy and timely access to market and market information. However, the low use of mobile phones for obtaining weather information is worrying. Weather information is an important detail upon which modern agriculture relies. Apart from providing normal agricultural weather information, it is relied upon to provide

sudden extreme weather forecast that can be devastating. This study did not investigate the reason for the low mobile phone use to obtain this service; however, smallholder farmers generally are conservative and would often rely on tradition and local intuition to predict weather patterns. Moving forward, a review of the use of weather predicted data is first necessary to ascertain the availability of the data to farmers, secondly whether the farmers can access the data, and finally whether the data can be made available through mobile phone applications.

Cogitating the benefits farmers claimed to have obtained from the use of a mobile phone, the realization of the full potential of mobile phones usage can be constrained by lack of social inclusion and physical infrastructure. Electricity is a critical infrastructure for this service for both the phone service providers and the user farmers. The farmers rely on electricity to charge their phones and often it is not available in supply; however, farmers are excited about the benefits mobile phone provides. The role of the extension service/agents cannot be overstated; it often involves the visit to the farmers at home or on the farm by the extension agents. The discussions in such meetings often can be managed via mobile phone. Adoption of mobile phone for this purpose will save time and enable targeted messages to reach more farmers within the shortest possible time. The role of weather information in agriculture in modern time cannot be overestimated considering the volatility in the weather conditions due to the effects of climate change. It is important that every government should intensify effort to improve weather advice systems and to ensure the advice gets to the farmers.

5.3 Recommendations

Based on conclusion the specified above, recommendations for enhancing the use of mobile phones in communicating agricultural information are given below and could be achieved through a combination of strategies; thus, the study recommends interventions in the following areas;

1. Owing to the fact that socio-economic characteristics are significantly associated with the use of mobile phones in communicating agricultural information, mobile phone service providers need to reflect on these characteristics when developing mobile phone applications and content which would be held by users valuable.
2. Researchers need to make a thoughtful review of their clients so that specifically they serve particular groups of clients based on their real agricultural information needs. This will serve as a solution to the fact that different groups of farmers vary in their requirements at different peaks of production periods.
3. Jointly, local government authorities in the study districts, in collaboration with mobile phone service providers, ought to educate farmers through sensitization and mobilization campaigns on apt usage of mobile phones to communicate agricultural information. Equally, local government authorities should improve telecentres so that they can grow into real centres for training smallholder farmers in mobile phone. As such, they need to set aside funds for training smallholder farmers about the use of mobile phones in communicating agricultural information.
4. As evidenced in the result section, farmers had more contacts with input sellers compared to other stakeholders. This could be interpreted that there is a need to encourage the relationship between smallholder farmers with input suppliers. Therefore, government authorities, through researchers, should liaise with mobile phone service

providers to subsidize smallholder farmers' linkage with input suppliers, providing free texts or calls.

5. Local government authorities should increase efforts to improve rural infrastructures, especially those meant for reliable electric power supply, to enhance mobile phone use.
6. Local government authorities should regularly organize meetings with various stakeholders for exchange of ideas meant to increase mobile phone use in communicating agricultural information.
7. Extension agents should be used to create more awareness on mobile phone use among the farming communities and to identify the barriers preventing farmers to use new information sources and to educate them on the use of modern agricultural information as source of improving their productivity.

5.4 Contribution to Knowledge

The study has created more consciousness on the roles of mobile phone use in enhancing agricultural productivity in the study area. It has also identified some key constraints affecting the farmers and use of mobile phone in the study area.

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