A Study of the Use of Mobile-Phones for Participatory Extension Services in the Gombe State FADAMA Project

By

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A thesis submitted to the School of Post Graduate Studies, Ahmadu Bello University, Zaria in partial fulfillment of the requirement for the award of Master of Science Degree in Mass Communication, Faculty of Social Sciences, Ahmadu Bello University, Zaria-Nigeria.

DEPARTMENT OF MASS COMMUNICATION
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DECLARATION

I hereby declare that the work in this thesis titled "An Exploratory Study of the Use of Mobile-Phones for Participatory Extension Services in the Gombe State FADAMA Project" was conducted by me in the Department of Mass Communication, Faculty of Social Sciences, Ahmadu Bello University, Zaria, under the supervision of Dr. Mahmud M. Umar and Mr. Cosmos IkechukwuEze.

The information derived from literature has been appropriately acknowledged. No part of this work has been presented for another degree or diploma in any institution.

Kabiru Danladi	**Signature**	**Date**

CERTIFICATION

This thesis titled AN EXPLORATORY STUDY OF THE USE OF MOBILE-PHONES FOR PARTICIPATORY EXTENSION SERVICES IN THE GOMBE STATE FADAMA PROJECT by KABIRU DANLADI meets the regulations governing the award of the degree of Masters of Science (M.Sc) in Mass Communication of the Ahmadu Bello University, Zaria-Nigeria and is approved for its contribution to knowledge and literary presentation.

_____	_____	_____
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DEDICATION

To Mum and Dad

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LIST OF ABBREVIATION AND ACRONYMS

ADF	Africa Development Fund
ADAPs	Accelerated Development Area Programmes
ADP	Agricultural Development Project
AERLS	Agricultural Extension and Research Liason Services
AETA	Agriculture Extension Transformation Agenda
AKIS	Agricultural Knowledge and Information Systems
AREU	Agricultural Research and Extension Unit
CDD	Community Driven Development
CDMA	Code Divisional Multiple Access
CEC	Cooperative Extension Centres
CTA	Technical Centre for Agriculutral and Rural Cooperation
EAs	Extension Agents
EIGs	Economic Interest Groups
FCAs	Fadama Community Associations
FDMA	Frequency Division Multiple Access
FDP	Fadama Development Project
FF	Farm Families
FGN	Federal Government of Nigeria

FUGs	Fadama User Groups
GADP	Gombe State Agricultural Development Project
GDP	Gross Domestic Product
GSM	Global Satellite Mobile Communication
ICTs	Information and Communication Technologies
ICT4D	Information and Communication Technology for Development
IICD	International Institute for Communication and Development
IFA	International Fertilizer Industry Association
ITU	International Telecommunication Union
KII	Key Informants Interview
LPDS	Local Development Plans
LGAs	Local Government Areas
NAERLS	National Agricultural Extension and Research Liason Services
NAQAS	Nigeria Agricultural Question and Answer Service
NARES	Nigeria Research and Agricultural System
NCC	Nigerian Communication Commission
NGOs	Non-Governmental Organisations
PEA	Participatory Extension Approach

ABSTRACT

This is a study in Information and Communication Technology and its incorporation into Extension Communication for farmers. One area that has not been fully investigated and its application still in its infancy is the incorporation of mobile phone in agricultural extension. The challenges are how to build an efficient agricultural information system using mobile phone technology.The study is "An Exploratory Study of the Use of Mobile Phones for Participatory Extension in the FADAMA Project in Gombe". The objectives of the study were to explore the potential use of mobile phone for agricultural extension in the FADAMA project in Gombe State. Using survey, questionnaire and Key Informant Interview as instruments, information was collected from members of the FADAMA User Groups, extension experts in Gombe State and ABU Zaria on the potentials of using mobile phones for agricultural extension. Findings of the study indicated that mobile phone usage in information dissemination to farmers in the FADAMA project in Gombe state was very limited. Its application was limited only to communication between the FADAMA office in the state capital with the Local Government Facilitators. Majority of the Fadama User Group members indicated (50.3%) preferences of the use of mobile phones in communicating with the FADAMA office. The major problems identified in using the device to send agricultural information to farmers in Gombe state was poor network, shortage of power and having people not always using their phone lines. The study recommended among others that mobile phones to be incorporated in the facilitation of the FADAMA programme and also extend its application for extention to ADP in Gombe State.

CHAPTER ONE

INTRODUCTION

1.1. THE STUDY BACKGROUND

Information is crucial and an important means of enabling farmers to benefit from agricultural inventions and innovations. It is through information that adoption of the new innovations and inventions is made possible. The role of information becomes more significant in a developing economy like Nigeria that has low levels of literacy and high incidence of poverty, particularly in rural-areas. The most important channel through which government and private bodies in Nigeria use in passing agricultural information to farmers is through the agricultural extension services (Abubakar & Abubakar, 1998). Institutional and governmental organs have been put in place such as the Agricultural Extension and Research Liaison Services (AERLS), the extension services of the Agricultural Development Project (ADPs), Ministries of Agriculture at both state and federal levels, Media Forum for Agriculture, Cooperative Extension Centres (CEC) of universities and public enlightenment units of the 18 agricultural research centres to ensure that farmers get to know and adopt agricultural innovations relevant to their situations. These bodies serve as facilitators of agricultural messages by acting as communication departments.

Agriculture contributes over 41.84% to Nigeria's Gross Domestic Product (GDP) in 2009 and 2010 and the sector employs around 70% of the workforce (World Bank, 2011). Most of those who work in agricultural sector are small-scale subsistence farmers; the country has around 14 million small scale farmers, and the average size of farms in the south of the country is 1 hectare, while in the north, the average farm is around 3 hectares. Around 33% of Nigeria's land is used as arable

land, though about 80% of the land is potentially cultivable; there is no shortage of land suitable for cultivation overall, but more densely settled areas in the south eastern states of the country have suffered from too much demand for arable land, giving rise to internal migration (Odjugo, 2010).

Much of Nigeria's agriculture is carried out according to traditional methods, with mechanization relatively rare. Government efforts to encourage modern methods have had limited success, since farmers frequently find it difficult to adapt to new technologies and have limited capital for updating machinery (Ozowa, 2009). Over the years, efforts have been made by the Federal Government to bring about agricultural development without much to show for it. Much of the failure can be attributed to the treatment of information delivery.

However, the agricultural extension service in Nigeria was not elaborate. The number of trained extension personnel compared with the farming population is very inadequate. The World Bank recommended a 1:1000 extension agent to farmers for effective guidance on modern farming practices. However, as it is now, most states of the federation have 1: 15000 to 20,000 extension agents to farmers (Ja'afar-Furo, Neils, Mojaba & Suleiman, 2012). To address this situation, deliberate policies need to be adopted by both the government and private sector to meet the needs of farm families in terms of information needed to improve their farming methods.

Some of the major challenges affecting Nigeria's agricultural extension and advisory services include: lack of a legislated agricultural extension policy, compounded by policy inconsistency in the sector; inadequate and untimely funding; poor leadership and coordination, low private sector participator, a very weak

Research-Extension-Farmer-Inputs Linkages system and driven by ineffective top-down, supply-driven, extension approaches (AETA Final Report, 2012).

According to Arokoyo (2009), Nigeria's agricultural extension institutions are characterized by a dominant, ineffective, and inefficient public agricultural extension service that is top-down, supply-driven extension system compounded by serious structural, organizational and management challenges. The criticism of the old system was largely due to its top-down approach, which has been supply-driven, technically weak, catering only for large farmers (progressive farmers) and providing insufficient coverage of the small-scale farmers. This calls for the adoption of Information and Communication Technologies (ICTs) by both researchers and extension workers to transmit relevant information needed by farmers in a most efficient way (Qamar, 2002).

Given these strong criticisms of public agricultural extension services which uses the radio and TV to disseminate information to a large heterogeneous audience, there is a need for current agricultural knowledge and information system (AKIS) by farmers (FAO, 2004). Therefore the use of conventional communication channels such as farm/home visit, personal letters, and use of contact farmers, for disseminating agricultural information is considered insufficient (Salau & Saingbe, 2008). These led to the growing recognition that farmers and members of rural communities in Nigeria have needs for information and appropriate learning methods that are not being met. Louder voices are being heard from rural and agricultural stakeholders, creating interest among governments and donors in supporting demand-driven extension (Greenridge, 2003) and (Lightfoot, 2003).

In Nigeria, as in many African countries like Kenya, Uganda and Tanzania there are obvious potentials for development in the use of ICTs. The arrival of

mobile-phones in the late 90s and early 2000 brought new possibilities to the continent of Africa in general and Nigeria in particular (Aker &Mbiti, 2010).Mobile phones, as the focus of this study have, in the last decade, bridged the urban-rural and rich-poor divides by connecting individuals to individuals, passing information about markets and services.

However, uncertainty posed an obstacle to the adoption of new technologies. This has to do with the consequences of using that technology, that is; "the changes that occur in an individual or a social system as a result of the adoption or rejection of an innovation" (Rogers, 2003:436).

1.2. THE CONCEPT OF FADAMA

The introduction of the FADAMA development in Nigeria is to sustainably meet the challenge of information management at the community level. Facilitation approach was introduced where the facilitator is the focal person at the community level. It is one of Nigeria's agricultural policies designed to increase food production in the country. The Project was incorporated within the Federal Government Agricultural Transformation Agenda. The first phase of the project, named FADAMA I started in 1990 through collaboration between the Federal Government of Nigeria and the World Bank. This is in realization of the fact that FADAMA potentials has a high capacity of reducing the negative effect of rudimentary and small holder rain fed agriculture on the teeming population in rural Nigeria.

When the Third National Fadama Development Project (Fadama-III) was introduced as a follow-up to the Second Phase (FADAMA II), it relies on the facilitation for demand – driven investments and empowerment of local community groups and to improve productivity and land quality. The project has introduced the user fee approach that could help in promoting pluralistic extension service delivery

in developing countries (Umali-Delainge, 1997) with Fadama beneficiaries contributing 10 percent of the cost of the advisory services they receive (International Food Policy Research Institute, IFPRI, 2008). The advisory services are important for implementing the National Economic Empowerment and Development Strategy Framework which aims to reduce poverty by transforming subsistence agriculture to commercial agriculture (Nigeria National Planning Commission, NNPC, 2006).

The Project covers the thirty-Six States of Nigeria and the Federal Capital Territory (FCT). Also, the Fadama Development Project (FDP) is co-financed with loans from the African Development Fund (ADF) to cover the programme in six (6) States of Kogi, Katsina, Jigawa, Plateau, Kwara and Borno. The beneficiaries were encouraged to organize themselves in economic interest groups, named Fadama User Groups (FUGs) (www.fadama.net). The FADAMA III, like the previous ones, is designed with a focus on community-driven development with maximum participation of the stakeholders at every stage of the project cycle.

To avoid problems encountered by the ADPs, the FADAMA adopted the Community Driven Development principle. In each of the participating states, facilitators were used instead of extension workers used in the earlier projects of the ADP. This, according to the FADAMA office in Gombe, was for the facilitators to act as partners in the community's development, with ideas and needs originating from the participating communities. The FADAMA project in Gombe has one TV programme, which is titled "from the FADAMA". The programme is more of on the field interview, where members of the FADAMA User Groups are interviewed in their farms, relating their experiences with other members. Members' response comes usually a week after the programme is aired, sometimes even longer than that.

Using mobile phone for extension can allow us to tackle many of the aforementioned problems with traditional extension. Given the continuing expansion of mobile phone networks and growing mobile phone ownership in Nigeria, what is important is how to harness the opportunity it provides in bridging the gap left by the radio and TV and other ICTs, which were used during the second phase in communicating new ideas to farmers in the project, as Umar (1997) put it, the audience of radio and TV lack the luxury of direct feedback where the relationship between the audience and communicator is impersonal and anonymous.

1.3. STATEMENT OF THE PROBLEM

Despite the importance of radio and television in the dissemination of extension services information, the content of their information is found to be more provider-driven than audience driven (Arokoyo, 2003). This means, the extension agents are the ones who package the information according to what they think is good for the audiences and mostly the people are not always interested because their needs are not adequately captured. This shortcoming of people not participating gave rise to agitations for more participatory extension services.

With the introduction of mobile-phones for communication, the positive impacts of the device have become more evident (Rajora, 2002). Provision of information especially for development goes beyond the traditional "one size fits all" information access model used by extension agencies and policy makers, focusing primarily on the customized needs of the target communities (National Telecentre, Database, 2009).

Development Communication scholars (Aker & Mbiti, 2010, Rashid & Elder, 2009, Scott, Batchelor, Ridley & Jorgensen, 2004) have pointed out the promise mobile phones hold of becoming Africa's first ubiquitous communications. In some

parts of Africa, especially in Kenya, Uganda and Botswana (Aker & Mbiti, 2010), in Asia; India, Bangladesh and Pakistan (oneworld.net, 2011) and in some of Latin American countries, farmers are already using innovative mobile phone applications to solve their most critical problems. However, its use, especially by extension agents, to reach out to farmers in most parts of Nigeria has not been directly investigated, particularly in terms of adoption, relevance and appropriateness in addressing the peculiar challenges of extension services in Nigeria. This is the gap this study wants to fill.

1.3. THE RESEARCH QUESTIONS

The study sets out the following questions to be answered:

1. To what extent extension workers use mobile-phone in the Gombe FADAMA project for extension purposes?
2. How participatory is the use of mobile-phone in FADAMA extension?
3. What are the problems and prospects of using mobile-phone for extension in FADAMA?
4. To what extent can mobile-phone be an appropriate means for extension communication in Gombe ADP?

1.4. OBJECTIVES OF THE STUDY

The aim of this study is to determine the potentials of using the mobile-phone for participatory extension in the Fadama Project in Gombe State. The specific research objectives are to:

1. find out the extent of the use mobile-phone for extension in the FADAMA project;
2. determine the extent of participation and possible ways of improvement in FADAMA extension;

3. find out the problems and prospects of using mobile-phone for FADAMA extension;
4. determine the appropriateness of using mobile-phones as a communication medium for the FADAMA extension;

1.5. SIGNIFICANCE OF THE STUDY

Agricultural production function implies that farmers need information on a variety of topics, at a variety of stages, before adopting a new technology. Agricultural extension systems were conceived of and developed in response to information asymmetries for poor farmers, particularly those with limited access to other sources of information (landlines, newspapers and radios). In sub-Saharan Africa, for example, less than 10 percent of the population had mobile phone coverage in 1999, but by 2008 that figure increased to over 60 percent of the population (Aker and Mbiti, 2010). While infrastructure investments still remain low in many developing countries, one of the most dramatic changes over the past decade, especially here in Nigeria has been an increase in the use mobile phone, its coverage and adoption.

It is hoped that findings of this study will help stakeholders of agricultural extension to see the potentials that mobile-phones can offer in effective participatory extension. When this is established, it will assist the Federal and States Ministry of Agriculture for planning. It can also reduce cost and man power and help other agencies such as FAO and other donor agencies to plan. For further research it will form abedrock of reference material and provide necessary data for policy makersin developing countries and specifically Nigeria to utilise the opportunity offered by mobile-phone as seventh mass mediumfor accelerated growth and development in areas of agriculture and other human development sectors.

The study is also important, especially for development communicators, especially now that development is becoming more and more participatory and the call for more farmers' involvement in the conception, planning, and execution of development projects.

1.6. SCOPE OF THE STUDY

This study will be limited to extension services by the FADAMA project, and the potential use of mobile phone in extension, in some selected local governments in Gombe State. These Local Governments are Akko, Billiri and Funakaye.

1.7. DEFINITION OF KEY TERMS

Agricultural Extension – refers to the entire set of organizations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being (Birner, Davis, Pender, Nkonya, Anandajayasekeram, Ekboir, et al., 2006). In this study the term is used to describe the passing of information to Fadama user groups.

