THE USE OF MOBILE PHONE AMONG FARMERS FORAGRICULTURAL EXTENSION SERVICES: THENAERLS EXPERIENCE IN NIGERIA.

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ABSTRACT
The rise of the Internet and new media has increased the rate of communication between people all over the world. It enables people to express themselves through blogs, websites, pictures, and other user-generated media such as the GSM. This study focuses on the use of GSM services for Agricultural extension in Nigeria with the aim of determining famers information need, service preference and determining economic status of owing GSM to support their farm services. The study is based on the Nigerian Agricultural Question and Answer Service project, using 9 pilot states in Nigeria. Findings from the study reveal that 70% of the farmers own GSM, but only about 40% are able to recharge their phone monthly, meanwhile more than 80% prefer agricultural commodity prices with less concern on whether forecast. The study concludes that GSM might increase interaction and linkages between the extension agents and the farmers considering farmers' increasing accessibility to mobile phones (GSM). The study thus, recommended that awareness campaign in promoting the use mobile phones services for agricultural extension activities should be encouraged and adequate funding with provision of communication facilities to development agencies like the NAERLS is recommended.

Introduction
Most African countries are troubled with either temporary or permanent food insecurity, which necessitate the issue of boosting agriculture to enhance food security. Food security is vital for national development; therefore, food security involves availability and access to food, most importantly, food self-sufficiency and agricultural development.

The Nigerian government has over the years employed various measures to tackle food insecurity in the country which has lead to the establishment of Agricultural Research Institutes (NARIs) such as the' National Agricultural Extension and Research Liaison Services (NAERLS), Institute for Agricultural Research (IAR) and the state Agricultural Development Project (ADPs) etc. Mobile telecommunication is becoming one of the most important industries in the world. Balogun (2000), argue that GSM facilitate economic development as it provides easy and effective communication need to stimulate and promote trade between Nigeria and its foreign partners ,n the world. Even at home, it plays a critical role m communicating government programmes thereby linking entire sectors of the economy together in order to achieve a common goal.

Governments and international organizations have attempted to overcome some of the perceived information failures related to adoption via agricultural extension services. Generally extension is defined as the delivery of information inputs to farmers (Anderson and Feder 2007) There were approximately 500,000 agricultural extension personnel worldwide in 2005, with 95 per cent of these working m public agricultural extension systems (Anderson and Feder 2007) Yet

despite decades of investment in and experience with a variety of public extension programs and evidence of their impact upon agricultural knowledge, adoption and productivity remains hrmted. Furthermore, the systems themselves have been m general "decay", primarily due to poor funding, problems of low number of extension agents (EAs).

AKer & Mbiti (2010) state that the rapid spread of information and communication technologies (ICT) in developing countries over the past decade offers a unique opportunity to transfer knowledge v a private and public information systems. Over the pass decide, mobile phone coverage has spread rapidly in Africa, Asia and Latin America as depicted in figure 1. As of 2009, over half of the population in sub-Saharan Africa, Asia and Latin America had access to mobile phone coverage, representing 60, 67 and 77 percent, respectively. Mobile phone coverage has greatly exceeded investments m other infrastructures in these countries, namely, electricity, roads and landlines. Coinciding with this increase in mobile phone coverage there has been an increase in mobile phone adoption, even in some *of* the world's poorest countries. As of 2008, there were about 4 billion mobile phone subscribers worldwide, with 374 million subscriptions in Africa 1 791 in Asia and 460 million in Latin America (International Telecommunication Union (ITU) 2009). While initial adoption was primarily by the wealthy, urban and educated residents, mobile phone are currently being adopted by the rural poor m some of the world's poorest countries (Aker and Mbiti 2010).