Effectiveness: this refers to adequate or extent to accomplish a purpose; producing the intended or expected result.

Extension – refers to a service or system which assist in spreading new knowledge, ideas in health, agriculture or education through educational procedures in improving methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting social and educational standards (Maunder, 1973). In this study it means a process through which information is communicated to end users.

Farmers: These refers to individuals whose primary job function involves livestock and/or agriculture cultivating farm, producing vegetables and raising livestock. In this study, farmers mean all those immediate target of the fadama III project in the selected LGAs in Gombe State.

Mobile-phone refers to a portable telephone device that does not require the use of landlines. Mobile phones utilize frequencies transmitted by cellular towers to connect the calls between two devices in this study it also refer to as cell phone device or GSM.

Opportunities: this refers to a favorable juncture of circumstances fit or convenient time; a time or place favorable for executing a purpose; a suitable combination of conditions; suitable occasion; chance

Participation – This refers to a conscious decision to reach out and to involve those people that would be most affected by a proposed development programme (White, 1994). In this study, participation means involvement of local farmers, who are part of the Fadama project, in the creation, content and conduct of a program or policy designed to change their lives.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. INTRODUCTION

This chapter focuses on studies made on the use of mobile phones in agricultural development. The chapter starts with giving an understanding of the Information and Communication Technology, (ICT) and how it can be differentiated from Information Technology (IT), evolution of mobile-phones, mobile-phones as mass medium, tracing the development of mobile-phones in Nigeria, its uses in communication, and its relevance in achieving participatory extension by using it to convey timely and relevant information to farmers. The chapter also discusses agricultural extension in Nigeria and extension as a form of communication. Efforts are made to bring examples of places where mobile phones were used in reaching farmers and bring out opportunities the device offered and challenges faced by extension officers in those places. Therefore, the literature review was divided and discussed under potential of mobile phone in agriculture, mobile phones in Africa, mobile phone for development, mobile phone in Nigeria, challenge of mobile phone and Agricultural Extension in Nigeria, agricultural extension in Nigeria, agricultural extension as process of communication, Training and Visit of the ADP in Nigeria, participatory extension and theoretical framework.

2.2. INFORMATION AND COMMUNICATION TECHNOLOGY (ICT)

Information and Communication Technology or ICT is a term that has been in existence since the 1980s, when it was popularized in the United Kingdom (ICT). The term Information and Communication Technology (ICT) can be differentiated from

Information Technology (IT) because it stresses the role of communications and the integration of telecommunications networks and computer networks (Vignare, 2013).

The communications component is critical when designing and delivering technology that is meant to widen dissemination among communities, deepen understanding for individuals and increase democratization of information which allows more people to provide and access information. Communication technologies involve people and telecommunications technologies include radio, television, Internet. The media used can be the same technologies but may also include mobile-phones and telephones, computers and smaller devices such as smart phones, which combine features of telephones and computers using the Internet. Increasingly, tablets, including iPads, are also becoming prevalent. ICTs like any other technology are designed to cater the needs of particular groups. They are shaped by social forces such as the needs of those who pay for their development, and the assumptions of the technologists who develop them. Most mobile telephony devices and services have been designed to meet the needs of businessmen or teenagers in western cities (Dey, Prendergast & Newman, 2008)

2.3. POTENTIALS OF MOBILE-PHONE IN AGRICULTURE

Agricultural extension has a long history in Nigeria and has passed different phases of evolution. ICT has been adopted at varying levels – through vans spreading audio / video messages, radio & television broadcasts. Traditionally, extension has largely been seen as a social service in Nigeria - initiated and funded by governments, development partners or community service units of large businesses basically for technology transfer to farmers. Although there are pockets of commercially motivated efforts through some forms of farmer advisory services to support specific

manufacturing supply chains or sale of inputs; stand-alone commercial extension services are almost nonexistent. The use of ICT in agriculture has generally followed this not-for-profit pattern, and attempts to commercialize ICT in agriculture have not been encouraged or at best treated with nonchalance.

One of the challenges identified by extension agents facing agricultural extension in Nigeria is finding a way of reaching out to farmers with relevant agricultural information. And the relatively low ratio between Extension Agents (EAs) and Farm Families (FF), farmers seek out agricultural information through word of mouth, generic broadcast programming, or often poorly informed or poorly incentivized agricultural input dealers (Anderson and Birner, 2007)). This underscores the usefulness of mobile-phones in agricultural information dissemination (NAQAS, 2010). The emergence of mobile phone networks and the rapid growth of mobile phone ownership across Sub-Saharan Africa, it has opened up the possibility of using a completely different model in delivering agricultural extension services. Nigeria has the highest mobile-phone tele-density in Sub-Saharan Africa (NCC, 2011). With mobile facilities covering the whole nation and neighbouring countries, the medium can play a vital role in making relevant agricultural information available to farmers.

2.4. MOBILE PHONES

The complexities of human condition and the imperative to communicate have made man to develop technologies to satisfy that. All advances in technology, especially mass communication technology are built upon foundations built by prior technologies (Lowery & DeFleur, 1988, Cambridge, 2000,). Although wireless technology is regarded as latest technology, the myth can be cleared that it was Marconi who discovered the use of wireless communication, and which has been used

for shipping communications for over a hundred years ago (Gupta, 2004). This singular invention gave way for the development in wireless communication.

The technology of mobile phone is developing rapidly every day. Its evolution started with the first Generation or the 1Gphones. These systems used analogue circuit-switched technology, with FDMA (Frequency Division Multiple Access), and worked mainly in the 800-900 MHz frequency bands. The networks had a low traffic capacity, unreliable handover, poor voice quality and poor security. Then the technology then moved to the second generation or 2Gphones which introduced for the first time a mobile phone system that used purely digital technology. The network was enhanced to 2.5G which is a standard wireless mobile telephone network that lies somewhere between 2G and 3G. The enhancements in 2.5G systems permit data speeds of 64-144 kbps, which enables these phones to feature web browsing, the use of navigation and navigational maps, voice mail, fax, and the sending and receiving of large email messages.

Then came the third generation or 3G mobile telephone networks, which were the latest stage in the development of wireless communications technology. Significant features of 3G systems are that they support much higher data transmission rates and offer increased capacity, which makes them suitable for high-speed data applications as well as for the traditional voice calls. The last is the fourth generation or the 4G mobile-phones, which is a more reliable system.

The advent of mobile telephony dramatically changed how people communicate. All over the world, various information systems have been deployed to very remote parts because the mobile phone is available, affordable and accessible to almost all humans alive today. It is now a matter of sophistication and depth. Within the Nigerian economy, the mobile phone has created several informal information

systems among diverse groups – families, farmers, traders, mechanics, bankers, doctors etc. are frequently communicating with each other by voice, SMS and even mobile Internet; calling for meetings and sharing information on products, prices etc (FGN, 2009).

In many African countries today, residents of one town can call their relatives living anywhere in the world to know how they are faring. Farmers in remote villages in Northern Nigeria can be able to send text messages to learn about tomato prices in far away Abuja or Lagos. Labourers in Kano can be able to call acquaintances in other areas like Abuja or Kaduna to find out about job opportunities without taking the risk of travelling or spending their little earnings to pay for the trip. People affected by HIV and AIDS can receive text messages daily from doctors, reminding them to take their medicines on schedule. Citizens can be able to reach out to their friends or relatives to report violent confrontations via text message to a centralized server that is viewable, in real time, by the entire world, as we see recently in Egypt and other Arab countries' revolution. This is the opportunity the ICTs can offer.

The mobile phone is the newest mass media as argued Ahonen (2008:2):

> The cell-phone is emerging as a mass medium. Twice as many cell-phones as TV sets, three times as many cell-phone subscribers as internet users, four times as many cell-phones as personal computers, five times as many cell-phones as cars. 31% of all music dollars spent worldwide already go to a wide array of cell-phone based music services, 20% of video-gaming software revenues.

The mobile phone is vastly important to our everyday lives and is the major vehicle by which we communicate with one another. Unlike the print, radio, TV or the internet, the mobile phone has an attribute that makes it a superior mass mediumin

many ways. It is a dominating mediachannelin the three most important factors - reach, audience accuracy and money (Ala-Pietilä, 2008).

Mobile-phone became mass medium first in Japan only seven years ago (now eleven). Compared to other media, the mobile-phone is as different to the web as TV is to radio and the mobile-phone can be to the internet as dominating as TV became over radio. One of its main advantages rest on the fact that senders know every time the exact composition of their total audience – targeted for information dissemination;

> "Differing from the internet, mobile as the 7th mass medium channel is similar to the five legacy mass media, economically viable with a stable business model from day one. Yet, differing from the legacy mass media, all of which are witnessing a decline in their audiences and revenues, mobile like the internet, is an interactive media enabling it to fully capitalize on social networking and digital communities" (Ahonen, 2010:4)

Like the internet before it, today the phone can replicate everything the previous six mass media can do (Print, recordings, cinema, radio, TV, and the internet). One can consume newspapers, read magazine articles, listen to radio and podcasts, buy MP3 songs, watch TV, and even watch whole movies on the mobile-phone. Any web content can be consumed on the phone, and the phone easily supersedes the interactivity of the web, because e-mail and IM are already on the phone, but SMS and MMS messaging are unique to mobile-phone (Ahonen, 2010).

The power of the mobile phone as a mass medium is six elements not available on previous mass media as it is considered truly personal media. A 2006 survey by Wired revealed that 63% of those studied do not share the phone even with one's spouse. And furthermore the phone is always carried. A survey in 2005 by BDDO found that 60% of the respondents sleep with the mobile-phone physically in

bed; a Nokia 2006 study found that 72% of those interviewed use the phone as their alarm clock.

It is also first always-on mass media, with many media organisations offering their audiences alerts via the phone, what is on another real time media like TV, such as CNN breaking news alerts via SMS. And above all it has a built-in payment mechanism. No other media has a built-in payment mechanism, even on the internet you have to subscribe to PayPal or provide a credit card, etc. But already today, older media collect payments through the phone (Gupta, 2004, Ahonen, 2010).

2.5. MOBILE-PHONE FOR DEVELOPMENT

At the Connect Africa Summit in 2007, Paul Kagame, President of Rwanda, has this to say on mobile phone: "In 10 short years, what was once an object of luxury and privilege, the mobile phone, has become a basic necessity in Africa" (Aker & Mbiti, 2010). The mobile phone has been one of the numerous breakthroughs in the world of ICTs. Nowadays, mobile phone is one of the most essential things of people. Mobile phone (also known as cell phone, wireless phone or cellular telephone), (Vadivel, Anandaraja, Sriram, Muthuvel, and Shibi, 2011) is a short range device used for mobile voice call or data communication over a network of specialised base stations known as cell sites. In Nigeria it is also known as Global System Mobile Communication or GSM for short. Its incremental benefits include the improvement of what people already do – offering them faster and cheaper communication, often substituting for costly and risky journeys (Richard & Abi, 2008).

Notwithstanding the digital divide that differentiates those who have access to ICTs and those who do not, phenomenal growth rates in the mobile telephony sector, have made hitherto isolated communities to have unprecedented access to communication flows. In the developing world, there is evidence that many emerging

mobile users are found in rural areas (Sood, 2006), and a study conducted by ITU (2006), discovered that Africa has the world's fastest growing mobile phone subscriptions.

Development communication scholars, especially in developing countries have realized most of the early approaches adopted in communicating new information to farmers 'were based on a transmission model of communication, where information was seen to pass from senders to receivers'. So the process, 'largely remained a strategy of unidirectional marketing and monologue' (Rajasunderam, 1996:6). Therefore, the last decade, from 2000 to date, saw a gradual shift from this hierarchical, top-down view of communication to a deeper understanding of communication as a two-way process that is interactive, horizontal and participatory (Rajasunderam, 1996). A gradual shift that moved from the usual expert to farmer extension, to a more participatory and more involving communication of development messages based on the community driven development principle.

Cole & Fernando (2012) in a study on informational inefficiencies and technology adoption in rural India identified and classified problems with traditional extension as being spatial, temporal and institutional in their nature, although these are not mutually exclusive categories and may interact in important ways.

They believe that the spatial dimension may occur because of limited transportation infrastructure in rural areas and the high costs of delivering information in person. For the temporal dimension; given that agricultural extension is rarely provided to farmers on a recurring basis, the inability of farmers to follow-up on information delivered may limit their willingness to adopt new technologies. Furthermore, this model of extension will also limit the ability of farmers to receive

timely information such as how to adapt to inclement weather and unfamiliar pest infestations.

Then the final class of problem is the institutional rigidities by which traditional extension is implemented. The reliance on extension agents to deliver in-person information is subject to general monitoring problems in a principal-agent framework (Anderson and Feder, 2007), particularly as monthly quotas for reaching farmers are often set, creating a ratchet effect, wherein agents may supply suboptimal effort, limiting their reach and effectiveness.

A final problem that interacts with all other classes of problems is that information provision to farmers is often top-down. This may result in an inadequate diagnosis of the difficulties currently facing farmers, as well as information that is often too technical for semi-literate farming populations, including the optimal use of technologies currently available to farmers.

Mobile phone-based extension allows us to tackle many of the aforementioned problems with traditional extension. Given the continuing expansion of mobile phone networks and growing mobile phone ownership in Nigeria has the capability to reach millions of previously excluded farmers at a virtually negligible marginal cost (FGN, 2009).

2.6. MOBILE PHONES IN DEVELOPING COUNTRIES

The dramatic penetration of mobile phones in the developing world, made the development agencies to become excited about using them for a wide variety of applications especially for development (Toyama, 2011). First, beyond basic connectivity, mobile phones offer benefits such as mobility and security to owners (Donner, 2006). Second, due to their unique characteristics, the mobile phone is an especially good leapfrogger – it works using the radio spectrum, as such there is no

need to rely on physical infrastructure such as roads and phone wires, and base-stations can be powered using their own generators in places where there is no electrical grid (Economist, 2008). Third, mobile phones only require basic literacy, and therefore are accessible to a large segment of the population. Fourth, mobile phones enjoy some technical advantages that make them particularly attractive for development. In addition to voice communication, mobile phones allow for the transfer of data, which can be used in the context of applications for the purposes of health, education, commerce or governance.

The link between mobile phones and development stems from the fact that information is critical factor in development. In a technology-driven society, getting information quickly is important for both sender and receiver. Mobile phones have made it possible to quickly find and distribute information. They have the potential to amplify the speed and ease, and to introduce new modes with which information is communicated. They can enable interactive communication flow unhindered by space, volume, medium or time, thereby influencing the existing communicative ecologies (Tacchi et al., 2003).

Studies like Anandaraja, Sriram, Muthuvel and Sebastian (2005) have shown that many farmers, especially in developing countries, have very limited access to information, both old and new, that may help improve their farming and livelihoods. However, the coming of mobile phones is seeing as a new development and an avenue through which information can reach farmers in their remote villages and communities offering them faster and cheaper communication, often substituting for costly and risky journeys (Id21 Insight, 2007).

The control and direction of agricultural extension work has largely remained to be top-down instead of the bottom up and participatory approach that has proven to

be more effective and sustainable (Ladele et al, 2008). Nigeria is lagging behind many other developing nations that have embraced participatory extension wherein extension service delivery has been demand driven.

And the use of ICTs has been restricted to only programmes produce by ADPs and broadcast via TV or radio, which adopted the top down approach with limited participation by farmers. To date, it is the radio and TV that have been the major ICTs used in agricultural extension delivery in Nigeria (Arokoyo, 2005). According to Oladele (2006) the use of traditional media sources to reach farmers was largely due to poor communication infrastructural facilities within the country.

Although the radio is adjudged as the best medium to reach farmers due to its simplicity and its ability to use local languages (Moemeka, 1981), the level of participation and feedback from large heterogeneous audiences, that receive these messages is delayed.