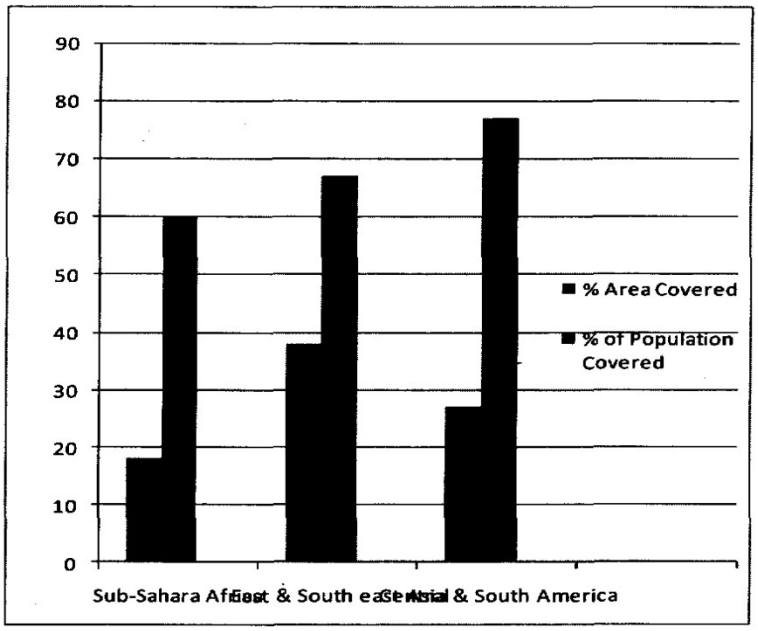

Figure 1 Area of population with mobile phone coverage in 2009, by region (Aker & Mbiti)

Mobile phones significantly reduce communication and information costs for the rural populace, in developing countries. This not only provides new opportunities for rural farmers to obtain access to information on agricultural technologies, but also to use ICTs in agricultural extension systems. Since 2007, there has been a proliferation of mobile phone based applications and services in the agricultural sector, providing information on market prices, weather, transport and agricultural techniques via voice, short message service (SMS) and internet. While such

programmes are innovative, they are not without challenges, and it is not yet clear that they will substitute for existing agricultural extension systems.

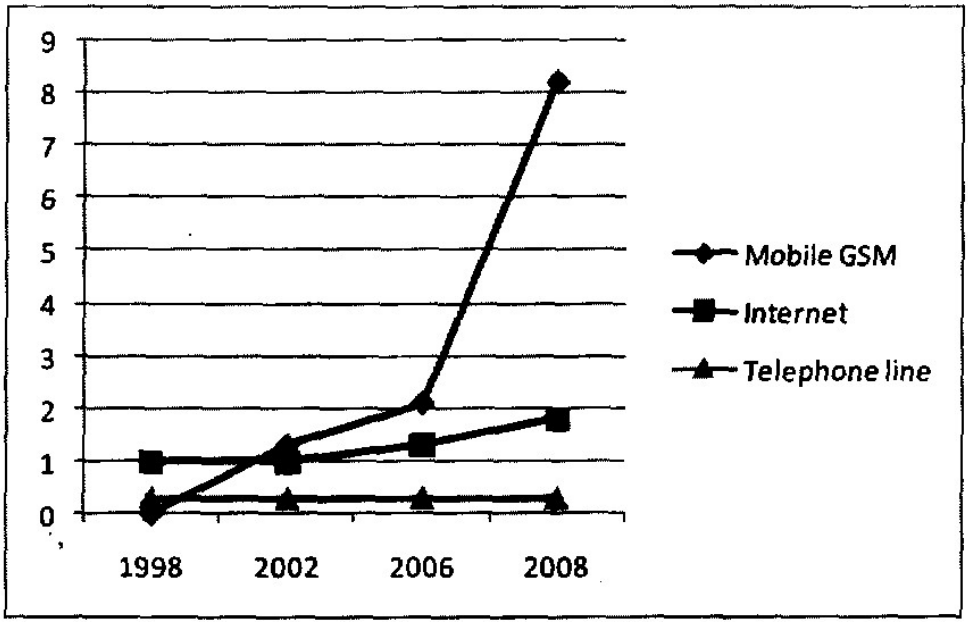

Figure 2 - ICT Developments in Africa (Source: ITU Information Society Statistical Profiles 2009 - Africa)