However the coming of mobile phones has created a new opportunity for people in most developing countries, Nigeria inclusive, to actively participate in the decision making process that affect their lives. Mobile phones significantly reduce communication and information costs for the rural poor in developing countries (Aker, 2010). According to him it did 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.

Mobile phones are speeding up ways in which farmers get, exchange, and manipulate information. They rework the way farmers interact with markets and cities. Increasingly, they enable farmers to focus, search, and extract useful and up-to-date market information from social and business networks (Ilahiane, 2007).

The mobile phone provides electronic capabilities (battery, processing power, memory), reach to customer, privacy, and anytime/anywhere, physical contact-less services (Nierinck, 2008)

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 (Aker, 2010). While such programs are innovative, they are not without challenges, and it is not yet clear that they will substitute for existing agricultural extension systems.

The IFA Africa Forum in 2008 advised that as the number of farmers with mobile phones steadily increases, the use of information and communication technologies (ICT) should be developed. They argue that mobile phones can be used as a platform to provide customized and real-time advice to farmers using multi-stakeholder initiatives which can be organized to develop comprehensive ICT services, including the provision of crop and input prices, weather forecasts, and time- and site-specific crop management recommendations.

The use of mobile phones in agricultural information dissemination was introduced in 2008 Nigeria Agricultural Question and Answers Services (NAQAS) with the support Technical Centre for Agricultural and Rural Cooperation (CTA). Initially the project selected eight (8) states of Nigeria as pilot cases. The states are Abia, AkwaIbom, Bauchi, Benue, FCT, Kano, Kaduna and Ondo States.

The service, according to NAQAS, (2010) operates by the "flashing method" that is a client flashes a designated number, NAQAS calls the client's numbers back to receive client's queries. Response to queries is either made immediately or afterwards following consultations with relevant subject matter experts or publication.

Literate farmers can also send text messages to which responses are sent back via the same channels.

According to Ssewanyana (2007) in Uganda, the combination of mobile phones and radio has enabled the population to participate in phone-in programs over important issues in the country, that include political debates, health issues, agriculture, education, environment and gender issues, which have a high impact on their lives. Gakuru, Kristen and Stepman, (2009) reported about a mobile conferencing adopted by extension agents with farmers as explained by Mary Nyakira of BROSDI/CELAC during the MobileActive 2008 conference;

> It not only contributes to a particular form of democracy and transparency but farmers like having group discussions around a mobile phone with the loudspeaker facility on. The extension worker is "beeped" *(flash)* when the group of farmers is ready to start the training session. The discussions are a follow-up on a previous field visit. But this time the extension worker gives advice out of his/her office. (Gakuru, Kristen and Stepman, 2009).

They also pointed out that majority of farmers are not that well organized and most of them have no political clout and cannot exert effective demand on agricultural information services. Despite the number of Market Information Prices Services using mobile phone for price information dissemination the market prices information remain often not freely available so that prices are set locally and rather arbitrarily given the actual relative scarcity. More often than not, market prices are determined by the vagaries of weather, transport, monopolistic traders, and so forth (Gakuru, Kristen and Stepman, 2009).

In South Asia a life-lines system project run by One World South Asia, has set up telephone lines in which farmers call in and submit their agriculture-related questions by phone where human operators answer these calls, log the questions, and then determine whether the answer already exists in their database, or whether an

expert must be consulted (Toyama, 2011). He went further to say that if the answers to these questions are readily available; the caller receives a notification by text-message that their question has a response that can be heard at a particular number. If the answers are not ready, the expert records the response, which is then entered into the system database, and again the caller receives a notification.

Over time, as farmers keep on calling the database records these questions and provides a readily available answers. It is expected according to Tayoma (2011) the system to answer more and more of the questions, with time readily available answers are made easy so that the need for expert time is decreased in the long run. The system seems to appeal most to somewhat wealthier farmers with medium plots of land.

In Mauritius, there is a mobile service used in Agricultural Extension – the "SMS Disease Alert" by the Agricultural Research and Extension Unit (AREU). This service is about sending SMS to registered planters when there is a disease outbreak on a particular crop. The service is beneficial to the planters as they can take precautions to prevent the disease to affect their crops (Hosenally, 2011)

However, this has enormous challenges, especially in Africa, where the telephone connectivity is low as argued Shanmugavelan and Wariock (2004) in the Panos Report:

> In the midst of the current enthusiasm for 'ICTs for development', it is often forgotten that most rural Africans do not yet even have access to telephones… In most of rural Africa, there is only one telephone for every thousand people. It is true that the number of phones in Africa has risen enormously in the past decade, especially since liberalization [of telecommunication markets], but most of the new telephones are mobiles, and they are mostly in cities. For rural people, buying and using a mobile phone is very expensive – a single call can cost as much as half the daily wage of an agricultural worker.

Few studies actually exist on the specific use of mobile phones for agricultural extension or development. According to Rashidi and Elder (2009), there is still a lack of evidence of usage of mobile phones as a tool to solve development problems, due mainly to the difficulty in measuring their social and economic impacts. Notwithstanding, a lot of works exist on the use of general ICTs for extension. For instance, Arokoyo (2003), Nwachukwu (2010), Toyama (2011) IICD journal (2011), Sanusi, Petu-Ibikunle and Mshelia (2010).

A study conducted in Malaysia on 'agro-based industry, mobile phone and youth' shows that mobile phone contributes a lot to agro-businessmen in terms of providing them with required information every time they need it, enhancing networking in getting technical information regarding agriculture and getting updated agriculture information. Age proved to have significant and positive relationship with their perception towards the contribution of mobile phone. There is possibility that the older the youth to be, the lesser usage of mobile phone among them (Shaffril, Hassan, Hassan and D' Silva, 2009).

2.7. MOBILE TELEPHONE COVERAGE IN NIGERIA

The introduction of mobile telephony in Nigeria in the late 1990s and the coming of the Global Satellite Mobile (GSM) in the early 2000 has dramatically change the way Nigerians communicate. Nigeria's policy of liberalization in the early 2000 and the economic reforms that followed has attracted seven national long distance communications operators. According to the NCC, as of 2005, just four years after the liberalisation of the telecommunication industry, the country had 13 fixed wireless access network operators; eight interconnect exchange operators, two Internet exchange operators and 562 Internet service/solution providers. There are also 13 unified access network operators.

By March, 2007, four 3G licenses were awarded and by 2010, Nigeria has about 40,000 GSM base stations and 10,000 CDMA base stations, up from approximately 10,000 GSM base stations and 2,000 CDMA stations. While Nigeria has about 71,000 Internet subscribers, it has 21.5 million registered mobile subscribers (www.ncc.gov).

In 2006, mobile phone became the first communications technology to have more users in developing countries than in developed ones. More than 800 million mobile phones were sold in developing countries in the past three years (GSM Association, 2006).

Mobile phones, as Coghill (2001:28) comments, are "the most radiative domestic appliance ever invented". They provide a variety of functions that touch upon every aspect of social life (Katz & Aakhus, 2002). More than one out of six people worldwide now have mobile phones (Katz, 2005) and for many people the mobile phone has become an essential part of everyday life.

With the proliferation of mobile communication technologies, communication scholars have begun to question how these technologies are being, and might be, assimilated into people's lives (e.g., Katz & Aakhus, 2002; Ling, 2004).

For extension which is seen as typically a service – public or private – that responds to the needs of farmers, extension workers can use the mobile phone, due to its flexibility to communicate to them vital information that can increase their knowledge, improve their productivity, income and welfare, and to manage the natural resources on which they depend in a sustainable way.

The whole idea of extension is to bring information and new technologies to farming communities, allowing them to improve their production, income and standard of living. In the past, extension was seen primarily as a public service,

institutionalised and organised by national governments, but today extension is increasingly becoming private with extension agents looking for a faster and cheaper means of reaching farmers.

Mobile-phone is playing a very important role in fulfilling the information needs of farmers. The mobile phone based agricultural information services like IFFCO Kisan Sanchar Limited (IKSL) and Reuters Market Light (RML) are becoming popular in India and providing services through SMS and Voice messages about agriculture related information (Dhaliwal and Joshi, 2010)

The mobile phone coverage in Nigeria over the past decade has grown at staggering rates covering all nooks and crannies of the country. Prior to 1999, Nigeria ranked among the lowest owners of telephone in the world. But the introduction of the Global System Mobile Communication (GSM) in the late 1990s revolutionalised the communication sector, and by 2001, MTN Nigeria and Econet (now airtel) have started operation. According to the National Communication Commission, NCC, (which is the regulatory body set aside to coordinate the activities of mobile phone service providers), there are an estimated over 52 million GSM subscribers in Nigeria as at 30th September, 2008 (www.ncc.gov.com). The proliferation of the GSM has simplified telephone communication as well as made it easy and so cheap that it is no longer the preserve of the rich (Ohoro and Barikwi, 2006).

By April 2014, the NCC released new figure of monthly GSM subscription with over 129 million subscriptions. (See appendix)

2.8. AGRICULTURAL EXTENSION AND TECHNOLOGY ADOPTION

A study by Hall, Dunkelberger, Ferreira, Prevatt, & Martin (2003), used Rogers (2003) diffusion of innovations model to analyze the use of personal computers and Internet technologies by beef and peanut farm operators in Alabama, Georgia, and Florida. The questionnaire for the study was designed to group respondents into Rogers (2003) adopter categories based on personal computer and Internet usage. The study further analyzed descriptive characteristics of the population such as age, education, and type of farmer. Finally, the researchers compared the adopter classifications to the descriptive characteristics of the participants (Hall et al., 2003).

The findings reported early adopters as the prominent group of farmers (28.6%), indicating they are likely to utilize a personal computer and Internet access in their farm business. Non-adopters, those without access to a personal computer, were the next largest group of participants (25.7%). The adopter categories were compared to the descriptive characteristics of the participants. The comparison revealed that age was a key factor in the adoption of the personal computer and Internet. Older farm leaders dominated the non-adopter, late majority, and early majority categories. The innovator and early adopter categories contained mostly farmers under age 45. Education level corresponded closely with age, and type of farmer did not impact the study (Hall et al., 2003).

The use of Information and Communication Technologies (ICTs) to meet the information needs of farmers is gaining momentum in the developing world and it is becoming of primary importance to extension workers and development partners in most countries. Information and Communication Technologies (ICTs) is an umbrella term that includes computer hardware and software, digital broadcast as well as

digital repositories online or offline (Selwyn, 2002). The ICTs include any communication device or application encompassing mobile-phones, digital radio, digital/satellite television, digital camera, CD ROM and personal computers.

Until recently, information systems are elitist because they were based solely on personal computers, Internet services and complicated web based programs – hardware and software that were not available, affordable and accessible to the common man, like the farmers and majority of the other stakeholders in the agricultural sector in the developing world (FGN, 2008). By introducing some level of management and value added services, these platforms can become vibrant information systems that will enhance efficiency in communication sector and reduce cost of doing business generally just like online and mobile services have transformed banking and financial service delivery. Agricultural experts have longed for increased application of ICTs in the sector. What have mainly stopped its evolution are the prohibitive costs and near impossibility of deploying and maintaining personal computers and satellite Internet services across the country.

The coming of mobile phones has offered developing countries formidable and cost-effective tools for accelerated development. In developed countries of the world and even some developing countries in Asia and Africa, the mobile phones have been used to impact economic development through applications in public administration, health care provision, agriculture, education, manufacturing, e-commerce, tourism and travels. The social and economic impacts of the mobile phone era have been compared to the industrial revolution, providing nations and individuals alike with unprecedented opportunities to accelerate economic growth, accomplish unprecedented levels of global communication and collaboration and produce an

exceptional number of dollar millionaires (Cecchini & Scott, 2003, Berthe, Kone & Traore, 2004).

A nation's research and extension system remain the most important single determinant to the level of its agricultural development and also a yardstick to the quality of life of its people (Radhakrisha and Thomson, 2006) and research has shown e.g. (Arokoyo and Delwa, 2000), no country has been known to achieve any meaningful progress in agricultural development without substantial investment in agricultural research and extension. They believe that performance of extension system has not been commensurate with the size, scope and level in the system as evidenced by poor productivity and the scandalously high food import bills as pointed out by the president of Nigeria (Arokoyo, and Delwa 2000) highlighting that the more the nation agriculture forward, the extension system must be given attention to make them able to give the farmer what they need.

Several efforts were made by scholars in relating how development partners can utilize the opportunity offered by technology of integrating ICTs within extension – particularly in the rural areas. At the frontline of extension – the CTA, ICT4D for instance have been organizing international conferences towards that direction. Ken Banks of the IDG News has this to say on radio and mobile phones "despite the excitement, radio clearly has one drawback – that listeners have no way of interacting real-time with the programmes. In an interesting twist, mobile phones might well be the perfect technology to help solve this problem". (www.kiwanja.net, 2010).

2.9. AGRICULTURAL EXTENSION IN NIGERIA

Organized extension service started in Nigeria in 1954 with the Ministry operated service. This was followed by other approaches including the National Fadama Development Project-I (NFDP-I). Here the extension agent was the officer in

direct contact with the farmer. It is noteworthy that all the approaches lacked sustainability. Many scholars suggested the use of facilitation approach (Roling, 1994) to achieve sustainability in extension service delivery (PCU-SPFS/FDC-DAIMINA, 2003).

Agricultural extension was the strategy adopted in Nigeria to reach out to farmers throughout the World Bank assisted ADPs. It started with the Nigeria's agricultural research and extension system (NARES). According to Arokoyo (2003:) the system 'is the most important single determinant of the level of Nigeria's (sic) agricultural development and hence the yards stick of the quality of life of its people'.

The system evolved over four decades from a rudimentary, export crop-focused service to what can be described as a professional service and was managed by the Ministry of Agriculture in the Federal and State government level. But few years after, the ministry based extension service was found to be unable to effectively address agricultural and rural development problems.

This led to the establishment of the Agricultural Development Program (ADP) (Ladele, Ogurinde& Mundi, 2008), which becomes the agency responsible for public extension service delivery at the grassroots. Its establishment came with the Training and Visit [T&V] Extension System focusing strictly on communication and educational function of extension. The system recorded significant success (Ladele et al, 2008), but could not be sustained due to its capital intensive nature and the withdrawal of its funding by the World Bank.

Although private extension service delivery was introduced at the state and local government level under the aegis of ADPs on a statewide basis, its activity is currently at low ebb. Numerous critiques of Training & Visit and other agricultural

technology transfer approaches have led to ‘a chorus of calls for new approaches to extension’ (Akinagbe&Ajayi, 2010: 353).

According to Arokoyo (2003) at the inception of the state-wide ADPs in 1980 the extension agent: Farmer (EA: Farmer), ratio ranged “between” 1:2000 to 1:3000. This was expected to come down to “between” 1:800 to 1:1000 by the project completion date and the withdrawal of World Bank support. This target was never achieved. He further explained that in a survey conducted by the NEARLS and PCU to ascertain the EA farmer ration in the country showed thatfarmer ratio in Nigeria was “between” 1:848, in Ogun State in the South- West Ecological Zone to 1:1650 in Katsina State in the North-West Ecological Zone.

This is similar to the finding by Arokoyo et al (2002), of ratio of “between” 1:1000 and 1:2000 in the public extension service, and worse for the women-in-agriculture program, which was found to have several extension blocks expected to be filled by female extension agents, vacant.

The success of any extension program is directly related to the level of involvement and participation of the clientele. This, having created awareness among uses of any project, the next phase will involve mobilizing farmers and getting them involved in planning and execution of the various components of the project. The ADP extension system therefore assists farmers in organizing planning and implementing conservation programs with appropriate, relevant and useful innovation from the research Institutes.