The graph clearly depicts the phenomenal growth in mobile telephony subscribers in Africa, the so-called "mobile boom". Africa has in the last 5 years recorded the largest increase in mobile cellular subscribers and mobile telephony has become the most useful ICT tool on the continent. By the end of 2008, there were 246 million mobile cellular subscriptions in Africa, almost eight times more than the number of Internet users at 32 million. The distribution of mobile subscriptions is worth noting: 66% of mobile subscribers are in 6 countries, with Nigeria and South Africa having the largest shares. Although the distribution is uneven, significant developments have occurred relative to 2000 when South Africa had 75% of Africa's mobile subscribers. According to Vanguard Nigeria (2011) there are over 60 million GSM numbers in Nigeria currently. (Felix & Ojikutu, 2010), further highlighted the current ICT statistics in Nigeria:

9% of Nigerians watch TV daily
19% of Nigerians listen to radio daily
4% of Nigerians read newspapers daily
Less than 2% of Nigerians use the internet daily
50% of Nigerians use GSM phone daily

The potential role of agriculture as an engine for economic development has long been recognized. Since the seminal contributions of Schultz (1964), Hayarni and Ruttan (1971), and Mellor (1998), there has been a large body of theoretical and empirical literature on the potential multiplier effects of agricultural growth on non-agricultural sectors cited in (Ghadi. S, Mittal, S, Mphati G. 2009) Cross-country and country-specific econometric evidence has indicated that

GDP growth generated in agriculture can be particularly effective in increasing expenditures and incomes of the poor (Gautan, Madhu. 2000, Gakun, Kristen, Francois, 2009).

Despite the importance of agriculture for economic development, agriculture has yet to perform as an engine of growth in many developing countries - especially sub-Saharan Africa (Gakun M, Kristen W, Francois S. 2009). In order to achieve the objective of this study, the use of mobile phone (GSM) for Agricultural Extension Services by the National Agricultural Extension and Research Liaison Services (NAERLS) in Nigeria was studied. Specifically, the objectives of this study are:

- Identify the potential mechanism through which mobile phones could improve agricultural extension and increasead option.
- Also to identify issues for feature research.

Mobile Phone in Agriculture

Mobile phones play a vital role through information supply and communication in Agriculture. One of the major challenges in agricultural extension is finding a way of reaching out to fanners and producers of various commodities with relevant agricultural information. The relatively low ratio between extension agents (EAs) and farm families (FF) underscores the usefulness of mobile phones in agricultural information dissemination. The growth in the use of mobile phones in the developing world has been phenomenal and mobile phones are also used to access the internet. Some of the advantages of the mobile phones are;

- It is easy to operate even by the non-literates;
- It is relatively affordable;
- It bridges the divide by strengthening communication between producers, en-users, research and extension.

The NAERLS Experience

The National Agricultural Extension and Research Liaison service (NAERLS), has the national mandate to generate agricultural information and disseminate same through means of communication to Nigerian farmers. The channels of communication used by the institute include Radio, TV, face to face (extension agents), cinematography, publications, exhibitions, agric shows and others like Mobile phone(GSM).

According to National Question and Answer Services (NAQAS) (2010), Nigeria has the highest mobile phone tele-density in sub-sahara Africa' With mobile phone facilities covering the whole nation and neighbouring countries. This medium can play an important role in making relevant agricultural information available to the various actors in rural areas that are dominant on the agricultural sector. The National Agricultural Extension and Research Liaison Services (NAERLS), Ahmadu Bello University (A.B.U) Zaria, has introduced the use of mobile phones in extension services in partnership with other agricultural agencies.