It is clear therefore, that no matter however effective, extension delivery through the village extension agent can neither be efficient nor cost-effective for a developing country like Nigeria, with a population of about 150 million, majority of

who are involved in agriculture (70 – 80 percent) and illiterate. The Extension Service therefore must be appropriately supported with the use of ICTs. (Arokoyo, 2003)

2.10. AGRICULTURAL EXTENSION AS A PROCESS OF COMMUNICATION

Agricultural Extension is an informal education process that assists farmers in improving their farming techniques and methods, increasing production efficiency and income, bettering their standard of living and lifting their social and educational standards (Maunder A., 1973). It involves the conscious use of communication of information to help farmers forming sound opinions and making good decisions (Van den Ban and Hawkins, 1996). According to Davidson and Ahmad (2003), the functions of agricultural extension may be classified into 3 main categories, which are:

1. Information dissemination
2. Technology transfer
3. Education

Also the perspective on communication has changed, according to Savaes (2002) it is more concerned with process and context, that is, on the exchange of 'meanings,' and on the importance of this process, namely, the social relational patterns and social institutions that are the result of and are determined by the process. 'Another' communication "favours multiplicity, smallness of scale, locality, deinstitutionalization, interchange of sender-receiver roles (and) horizontality of communication links at all levels of society" (McQuail, 1994:97). As a result, the focus moves from a 'communicator-' to a more 'receiver-centric' orientation, with the resultant emphasis on meaning sought and ascribed rather than information transmitted.

With this shift in focus, one is no longer attempting to create a need for the information one is disseminating, but one is rather disseminating information for which there is a need. The emphasis is on information exchange rather than on the persuasion in the diffusion model.

Agricultural extension when is focused on agriculture is essentially a communication process whereby various participants are linked through the exchange of information (Ladele et al, 2008). According to them, agricultural extension addresses problems of livelihood, development and change and it is dynamic in process and application because of its problem solving orientation. It is designed to give assistance to farmers, help them identify and analyse their production problems and become aware of the opportunity for improvement (Adams, 1982).

There are basically three main functions of agricultural extension; however, what is common is that all of them involve COMMUNICATION (Hossenally, 2011). He opined that 3 main extension methods which involve, thus;

1. The individual method (farm visits, office calls, informal contact, and telephone calls),
2. The group method (group meetings, field demonstrations, conducted tours, seminars etc.); and
3. The mass media (newsletters, pamphlets/leaflets, radio talk, TV programmes etc.) and now the mobile-phones.

However, while choosing the extension method to be used, the Extension Officers or development partners must analyse the situation well and consider several points before coming to a final decision. Ideally the best choice is to combine the different extension methods that are available and the choice is made depending on the topic, the target group, and the resources available (Hossenally, 2011). However,

apart from these extension methods, another means to communicate to farmers and other stakeholders in agriculture would be the use of ICTs (Hossenally, 2011).

2.11. THE TRAINING AND VISIT OF THE ADP IN NIGERIA

In Nigeria when the ADPs were initiated, Training and Visit [T&V] Extension System was adopted which is a professional extension approach, which brought professionalism into extension work, focusing strictly on communication and educational function of extension (Ladele et al, 2008). They went further that the programme recorded significant success under the approach but the impact could not be sustained as it was capital intensive and was donor-driven. Impact could not be sustained when the World Bank [sponsor] withdrew its funding support.

The T & V is still utilized by the Public extension in Nigeria with series of adaptation with significant shift from the original conception.

There was also the University-based extension project which complemented the Conventional extension model. The extension outreach programmes of ObafemiAwolowo University, Ile-Ife (at Isoya); University of Ibadan (at Badeku) and Ahmadu Bello University (at Samaru) all in the 1970s were effectively integrated into research and teaching functions of the respective universities. Unfortunately the fund drain that followed that era, those laudable projects could not be significantly sustained (Ladele et al, 2008).

According to Ladele et al, (2008), the ministry based extension service was found to be unable to effectively address agricultural and rural development problems. This led to the establishment of ADP thus marked the departure of the Nigerian extension system from ministry based extension to project based extension system.

The ADP was sponsored by the World Bank in collaboration with the states and federal governments. Agricultural Development Projects were first established at

pilot level in Funtua, Gusau and Gombe in 1975. The success of the pilot projects resulted in several projects with variety of designs – the original enclave projects (ADPs); the Accelerated Development Area Programmes (ADAPs), the phased ADPs, and the state-wide projects. Almost all the states in the country actively implemented statewide ADPs until World Bank finally withdrew funding at the expiry of the project.

Development activities of ADPs declined considerably, though at varying degrees across the states, as government could not meet the financial demand of these projects (Ladele et al, 2008). The ADP system was premised on the fact that a combination of factors comprising the right technology, effective extension service, access to farm inputs, adequate market and other rural infrastructure are essential elements for increased output and productivity, required to raise the income and living standards of the rural dwellers who are mainly farmers (Ayichi, 1995). The objective of the ADPs is to provide the enabling environment sufficient to act as the driving force that will motivate the farm families.

Farmers were reached through mass communication techniques including motion pictures, weekly radio programmes and wall posters among others. Subject matter specialists who are trained through the Monthly Technology Review Meetings are later to go their respective zones to train extension workers through the Fortnightly Training Meetings.

However, the paradigm shift from the top-down (donor-driven) approach of transmitting information, which was centred around the 'expert' to farmer to a more participatory and stakeholders' involvement, has made the ICTs, a handy tool for extension and rural communities to move into the information age (Arokoyo, 2003).

2.12. PARTICIPATORY EXTENSION

In an effort to move forward after the low acceptance of early approaches, another paradigm for rural development emerged with the promotion of active participation, empowerment and poverty alleviation. Scientists became aware that though they had been analysing in detail the conditions and designing sound solutions for farmers, still the farmers did not adopt their recommendations. It was then that the researchers and Extensionists began to develop another approach, which entailed asking farmers what they really want and on the basis of such information researchers developed solutions which will be brought back to farmers so that they could select out different options (AGRITEX, 2010).

Generally the term participation refers "to the role that has to be played by the beneficiaries of development programs and projects" (AGRITEX, 2010:15). It involves researchers study the context and overall environment of a selected community, identify the problems, prescribe the solutions/recommendations, plan the necessary interventions and monitor and evaluate the development process. In this case, the beneficiaries' role is restricted to implementation of the superior ideas of the "outsiders".

Participatory extension or PEA is a way of improving the effectiveness of rural extension efforts by government agencies, NGOs and other organisations engaged in rural development (Hagmann, Chuma, Murwira and Connolly, 1999). It is an extension approach and concept which involves a transformation in the way extension agents interact with farmers. Hope and Timmel (1984) said PEA is community-based extension and joint learning iscentral to PEA and it is designed based on Freire's pedagogy of liberalization (Hope and Timmel, 1984). A number of

advantages accrue to participation as opined Umar (2006). There is an opportunity of choice from alternative views; enable citizen understands the limits and constructive engagements one hand and on the other have influence on the collective outcome.

With the global rise of ICTs, there is ample opportunity to take hold of this development, utilise the existing tools and use them in new ways. One of these tools is the mobile phone, which has been at the heart of exciting developments in the field of communication studies across the African content. The growth of mobile phone usage has meant that this technology has provided opportunities for many service sectors (Brown, Cajee, Davies, & Stoebel, 2003). The use of cell phones has proven to be successful in many developmental projects such as mobile banking (Brown et al, 2003), the Grameen Phone Lady Project (Richardson, Ramirez, & Haq, 2000) and various other information extension services (Aker, 2006).

The mobile phone revolution has challenged extension to align functions and services with appropriate ICT tools. Mobile phones can be used by farmers, members of the community and extension workers to connect and communicate. Donner (2009) shares a number of services that use mobile phones for interaction with rural farmers. Before mobile technologies, connecting to rural farms and providing information was time-consuming and involved hours of travel. The information provided can give farmers a critical resource.

The ICT framework needs to be carefully considered when planning for mobile phone use. Two case studies in Uganda indicate that it is important to consider the benefits from simple tools such as mobile phones in light of other barriers such as infrastructure, electricity, level of poverty, level of literacy, type of information to be transferred and sustainability (Donner, 2009).

The idea is to harness the potentials of mobile-phones in the Fadama III programme, while putting farmers in the driver's seat, or to quote Rex Chapota, Farm Radio International Coordinator in Malawi, "to put farmers first, farmers throughout, farmers always".

No matter what the name of the system, approach or programme (participatory extension, cooperative extension, advisory services, technical assistance or linking research to practice), the function remains the same: the transfer and exchange of practical information for the farmer to improve his/her outcomes (Christopolos, 2010).

2.13. TECHNOLOGY ACCEPTANCE AND THE USE OF MOBILE PHONES

Understanding individual acceptance and use of technology is one of the most mature streams of information systems research (Benbasat and Barki 2007; Venkatesh, Morris & Davis, 2007). There have been several theoretical models, primarily developed from theories in psychology and sociology (Venkatesh, Morris & Davis, 2003), employed to explain technology acceptance and use. A review and synthesis of eight theories/models of technology use resulted in the unified theory of acceptance and use of technology (UTAUT; Venkatesh et al. 2003).

However, there exist few studies regarding the users' acceptance of mobile phones in extension, especially in Nigeria, though a lot of literature exists in understanding technology acceptance in general. Several factors have been identified as the reasons for technology acceptance or rejection and people accept new ideas or innovations through a series of complex mental processes in which adoption is the final action (Beal & Bohlen, 1956). There is fun or pleasure derive from using the technology – it is generally referred to as hedonic experience (Brown & Vankatesh, 2005) and it has been shown to play an important role in determining the acceptance

of new technology. These include social, physiological, psychological, sociological, ideological pleasures (Jordan, 2002). Dishaw and Strong (1999) also argue that users‟ perceptions about ease of use and usefulness are likely to be developed from rational assessments of the characteristics of the technology and the tasks for which it could be used.

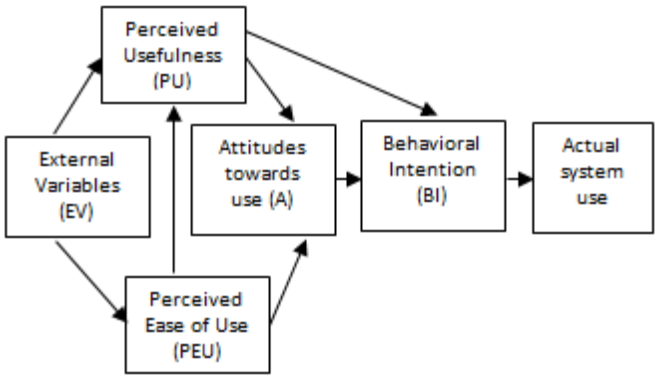


Figure 2.1. Technology Acceptance Model (TAM) (Davis, 1989)

2.14. THEORETICAL FRAMEWORK

This study is anchored on the Diffusion of Innovation theory (DOI). Diffusion of Innovation theory is a useful theory in explaining adoption of new innovation or idea. It is a systemic framework that described either adoption or non-adoption of new technology. The theory was propounded by E.M. Rogers who defined it as “the process by which an innovation is communicated through certain channels over time among members of a social system” (Rogers,1995:5).

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003). An innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption. The diffusion process typically involves both mass media and

interpersonal communication channels. And, in today's world, information technologies such as the Internet and mobile-phones – which combine aspects of mass media and interpersonal channels, represent formidable tools of diffusion (Morris & Ogan, 1996).

Rogers classified four main elements within which the theory operates – innovation, communication channels, time and social system. "An *innovation* is an idea, practice, or project that is perceived as new by an individual or other unit of adoption" (Rogers, 2003:12). An innovation may have been invented a long time ago, but if individuals perceive it as new, then it may still be an innovation for them.

The second element of the diffusion of innovations process is communication channels. Communication according to Rogers (2003:5) is "a process in which participants create and share information with one another in order to reach a mutual understanding". This communication occurs through channels between sources. Rogers states that "a *source* is an individual or an institution that originates a message. A channel is the means by which a message gets from the source to the receiver" (Rogers, 2003:204). He states that diffusion is a specific kind of communication and includes these communication elements: an innovation, two individuals or other units of adoption, and a communication channel. Mass media and interpersonal communication are two communication channels. While mass media channels include a mass medium such as TV, radio, or newspaper, interpersonal channels consist of a two-way communication between two or more individuals.

According to Rogers (2003), the time aspect is ignored in most behavioral research. He argues that including the time dimension in diffusion research illustrates one of its strengths. The innovation-diffusion process, adopter categorization, and rate of adoptions all include a time dimension.

The social system is the last element in the diffusion process. Rogers (2003:23) defined the social system as "a set of interrelated units engaged in joint problem solving to accomplish a common goal". Since diffusion of innovations takes place in the social system, it is influenced by the social structure of the social system. For Rogers (2003:24), structure is "the patterned arrangements of the units in a system". He further claimed that the nature of the social system affects individuals' innovativeness, which is the main criterion for categorizing adopters.

Technology adoption is a popular theme in marketing and new product development (NPD) literature. Conversely, the research examining non-adoption of technology is relatively limited, but better treatments of the subject usually stem from a Sociological perspective.

Several marketing studies have focus on how new technology is perceived by consumers, which is usually tested by their behaviours and reactions to technological innovation (Moore and Benbasat, 1991) and how these may change with time and experience (Kim, 2009). A common interest here is the analysis of user demographics (Laukkanen et al., 2007; Lee et al., 2005) such as age, gender, education and so on, to predict technology adoption (Morris and Venkatesh, 2000). Similarly, many NPD studies attempt to discover which stages in the development process or features of a new product are most critical to achieving market success and wide adoption (Henard and Szymanski, 2001; Moreau et al., 2001). On the other hand, most sociological studies on this subject analyse how technology adoption is affected by the characteristics of society in which potential users are embedded (Selwyn, 2003; Slowlkowski and Jarratt, 2007).

The strength of the theory is that adopters and non-adopters of an innovation may be studied to identify the factors that influence their adoption behaviour (Lewis

1997:7, Ojiambo 1989:38). Some of these influences include: the nature of the innovation, the communication channels, and the characteristics of social group, institutions or organizations (Lewis 1997:7, Ojiambo 1989:38, Minishi-Majanja and Kiplang'at 2005).

The segments of the innovation diffusion literature that have maintained viability over the years are related to the characteristics of innovations, the stages of the adoption process, and the effect of interaction of farmers on adoption (Stephenson, 2003).

The criticisms of the DOI theory initially focussed on methodological problems with the research (Ruttan, 1966), but interest in the theory declined as it began to be viewed as a source of inequity among farmers. Goss (1979) observed that the application of innovation diffusion theory in developing countries had undesirable consequences. These problems, according to Stephenson, (2003) stemmed from the following:

- It is assumed that benefits resulting from the adoption of innovations spread and become homogeneous. But experience from Latin America showed the gap in inequities actually widened.
- Aggregate statistics for development projects may show improvement in elements like production, but commonly the farmers most in need of help received little benefit.
- Non-adopters are affected by the diffusion of innovations process because larger farmers increase production as a result of adopting an innovation, resulting in a decrease in prices received by all farmers.

Everett Rogers, the father of innovation diffusion theory, periodically summarizes the literature (1962; 1971; 1983; 1995). In the 1983 edition, he acknowledges criticisms of the theory, noting that the absence of critical viewpoints in the early development of the theory may have been a weakness in the long run. Had adjustments been made earlier through critique and debate, perhaps some of the current problems with the theory would have been avoided. Criticisms compiled in the most recent edition (Rogers, 1995) include:

1. A Pro-Innovation Bias
    - There is the implication that an innovation should be diffused and adopted by all farmers.
    - The act of innovating is considered positive and the act of rejecting an innovation is considered negative. Remember the categories of adopters: Innovators versus Laggards.
2. Individual-Blame Bias
    - The development agency is not blamed for its lack of response to the needs of farmers. Rather, the individuals who do not adopt the innovation are blamed for their lack of response.
3. Issue of Equality
    - The negative impacts of the theory are not considered. What are the consequences in terms of unemployment, migration of rural people, and equitable distribution of incomes? Will the innovation widen or narrow socioeconomic gaps?
4. Bias in Favor of Larger and Wealthier Farmers
    - "Development agencies tend to provide assistance especially to their innovative, wealthy, educated, and information-seeking clients.