NAQAS with CTA support, was able to increase the outreach of the Question and Answer Service, (QAS) to many more communities with the intention of introducing both the Question & Answer Service and the use of NAQAS Mobile to operate hand in hand. The use of mobile phones in agricultural information dissemination was introduced in September 2008 by Nigeria

Agricultural Question and Answer Service (NAQAS) of NAERLS A.B.U with the support of Technical Centre for Agricultural and Rural Cooperation (CTA) in eight (8) states of Nigeria pilot cases namely: Abia, Akwa-Ibon, Bauchi, Benue, FC1 Abuja Kano, Kaduna and Ondo states. NAQAS is a service unit of NAERLS which serve as farmers resource centre, the mobile phone serviced aims at:

- Improving access to agricultural information in a most cost efficient and timely manner.
- Promoting the use of information in order to enhance sustainable agriculture and rural development to improve food security in Nigeria.
- Institutionalizing the service for it to be well known and used by a large section of the target group.
- Supplying information need of users pertaining to world market prices, research and development activities in agricultural and rural development.
- Improving networking as well as developing partnership through training.

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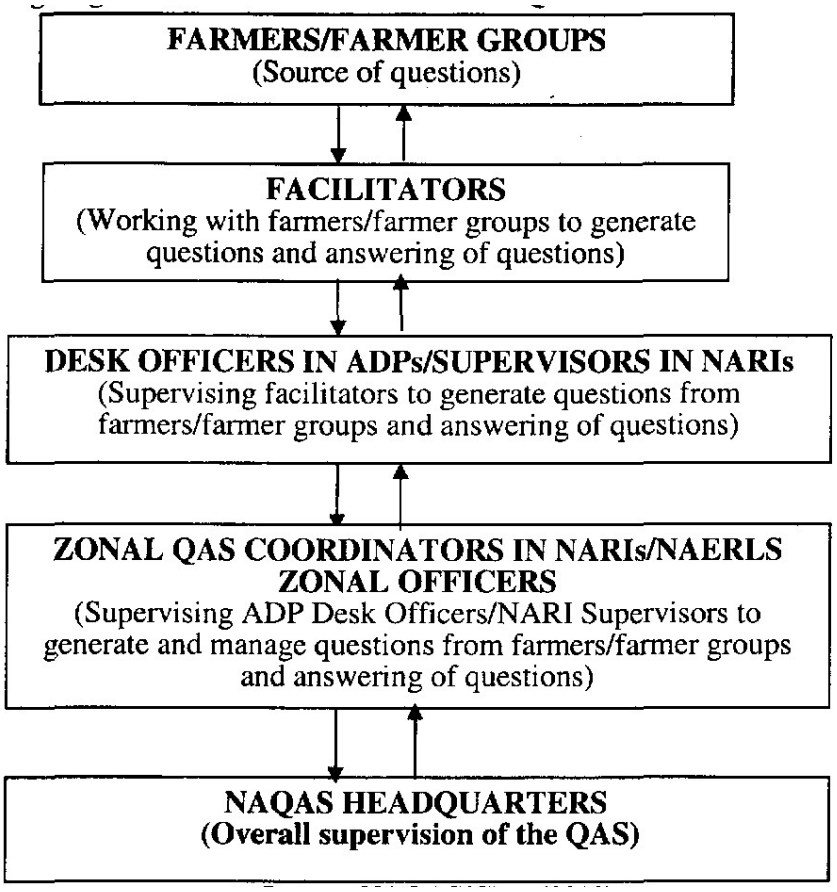
How the Mobile Phone-Based Service Operates

The service operates by the "flashing method", i.e. a client flashes a designated NAQAS phone. NAQAS calls the client's numbers back to receive client queries. Response to queries is either made immediately or afterwards following consultations with relevant subject matter experts or publications. Literate farmers can also send text messages to which responses are sent back via the same channel. To achieve this, NAQAS/CTA set up Zonal structures across the country targeting farmers and farmer groups to generate and answer questions to improve farm operations as depicted below.