> Following this progressive, or ('easy to convince') diffusion strategy leads to a lower degree of equality. For example, more progressive farmers are eager for new ideas, and have the economic means to adopt; they can also more easily obtain credit if they need it. Because they have larger farms, the direct effect of their adoption on total agricultural production is also greater" (Rogers, 1995: 128-129). Consequently, the rich get richer and poor get poorer.

Despite the criticisms, based on the theory's assumptions and its general tenets, this study finds the Diffusion of Innovation as the theoretical framework of this study. This is because it is relevant in understanding the process of change that occur in the way people communicate due to the change in technology and the way these changes affect societies and how societies adopt or reject these new changes. It serves to direct the attention of innovators to those factors directly influencing the uptake of an innovation and guide them in understanding those factors so that the uptake can be influenced through those factors (Chigona & Licker, 2008)

CHAPTER THREE

METHODOLOGY

3.1. INTRODUCTION

This chapter focuses on the methodology of data collection as well as the analysis of the data. It presents the research design, the study area, the population, sampling procedure, the sample, the research instruments, validity and reliability of the research instruments and methods of data analysis.

3.2. RESEARCH DESIGN

For the purpose of this study, survey method was employed. The method involves collecting information from a large number of people. The data may be elicited face to face – interviewing or at a distance by questionnaire (Marshal 2002). According to Wimmer and Dominick (2006) survey are commonplace in all aspect of life. In survey the researcher is only interested in observing what is happening without any attempt to manipulate or control them. (Asika, 1991).

Survey method can either be descriptive or analytical, it is descriptive when it attempt to describe or document current conditions or attitude that exist at a moment (Wimmer& Dominick 2006), while if it attempt to know why certain situation exist, it is said to be analytical. Baxter and Babbie (2004) argued that in a quantitative oriented communication research, researchers often operationalise variables by asking structured questions, this method is called the survey method.

Survey method is justified in this study because it is a method suitable for gathering information from a large number of respondents on a given issue.

In the data gathering both qualitative and quantitative research methodologies were employed to have a deeper understanding of the issues first hand of both the extension workers and farmers which are useful in understanding the potentials of using mobile-phones for participatory extension. This means that inferences and generalisations can be made on the entire population where data is collected. The quantitative approach was used because the current situation or the baseline is not known. Therefore it used to answer Research Question 3 and 2. The qualitative research approach on the other hand "allow individuals under investigation to respond freely using their own linguistic codes and displaying their natural behavioural form" (Gunter, 2000:277). For this study, the qualitative method used Key Informant Interview to answer Research Question 1 and 4. The persons were selected based on their knowledge of extension and how ICTs can be incorporated into extension. In quantitative method according to Baxter and Babbie, (2004) researchers often operationalise variables by asking structured questions. For this study, a sample was drawn from the entire population and asked questions based on the research questions.

3.3. POPULATION OF THE STUDY

The research population in this study was the officials of the FADAMA III project, extension experts and the farmers, who are members of the FADAMA User Groups (FUGs) in the local governments, selected from each of the three senatorial districts in Gombe state. According to the Fadama III office in the state, there are a total of 62, 251 Fadama Community Associations/Fadama User Groups/Economic Interest Groups (FCAs/FUGs/EIGs) in all the eleven local governments in the state. Gombe local government has the highest number of FCAS/FUGs, with 7,711 registered Community Associations; Akko LGA is the second with 6,317Fadama User Groups. (www.fadama.net).

The area chosen for this study was one local government, each in the three senatorial zones. The LGAs were selected purposively from each senatorial district based on the number of FUGs in the LGA and their location. This is to have a divergent result from all over the state. Billiri was selected in Gombe South, Akko in Gombe Central and Funakaye in Gombe North.

In selecting the three local governments, the study considered LGAs with high number of FCAs/FUGs/EIGs in the senatorial districts where they were selected. Local governments with the highest number of FUGs were picked. Therefore, the study purposively selected Akko and Billiri based on the number of FUGs they have. While Funakaye local government was selected base on its location as a rural LGA. The samples were drawn from these 3 LGAs.

3.4. THE STUDY AREA

The study was conducted in Gombe State. The State was part of the then North-Eastern state, comprising the present Borno, Adamawa, Bauchi, Taraba and Yobe. It came into existence on 1st October, 1996, when it was excised from the old Bauchi State by the then Federal Military Government. Divided into 11 Local Government Areas (LGAs), namely, Akko, Balanga, Billiri, Dukku, Funakaye, Gombe, Kaltungo, Kwami, Nafada, Shongom and Yamaltu-Deba, Gombe State is a successful fusion of two distinct groups of people, comprising the Emirate of Gombe North and the ethnic grouping of Gombe South (www.onlinenigeria.com).

In the map below, figure 3.1, one can see the location of the study area, Funakaye is located in the North-Eastern part of the state, Akko in middle of the state, while Billiri in the South-Western part of the state.

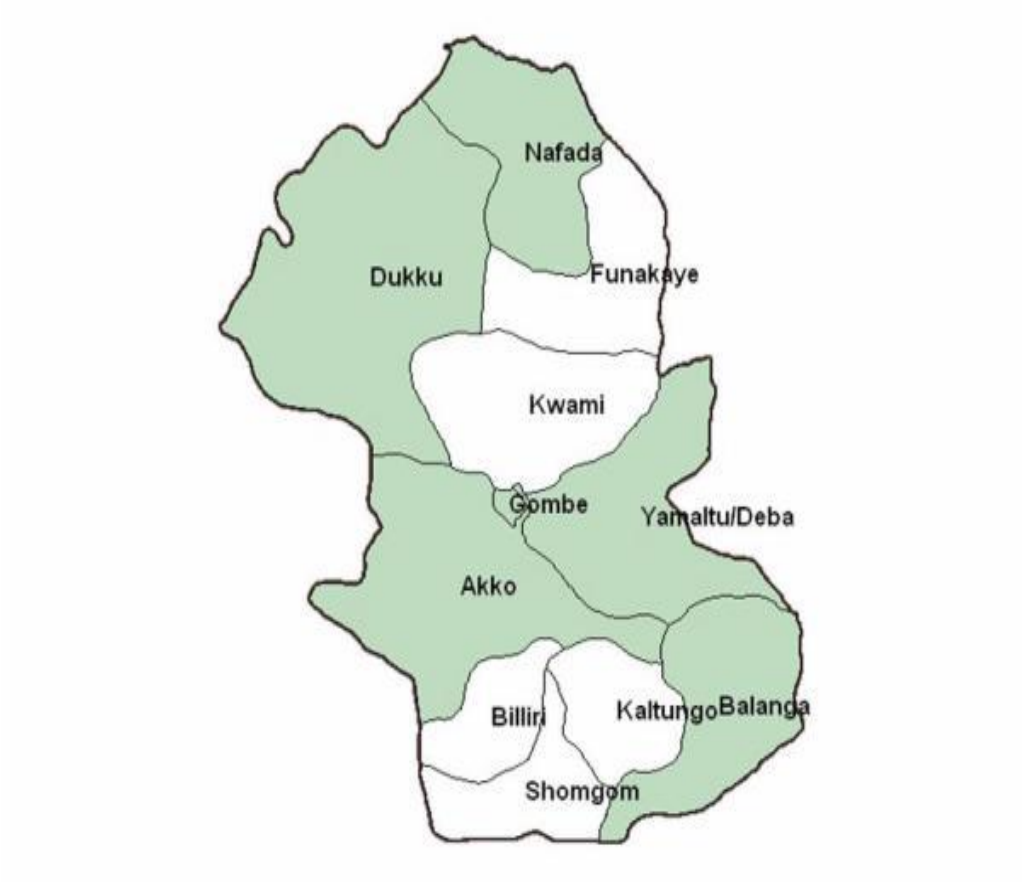


Figure 1: The map of Gombe State, showing the study area within the 11 LGAs. (source:http://www.gombestategov.com/)

The state is located between latitude 9°30' and 12°30'N and longitudes 8°45' and 11 °45'E of the Greenwich Meridian. It lies in the centre of the north-east geo-political zone of Nigeria and shares a common boundary with all the other states in the zone, namely, Adamawa, Bauchi, Borno, Taraba and Yobe. Gombe occupies a total land area of about 20, 265 km2 and has a topography that is mountainously undulating and hilly to the south and a flat open plain to the north. The Gongola River traverses the state with numerous seasonal streams that serve as tributaries to the river (www.gombestate.gov.ng).

According to 2006 census figure, Gombe's population was 2,365,040 with males 1,244,228 slightly ahead of the females, 1,120,812 the sex ratio being 100 males to 98.9 females, representing a fairly equitable gender distribution. About 46%

of the population are adolescents (i.e. less than 15 years.), while 51% are adults still in active service (between 15-64 years) while about 3.0% belong to the retirement age (65years and above). Out of this population 80% are peasant farmers (www.population.gov.ng & www.statssa.gov.za).

With its average annual rainfall of 850 mm, the state is endowed with rich agricultural land, and with about 80% of the people are mainly peasant farmers producing food and cash crop, such as millet, sorghum, maize, vegetable, cotton and groundnut, through rain-fed as well as irrigation agriculture. Some of the people are also engaged in livestock farming, fishing and craft work (www.gombestate.gov.ng).

3.5. SAMPLING TECHNIQUE

Due to the complex nature of the sampling size in this study, the researcher used multi-stage sampling procedure; accordingly, multi-stage sampling has to do with applying more than one technique to arrive at the required sample size. Purposive sampling method was adopted in the selection of the samples. The purposive sampling technique is a type of non-probability sampling that is most effective when one needs to study a certain cultural domain with knowledgeable experts within. Purposive sampling may also be used with both qualitative and quantitative research techniques. The inherent bias of the method contributes to its efficiency, and the method stays robust even when tested against random probability sampling. Choosing the purposive sample is fundamental to the quality of data gathered; thus, reliability and competence of the informant must be ensured (Bernard, 2002)

The intention was to ask members of the FUGs and FCAs on the potential use of mobile phones to reach farmers in FADAMA project, therefore the choice of the purposive sampling. The purposive sampling is sometimes referred to as judgemental

sampling. The method allows a researcher "to select a sample on the basis of knowledge of a population and the purpose of the study" (Babbie, 2001:179).

In this study, purposive sampling was employed at the level of selection of the samples for the study and respondents for the in-depth interview. Only officials of the FADAMA III, extension workers in the State ADP and professionals on extension – extension officers working under the NAERLS, ABU Zaria were selected for the qualitative research. For the quantitative research the samples were selected purposively as members of the FCAs & FUGs.

However, at the level of selection of respondents to answer the questionnaire, a simple random sampling was used to select the one person to make the total number of the respondents.

3.6. SAMPLE SIZE

Three persons made the sample size for the in-depth interview, one person each from the FADAMA III office, Extension office from the State ADPand National Agricultural Extension Research and Liaison Services, ABU Zaria. The selection of these people was based on their knowledge of extension specifically; an expert in the NAERLS who is currently involved in the NAERLS project testing (NAQAS) the use of mobile-phones to communicate information to some communities in Zaria.

For the survey, a formula was used to select the sample size. The formula was developed by Yamane in 1967 (Israel, 1992). The formula provided a simplified calculation to arrive at the required sample size at 95% confidence level and 0.05 precision levels. The total number of farmers in the FUGs was selectedout of the entire population of the FUGs in the selected three local governments. The total

number of the FADAMA members in the state was 62, 251. Therefore in selecting the sample the study used the following formula:

$$n = \frac{N}{1+N(e)2} \quad \text{---------- 3.1}$$

Where n is the sample size and N is the population e is the level of precision.

$$n = \frac{62251}{1+62251(.05)2} \quad \text{---------- 3.2}$$

$$n = \frac{62251}{157} \quad \text{---------- 3.3}$$

Therefore n= 396 (appr.)

From the formula, the study was able to arrive at 396 sample size selected. However the researcher used 400 samples based on arguments of Wimmer and Dominick (2006) the higher the number of the samples the more representative it is to the entire population.

The 400 hundreds respondents were drawn from Kentengeren, Leggal, Baganje, Tal and Zazzagawa in Billiri Local Government Area in Gombe south. In Akko Local Government Area in Gombe Central, the respondents were drawn from Tukulma, Akko, Kumo, Kalshingi and Bula while in Funakaye the respondents were drawn from Bajoga, Dou Mayo, Tongo and Ashaka village. For each of the local governments selected, the same formula was used in determining the number of samples to be selected.

The villages were selected also using a simple random sampling. The facilitator provided the names of the villages and the researcher wrote the names of the villages and squeezed the papers and threw them on the ground. The villages in all the local government were selected using that procedure.

3.7. ADMINISTRATION OF RESEARCH INSTRUMENTS

Four hundred copies of questionnaire were distributed to farmers who are members of the FADAMA User Groups in Billiri, Akko and Funakaye local government areas of Gombe State. The questionnaires were administered through the process of purposive sampling. Since the focus of the study is to look at the potential use of mobile phones for extension in the FADAMA project, the selection of respondents was done by identifying members of FUGs in these areas purposively. Out of the 400 questionnaires distributed, however only 380 questionnaires were retrieved.

The questionnaire comprised of three sections and data generated will be presented as follows:

- The first section comprises of demographic data such as age, sex, level of education and income of respondents.
- The second section comprises of data describing access and usage of mobile phones by farmers.
- In the third section data obtained from what the farmers feel are the challenges or problems to be encountered when using mobile phones for extension.

3.8. MEASUREMENT OF INDEPENDENT AND DEPENDENT VARIABLES

The dependent and independent variables were measured thus:

3.8.1. INDEPENDENT VARIABLES

Agents' relationship with the FUGs: This means the agents' relationship with the FUGs and the spirit of bringing everybody along. This is to understand whether the relationship between the agents and the farmers, who have mobile phone, is significant to their facilitation of the FUGs effective participation in the programme.

FADAMA CDD programme: This means the FADAMA programme of putting the FUGs first.

FUGs Background: The FUGs birth place and educational background. This is to understand whether the FUGs educational background has any impact on the level of her/his participation. This can be measured by their ability to use the mobile phone efficiently by way of calls and text message.

3.8.2. DEPENDENT VARIABLES

Effective Participation: This means the access FADAMA Users Groups' (FUGs) have to mobile phones, their ability to use the mobile phone to send and receive agricultural information from the extension agents via their mobile phones and their ability to contribute to what is send or received towards achieving the stated goal. This is to determine the ability to read and compose text.

Participation: this is the level of participation of the members of the Fadama Users Groups. It can be determined by their membership.

3.9. VALIDITY AND RELIABILITY

To ensure the validity and reliability of the data collected is achieved; the questionnaire was vetted by research experts. The observation and corrections made by these experts was implemented. After that, a pilot study was conducted for the quantitative research, using 15 three sections questionnaire on independent respondents within Gombe State to test the instruments. Also, the procedure of selecting the primary data was strictly adhered to. Also the qualitative research was thorough, because if one "does a sloppy job taking notes or otherwise recording what

was observed, there is the possibility that incorrect interpretations may be drawn from the data" (Wimmer and Dominick, 2003:114).

Although the researcher employed research assistants, the researcher monitored both the interviews and the distribution of questionnaires to respondents. Facilitators in the local governments were used in the distribution and collection of the questionnaire. For the interview, tape recorders and notebook were used to ensure everything is captured.

3.10. DATA ANALYSIS AND DISCUSSIONS OF FINDINGS

Qualitative data usually comes in form of sentences, extended quotes, paragraphs of description and even pictures and diagrams (Wimmer and Dominick, 2006), the presentation and analysis of the in-depth interview waswritten in narrative style. While the quantitative data was analysed using the SPSS 13.0 statistical software.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1. INTRODUCTION

This chapter focuses on the analysis of data as well as discussion of findings. It provides answers to the research questions and the objective of the study. SPSS 13.0 statistical tool was used to analyze the quantitative data and descriptive statistics used to analyze the qualitative data.

4.2. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

This section provides the socio-demographic characteristics of the respondents and the responses to questions asked in the questionnaire. Analysis and explanations followed the table and the figures.

4.3. Table 4.1 Respondents Demographic data.

CATEGORIES	FREQUENCY	PERCENTAGE
AGE		
18 - 25	32	8
26 - 35	90	24
36- 45	171	45
46 – and above	151	23
TOTAL	380	100
SEX		
MALE	216	58
FEMALE	319	42
TOTAL	380	100
EDUC.BGRD		
WASC/WAEC/NECO	189	50
ND/NCE	104	27.4
BSC	21	5.5

OTHER	66	17.1
TOTAL	380	100
MONTHLY INCOME		
N10,000-N20,000	68	18
N20,000-30000	238	63
N30,000 – 40,000	43	11
40,000 and above	31	8
TOTAL	380	100

Table 4.1 above is the demographic data of the respondents. It shows that the respondents (8%) are between 18-25 years, (24%) are between 26-30 years. However majority of the respondents (45%) are between 36 – 45 years, while (23%) of the respondents are 40 years and above. This shows that most of the FADAMA members are in their active age, still young, energetic and full of vigor that can easily assimilate and accept new innovation. This also affirmed an earlier study on mobile banking adoption and application of diffusion of innovation theory in Saudi Arabia which shows that most of those who adopted mobile banking when it was introduced are relatively young in the sample; more than two-thirds of the mobile banking users (72.7%) are between 18 and 25 years old (Sohail & Al-Jabri, 2012, Laukkanen et al., 2007; Lee et al., 2005).

The demographic data also shows that majority of the FADAMA members are male with (58%) while females are (42%). Majority of the female members that responded to the questionnaire were found in Billiri L.G.A. The large number of male in the response may be as a result of the cultural and religious belief of the people living in the study area, which are predominantly Muslims. Majority of the FADAMA members have some level of educational qualification with majority 50% having

SSCE and 27.4% with a National Diploma (ND). This is an indication that illiteracy might not be a problem in terms of incorporating mobile phone for extension in the FADAMA programme.

Majority of the respondents indicated that their income per annum range from 20,000 to 30,000 naira (63%). This means on average they are poor subsistence farmers by World Bank definition of poor of having less than a dollar a day. However, not to the extent of not buying a mobile phone.

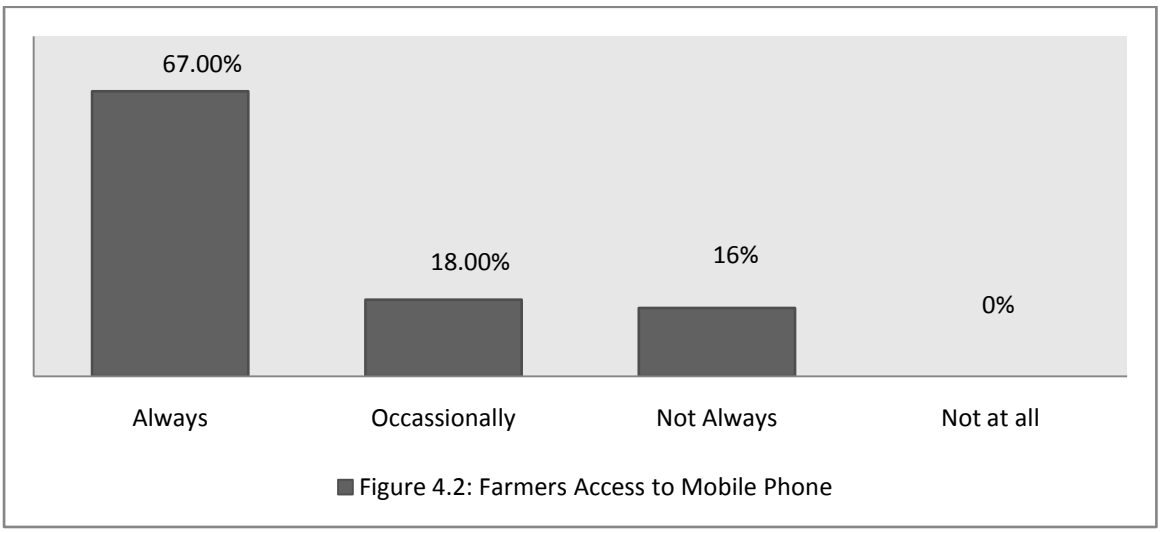


Figure 1, indicates respondents' access to mobile phones. Majority (67%) indicated that their access to the device is always. Others access to the device varies with 6% indicating that they have never had access to mobile phone. The question was very clear about the ownership of the device. It asked them if they owned the mobile device. According to Helton, (2012) the sales of inexpensive handsets in developing countries soared in recent times, creating an information technology infrastructure that connected millions of people who had never before had a telephone. It is not surprising therefore to see a high percentage of those who owned the device in these areas.

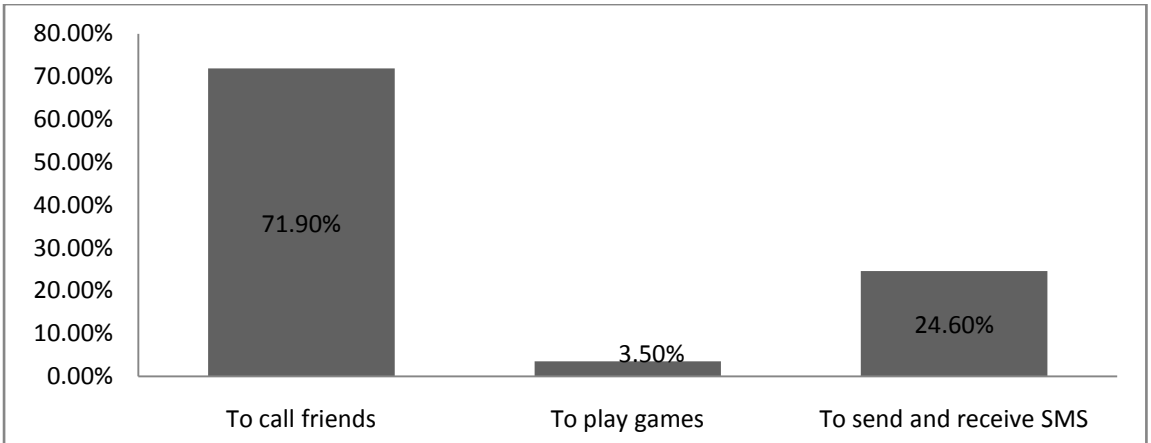


Figure 4.3: Uses for which Fadama Users put the device

For what they use the device for, majority of the respondents, (71.9%) indicated that they use the device to call friends, while 24.6% use the device to send and receive SMS. No possible explanation can be given for this. But in 2009, the Pyramid Research conducted a research in Nigeria on the impact of GSM mobile on the lives of Nigerians. Finding shows that most people use mobile services predominantly for a mix of personal and work-related communications, suggesting they see value in mobile services across a variety of activities. Majority also indicated the use the voice call service most frequently than the other services (www.pyramidresearch.com).

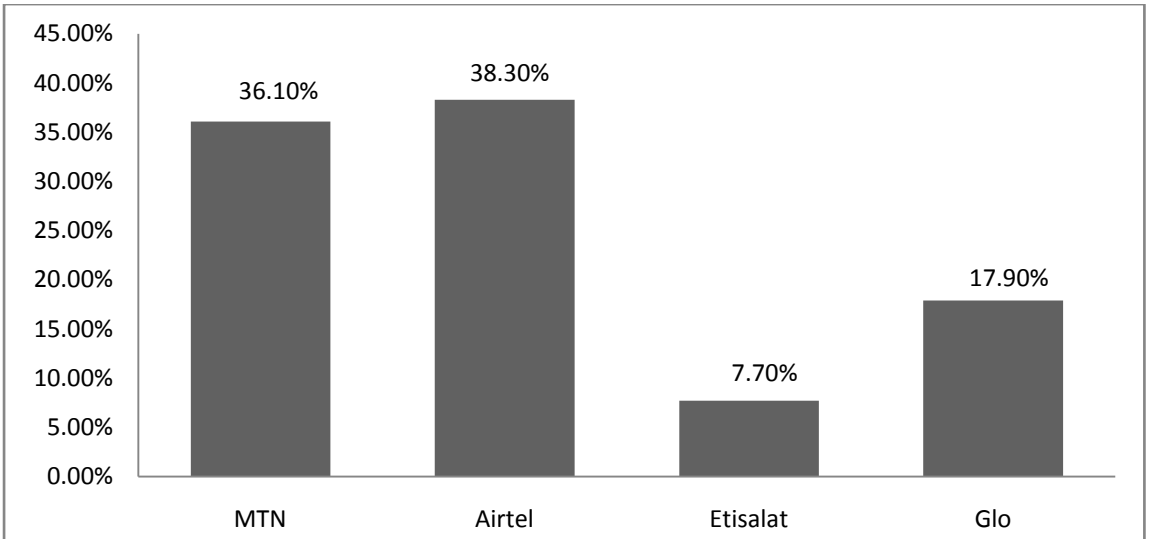


Figure 4.4: Mobile Network used by Fadama Groups in these areas

Respondents were also asked to indicate the networks they use. Majority of respondents indicated the use the Airtel network which overtook Glo Mobile as the second largest player in the mobile market after its rebranding exercise in 2008 (www.pyramidresearch.com). This could be as a result of airtel introduction of its ultralow-cost handset project, which markets phones with prices as low as N3000 in the Nigerian market. As a result, it gained more than 1m customers within nine months. Then MTN, subscribers followed, which according to the Pyramid research, has managed to maintain its position as the largest operator in terms of subscriptions by constantly investing in aggressive network rollouts (www.pyramidresearch.com).

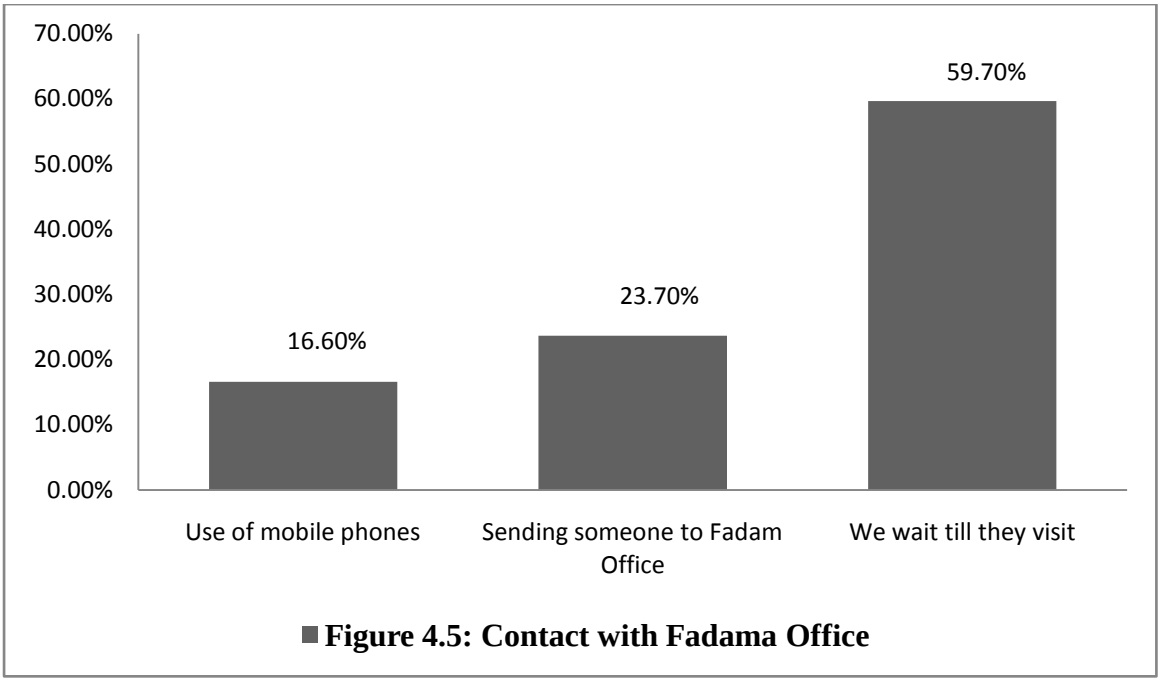


Figure 4.5: Contact with Fadama Office

From the above figure, the contact between FADAMA office and the FUGs and FCAs is when they visit their areas. Majority of the respondents 59.7% indicated that if they have any question to ask the FADAMA officials they have to wait till they visit. It has been observed that after three years of implementation of the Second National FadamaDevelopment Project preliminary lessons learnt from theproject wasthequalityoffacilitationsupporttothe FCAs and FUGs, which waslowespeciallyinthetechnicalfields (Daudu&Maduekwe, 2012).

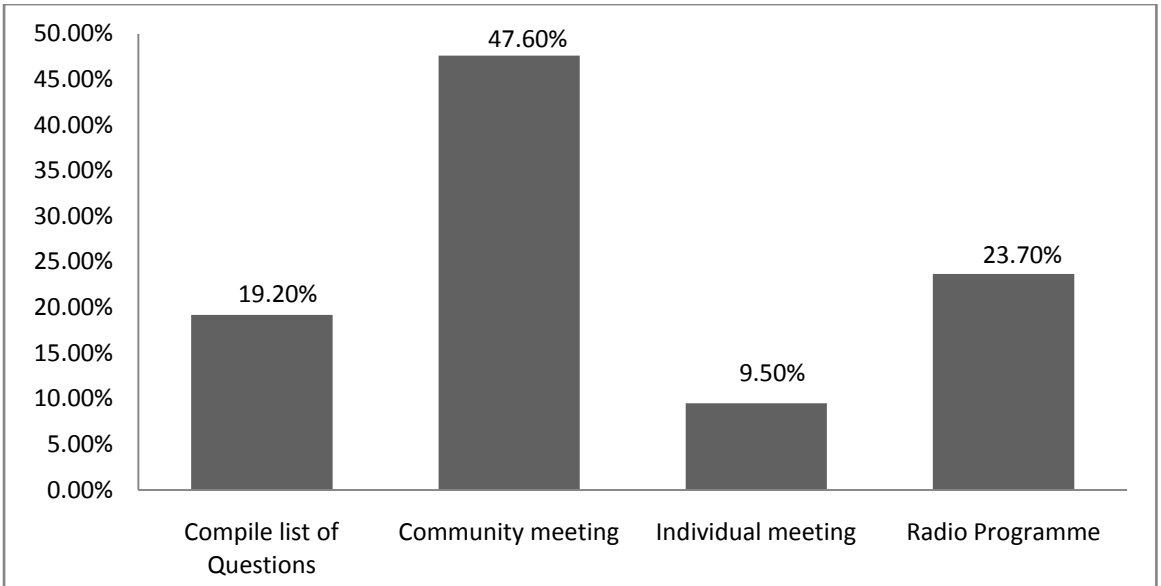


Figure 4.6: How FUGs contact the FADAMA office

When Fadama User Group members were asked to indicate how they receive information or get to contact FADAMA officials majority indicated that the FADAMA officials usually call for a community meeting whenever the need arise. This was followed by a question on how long it will take to respond or organise these meetings. Few respondents 9.5% indicated that they communicate with FADAMA officials individually. Most of the contacts as indicated by the respondents 47.6% were through the community meetings.