Oganogram for flow of information in NAQAS Mobile



Source: NAQAS/CTA (2010)

The NAQAS mobile phone services provide vital information to farmers in all areas of agriculture such as:

a. Crop and forestry production
b. Livestock and fish production.
c. Food technology and home economics.
d. Processing and storage market information.
e. Farm tools and machineries, irrigation and soil conservation.

Methodology

Review of literature and questionnaire administration was adopted to assess the extent to which National Agricultural Question and Answer Service (NAQAS) of National Agricultural Extension and Research Liaison Services (NAERLS) that has the national mandate for agricultural extension in Nigeria used the GSM for agricultural Extension. Phone based information access data questionnaire was administered to nine (9) states in Nigeria, namely: Abia, Akwa-Ibon, Bauchi, Benue, FCT Abuja, Kano, Kaduna, Ondo and Ogun states, to determine the best strategies for Agricultural Information via the mobile phone (GSM). 200 respondents were drawn through simple random sampling method.

Findings and Discussions

Below are the findings and discussions of the administered phone based information data questionnaire sample in nine (9) states in Nigeria namely: Abia, Akwa-Ibon, Bauchi, Benue, FCT Abuja, Kano, Kaduna, Ondo and Ogun states, to ascertain the respondent abilities in operating mobile phone. Thus; Bauchi, Benue, FCT Abuja, Kano & Kaduna represent the Northern Zones, and Abia, Akwa-Ibon represent South-South & South East Zone while Ondo & Ogun represents the South Western Zone as describe in figure 3, 4, & 5.

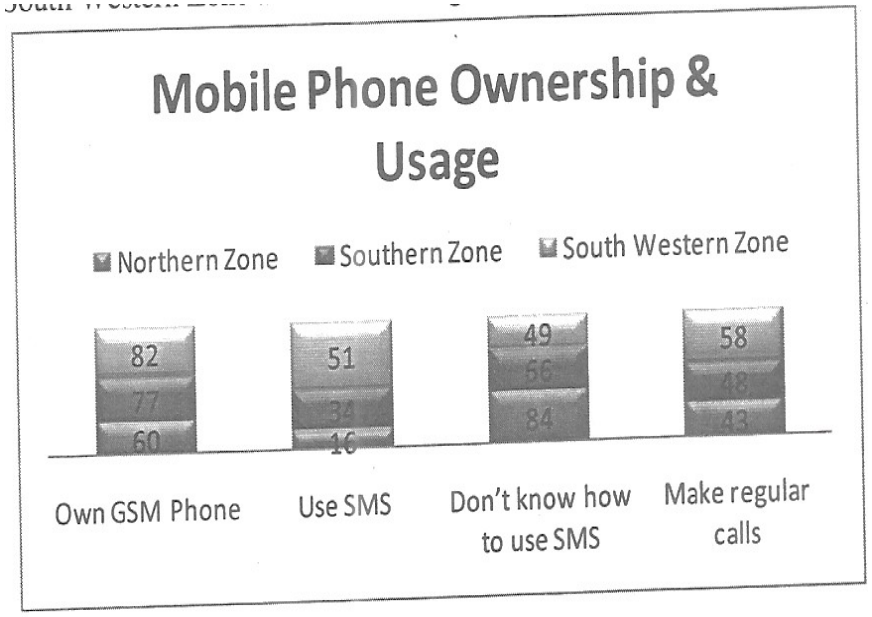


Figure 3

The above figure shows the percentage of farmers that own mobile phone (GSM) in the three (3) agro-ecological zones of Nigeria and their experiences in its application such as those that are able to use the GSM to send text (SMS) messages and those that can make regular calls. It reveales that a high percentage of farmers in the various zones have mobile phone and also can't make regular contacts with others. The results show that the average farmer in the Southern and Northern parts of Nigeria cannot send SMS messages. This findings validates Ezeh's (2013) study which discovered that many farmers are aware of ICT facilities such as mobile phone but application of these ICT facilities to farming practices is very low therefore has little impact on their farming activity.

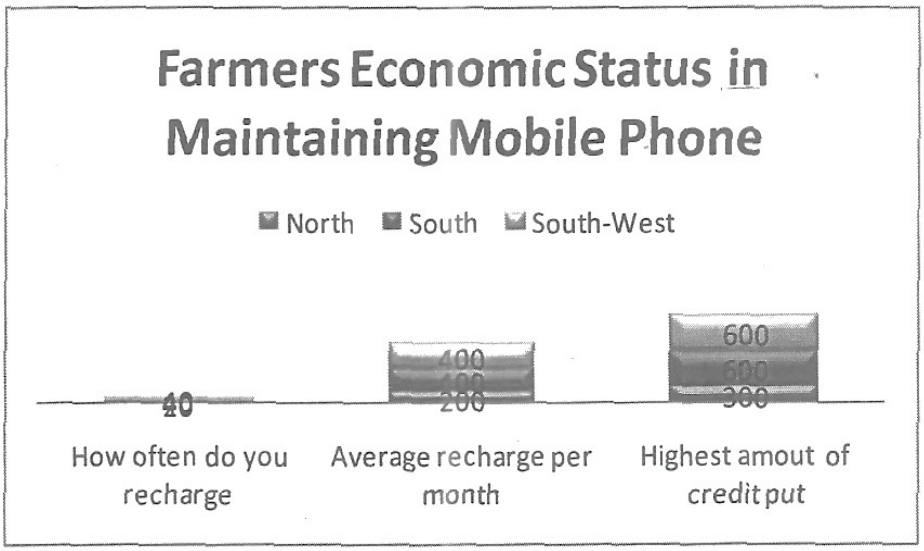


Figure 4

Figure 4 shows the economic status of farmers, whether they are able to put recharge credit card on there mobile phones or not. It reveals that majority of them do not buy recharge credit card to their mobile phone often. Invariably, most of the farmers may likely not be making many contacts due to one reason or the other considering the average amount of recharge credit card used per month. The lowest is ₦200 and the highest being ₦600. However this concurs with Arokoyo, (2005), Anthon, (2007) and Haruna, Usman, Makama and Haruna (2013) findings who's discovered that high cost of telephone/mobile services and literacy as constraint to effective ICT usage among farmers.