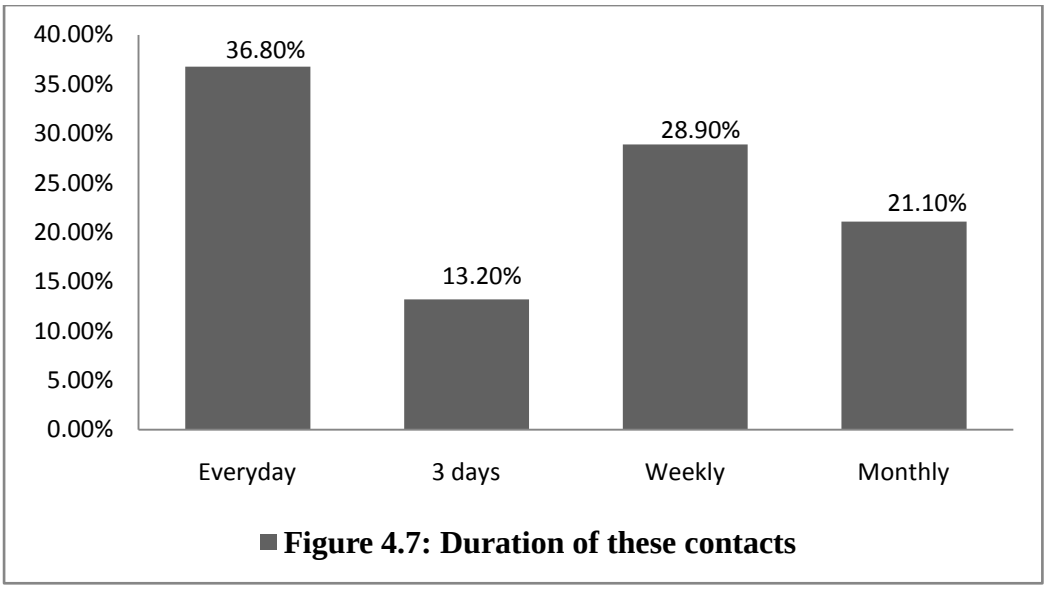


Figure 4.7: Duration of these contacts

Most of these community meetings are not frequent; in fact in some discussions some respondents said they have never had such meetings since the beginning of the FADAMA III programme. This means that the facilitation process of the Fadama is not participatory.

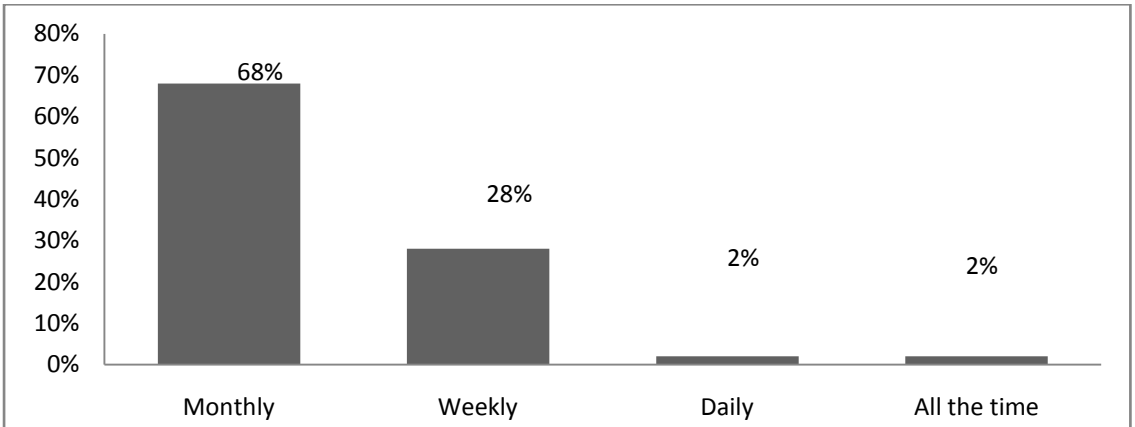


Figure 4.8: Contact by FADAMA office to FUGs through mobile phone

Having a phone does not necessarily been a means to be contacted by the FADAMA office, because most respondents were never contacted by the FADAMA office. Some of them in one on one interactions indicated that they were part of the FADAMA I & II, but were never contacted via their mobile phone. The respondents 38% of them indicated that they were never contacted by the FADAMA office through their mobile phones.

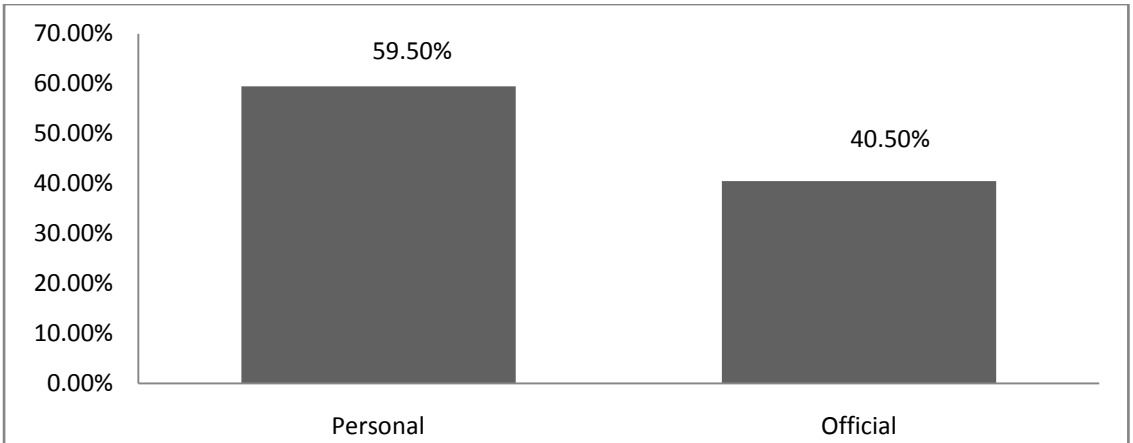


Figure 4.9: Information exchange between FUGs and the FADAMA office

From the above table, it is very clear that the relationship between the FADAMA office and the FUGs members is mostly personal. Majority of the respondents (59.5%) indicated that the information exchange between them and the FADAMA office is personal.

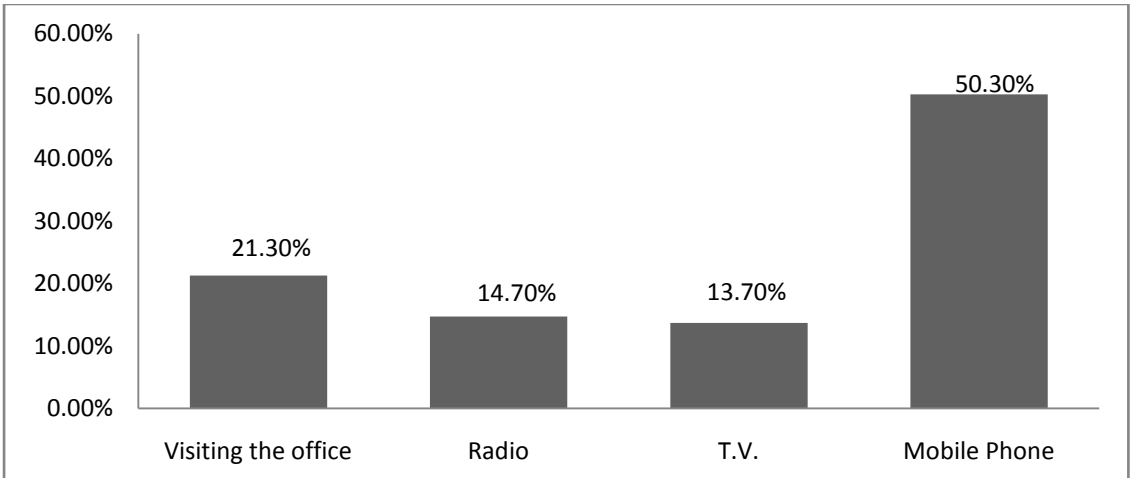


Figure 4.10: Preference when communicating with FADAMA office

When they were asked their preferences when communicating with the FADAMA office, majority of respondents indicated that they would like to do so using their mobile phones. The present approach being used by the FADAMA is facilitators. The facilitators are chose in each of the communities, who usually communicate with the desk officer or the Community Development Officer in the

state office and later convey the message to farmers. However, the approach was duped non effective. This is because poor facilitation is manifested in inadequate sensitization of the FCAs, low-level comprehension of the project approach and the associated guidelines by the FCAs and low quality of local development plans (LDPS) (Daudu and Maduekwe, 2012).

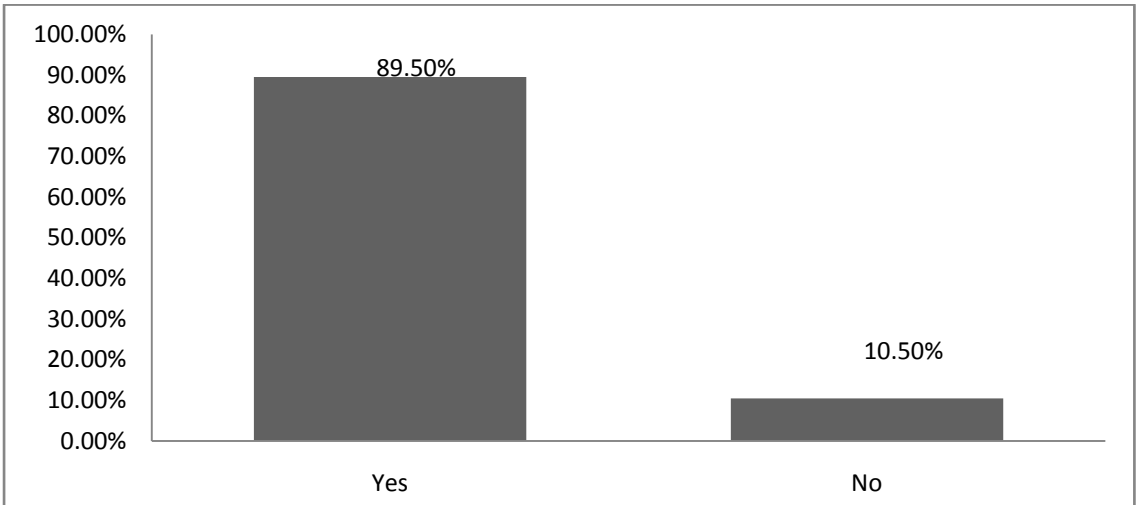


Figure 4.11: Opportunity to ask questions

Most respondents indicated that the opportunity to ask questions on how to improve their faming activities was not given to them. This could be as a result of administrative inertia i.e. the inability of the FADAMA management officers to take appropriate decisions or not given the facilitators delegative authority to discuss fully with the farmers. Other factors that may likely hinder interaction between the farmers and the FADAMA facilitators according to Daudu and Maduekwe (2012) are excessive workload for facilitators. For instance, Billiri and Akko LGAs have more than 10,000 FUGs and FCAs has only 2 facilitators that are scattered within these 2 LGAs. These facilitators are also hindered by lack of working equipments and transport facilities.

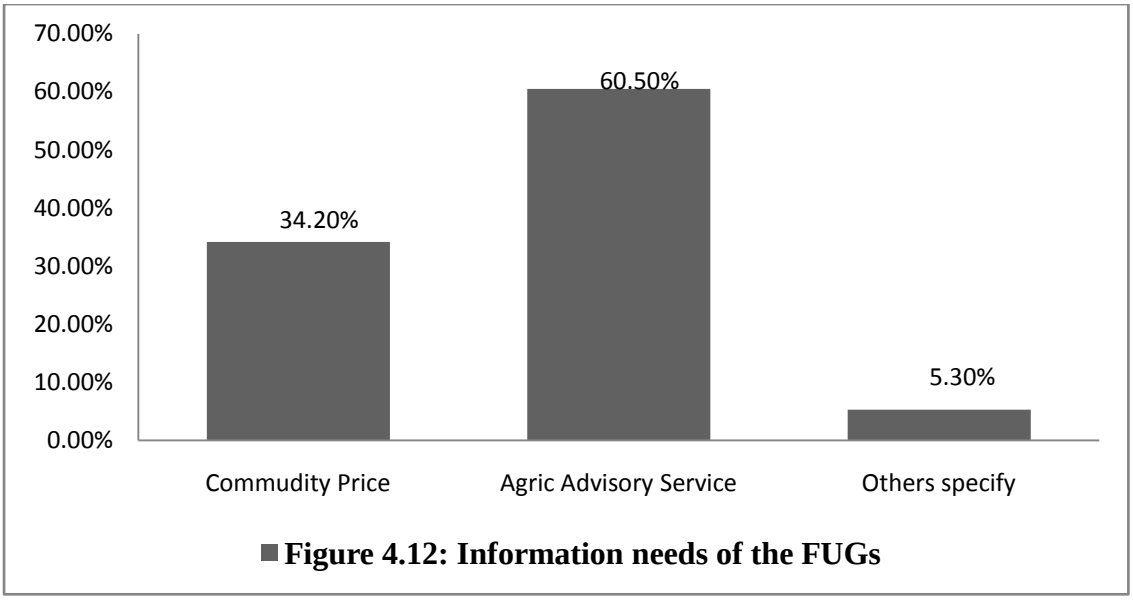


Figure 4.12: Information needs of the FUGs

Majority of respondents indicated that their information needs ranges from how to improve their crop cultivation, fishery and cattle and above all how to get fertiliser. As observed by Soola (1988) farmers' information needs in Nigeria cover a wide variety of the farmers' activities. These include availability of requisites such as improved seeds, fertiliser, farm implements and pest control.

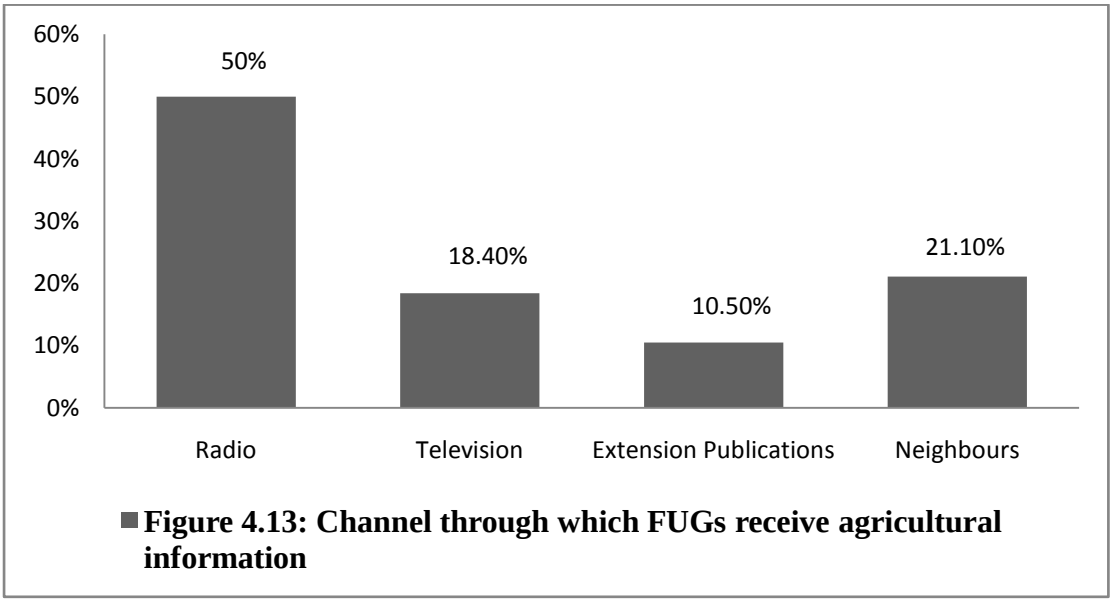


Figure 4.13: Channel through which FUGs receive agricultural information

Respondents were ask to indicate the channel they receive agricultural information, however majority indicated that they receive agricultural information from the radio with 50%, only 10% of the respondents get their agricultural related

information through the extension publication, which shows how low agricultural extension is in those areas.