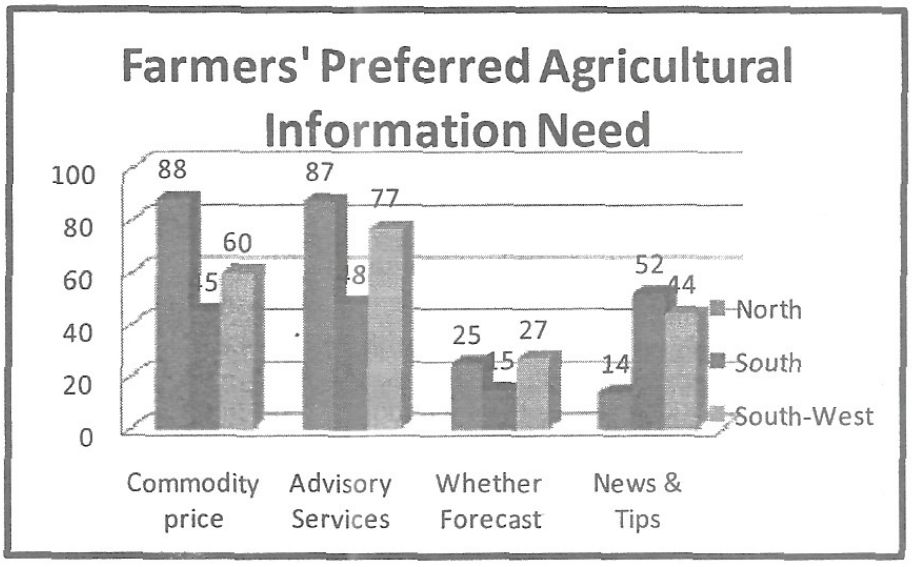


Figure 5

Figure 5 indicates farmers' preferred information need using mobile phone (GSM). -Commodity pricing was revealed to be their most preferred Agricultural information need; the commodity price gives information on current market pricing from different markets in the country followed

by advisory services which includes information on crops, fishery, livestock etc. Information on whether forecast was insignificant to the respondents in all zones.

Discussion of Findings

This study has reviewed the important role that mobile phone (GSM) can play in bridging the gap between extension agents and farmers hence, the study revealed that majority of farmers own mobile phones. But the challenge is that average farmers in the South-South, South-East and Northern part of Nigeria don't know how to send SMS messages which may be due to low level of formal education. Furthermore, majority of the respondents do not buy recharge credit card to their mobile phone often considering the average amount spend on recharge cards per month the least ₦200 while the highest amount being ₦600. Meanwhile, Commodity pricing was the most preferred Agricultural information need; the commodity price gives information on the current market pricing from different markets in the country followed by advisory services which includes information on crops,fishery, livestock etc NAQAS (2010). Information on whether forecast was insignificant to the respondents in all zones.

It was noted by NAQAS (2010) that approaches for using the mobile phone service for information delivery is yet to fully take up, because they lack some basic facilities for contacts but in the main time multimedia services are being used such as the Internet, CD Rom, books among others. But due to the dwindling funding situation of National Question and Answer Services, the NAERLS management recently in 2017 changed its arrangement to now establish the National Farmers Helpline Centre (NFHL). This has resulted in the need to explore alternatives for reaching farmers with the requisite agricultural information on time and at very low cost. Hence, the birthing of a National Farmers Helpline, which is to function as a one stop extension shop that farmers can call and receive agricultural information in real time at very low cost. Its operations are like those of customer care service that telecoms companies provide for its customers. A call for example will be costs as low as between 10 and 20 naira, irrespective of the amount of time spent on the dialogue.

Conclusion and Recommendations

To achieve food security in the country, NAERLS needs to have wider medium to get to the grass roots farmers with relevant agricultural information. Questions and answer on the new agricultural technologies/innovation needs to get to the farmers quickly for possible adoption. The rapid spread of mobile phone coverage in developing countries provides a unique opportunity to facilitate technological adoption via ICT-based agricultural extension programs like NAQAS now NHFL.

Mobile phone significantly reduces communication and information costs for the rural poor in developing countries. This not only provides new opportunities for rural farmers to obtain access to information on agricultural technologies, but also to use ICTs in agricultural extension systems. Since 2007, there has been a proliferation of mobile phone based applications and services in the agricultural sector, providing information on market prices, weather, transport and agricultural techniques via voice, short message service (SMS) and internet. While such programmes are innovative, they are not without challenges, and it is not yet clear that they will substitute for existing agricultural extension systems.

Furthermore, as many of these projects are fairly recent, empirical evidence on their success is still largely anecdotal. In order to measure the impact of such services on farmers' knowledge, adoption and welfare, as well as the cost-effectiveness of such services, rigorous impact evaluations are needed.

Consequent to the conclusion it is therefore **recommended** that:

- Awareness campaign in promoting the use of mobile phone forAgricultural Information among farmers should beencouraged.
- All calls from farmers to farmer resource centre are to be free.
- Adequate communication facilities to be provided for properand efficient services of the NAERLS.
- Adequate funding to development agencies like the NAERLSshould be punctual.
- Further, a study on this area is also recommended.

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