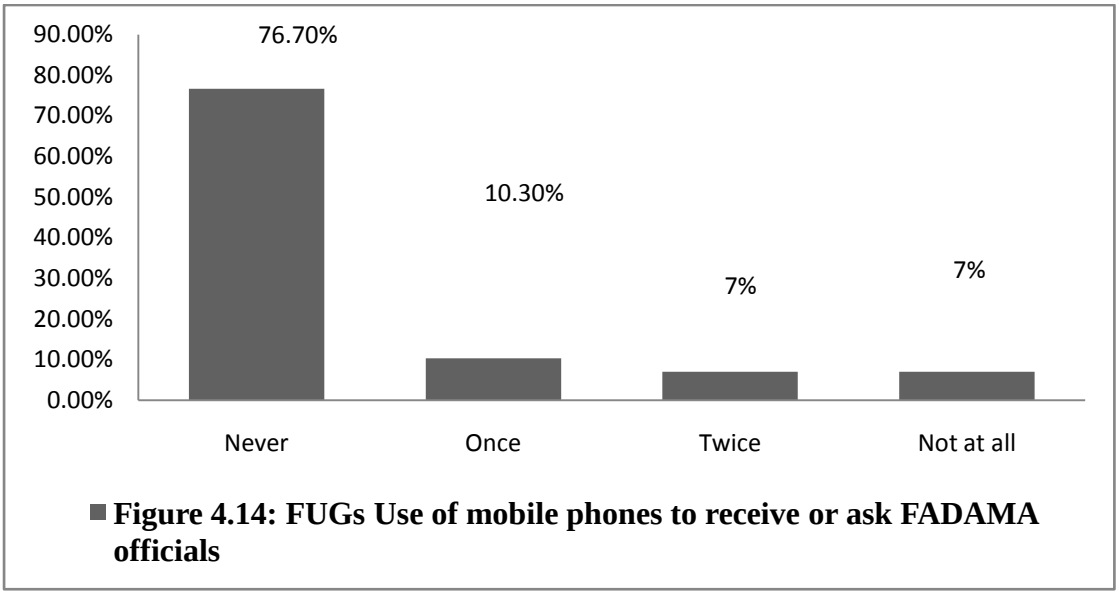


Figure 4.14: FUGs Use of mobile phones to receive or ask FADAMA officials

Respondents were also asked whether they use their mobile phones to ask or receive information from FADAMA officials, majority indicated that they have never received or ask question relating to agriculture from the FADAMA officials.

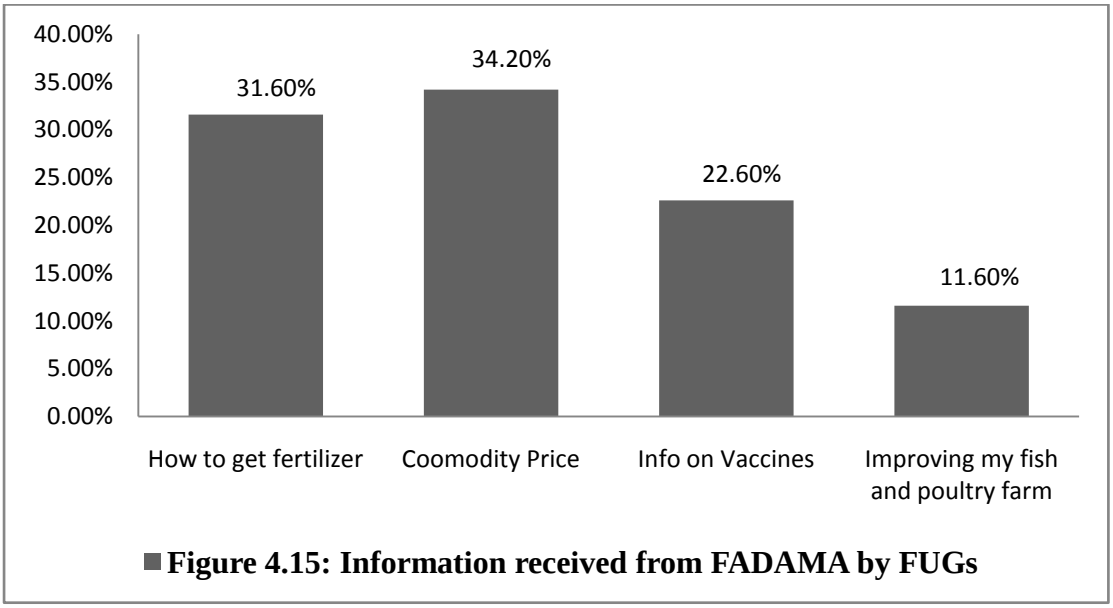


Figure 4.15: Information received from FADAMA by FUGs

Majority of the respondents indicated that what they need is information on prices of the agricultural products 34.2%, while 31.6% are concerned with how to get fertiliser.

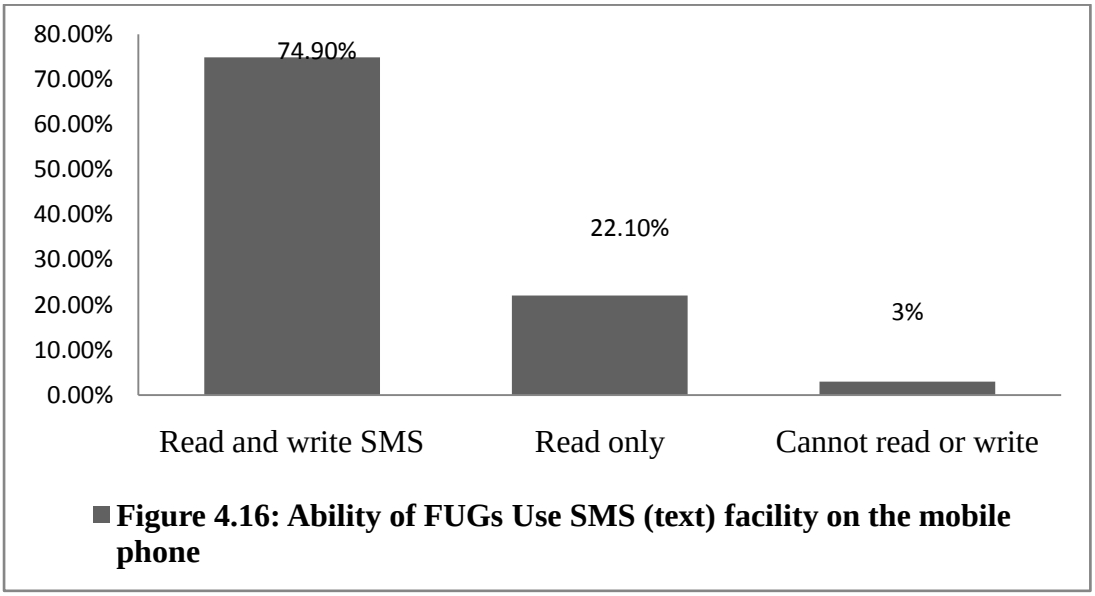


Figure 4.16: Ability of FUGs Use SMS (text) facility on the mobile phone

Majority of the respondents indicated they can use the short message service (sms) facility on their mobile phone, with 74.9% indicating they can read and write while 22.1% indicated they can only read SMS. With the literacy level of the respondents, it is not surprising to see most of them can use sms facility on their phone. Most of them can read and write and that explains their ability to use the sms.

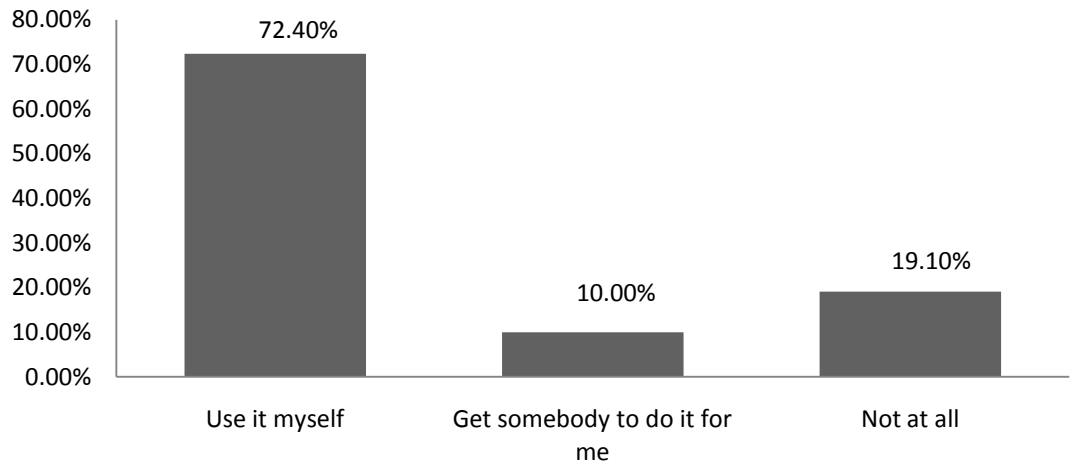


Figure 4.17: Whether the FUGs use it themselves or someone assisted them.

When asked to indicate if they used the SMS facility in their phones or somebody help them. Majority of the respondents indicated that they use it themselves with over 72.4%. In a study conducted in 2010 on Creativity and Social Change through SMS in Nigeria, the findings shows that the younger generations of Nigerians from 2001, like elsewhere in the world, can be described as "the thumb tribe", a generation of people skilled in the manipulation of the phone and computer keys with their fingers, especially the thumb. This younger generation has now grown up and the use of mobile phones has increased even among the older ones. Research on mobile usage at the base of the pyramid from Asia has shown that voice calls and SMS are the most common activities (LIRNEasia, 2009).

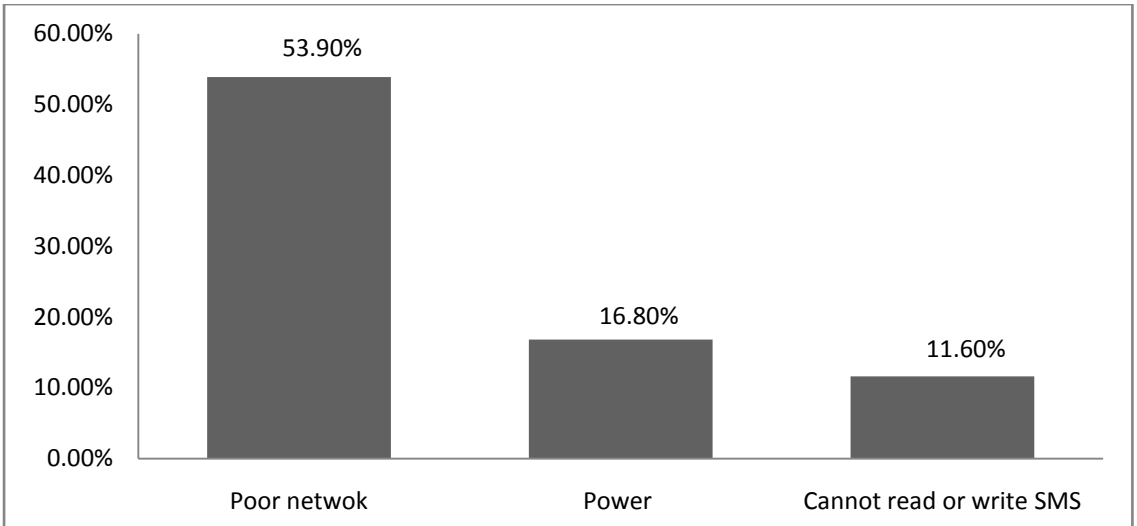


Figure 4.18: Problems faced by FUGs when using mobile phone.

Respondents were asked to indicate problems they undergo when using the mobile phones. Majority indicated that poor network is their major problem. Adomi (2006) carried out research on mobile phone usage patterns of library and communication science students at Delta State University, Abraka, Nigeria. He enumerated some of shortcomings of mobile phones usage as frequent network failure, high cost of recharge cards/airtime, limited area of coverage and power outage.

4.4. KEY INFORMANT INTERVIEW

A Key Informant Interview was conducted in Gombe on 23rd and 24th December, 2012 with two key informants. Officials of the Gombe Agricultural Development Project (GADP) and the FADAMA office participated in the 20-30 minutes interview. Consequently, another interview was also conducted in NAERLS, A.B.U. Zaria on the 14th March, 2013. The experts in ADP and FADAMA were selected based on their knowledge of Agricultural Extension in the state. The key informant selected in NAERLS, ABU Zaria was selected based on his knowledge ofextension and the use of mobile phones in extension. This is to gain understanding

of the current state of extension in Gombe state, and the possibility of incorporating mobile phones for extension.Prior to the interview, the interviewees were informed through correspondence on what the researcher was looking for and as well as specific questions.

The Key Informant from the ADP and FADAMA's response on the use of mobile phones for extension was fear. They expressed their fears in using mobile phones for extension. Specifically the ADP people were of the opinion that introduction of mobile phones in extension, means lay-offs. They feel most extension workers are going to lose their jobs. Currently, the official figure for farmer to extension ratio in Gombe State stands at about 1:1255 in 2011. This figure is close to the World Bank standard of 1:1000 extension worker/farmers. However, the reality, according to the media officer of the ADP is that extension:farmer ratio stand between 1:3000-1:5000 especially in places where the farmers need more experts' advice the most.

He specifically mentioned that in some villages in Akko, Balanga, Billiri, Shogom and Kaltungo with over 20,000 farm families have 5-10 extension workers. This underscores the need to device other means to supplement extension activities in the state. According to him,

> At present there exist only two radio and TV programmes produced by the Gombe ADP. These are Noma da Kiwo andNoma da Raya Karkara. The programmes according to the Assistant Director, Media of the Gombe ADP were aired 44 times in 2011. Noma da Kiwo which is a radio programme was aired 32 times from January – August 2011 nd was sponsored by GSADP. The other programmeNoma da Raya Karkara was aired 12 times through radio and TV from July – September. The programme was sponsored by CBARDP. The Noma da Kiwo was aired again through TV and radio 8 times from June – August and was sponsored by NPFS.

The use of mobile phone was introduced in February 2012, when the Federal Government introduced the use of mobile phones into the fertilizer distribution programme. The programme according to the Assistant Director has little achievement. This was due to some technical challenges they faced in terms of poor network and wrong phone numbers supplied by farmers. Most of the SMS sent to farmers supplied mobile phone numbers bounced back. So it became extremely difficult to reach some farmers. Other farmers supplied their neighbours, friends or family members' mobile phone numbers.

The key informant in the FADAMA office said the FADAMA programme uses facilitators in place of extension. Therefore in the Fadama office the word 'extension' has been replaced with 'facilitators'. The facilitators' main job is to serve as a link between the Fadama User Groups and the Fadama Office in the state capital. The use of mobile phone in the Fadamaprogramme is at the level of facilitators and the Community Development Coordinator, whose responsibility is to ensure coordination between the Fadama User Groups and the facilitators.

The facilitator, according to the key informant, is the link between the Fadama development project management and beneficiaries. Facilitators' main task and responsibilities are: assist beneficiary communities in analyzing their situation and their problems and finding pertinent solutions; assist communities and groups to implement, monitor and evaluate their activities and help local communities and groups and to establish link with other groups and institutions that may be able to support them.

The key informant also said that preliminary lessons learnt from the previous project – the FADAMA II project indicate that the quality of facilitation support to the

FCAs is low especially in the technical fields. Poor facilitation is manifested in inadequate sensitization of the FCAs, low-level comprehension of the project approach and the associated guidelines by the FCAs and low quality of local development plans (LDPS).

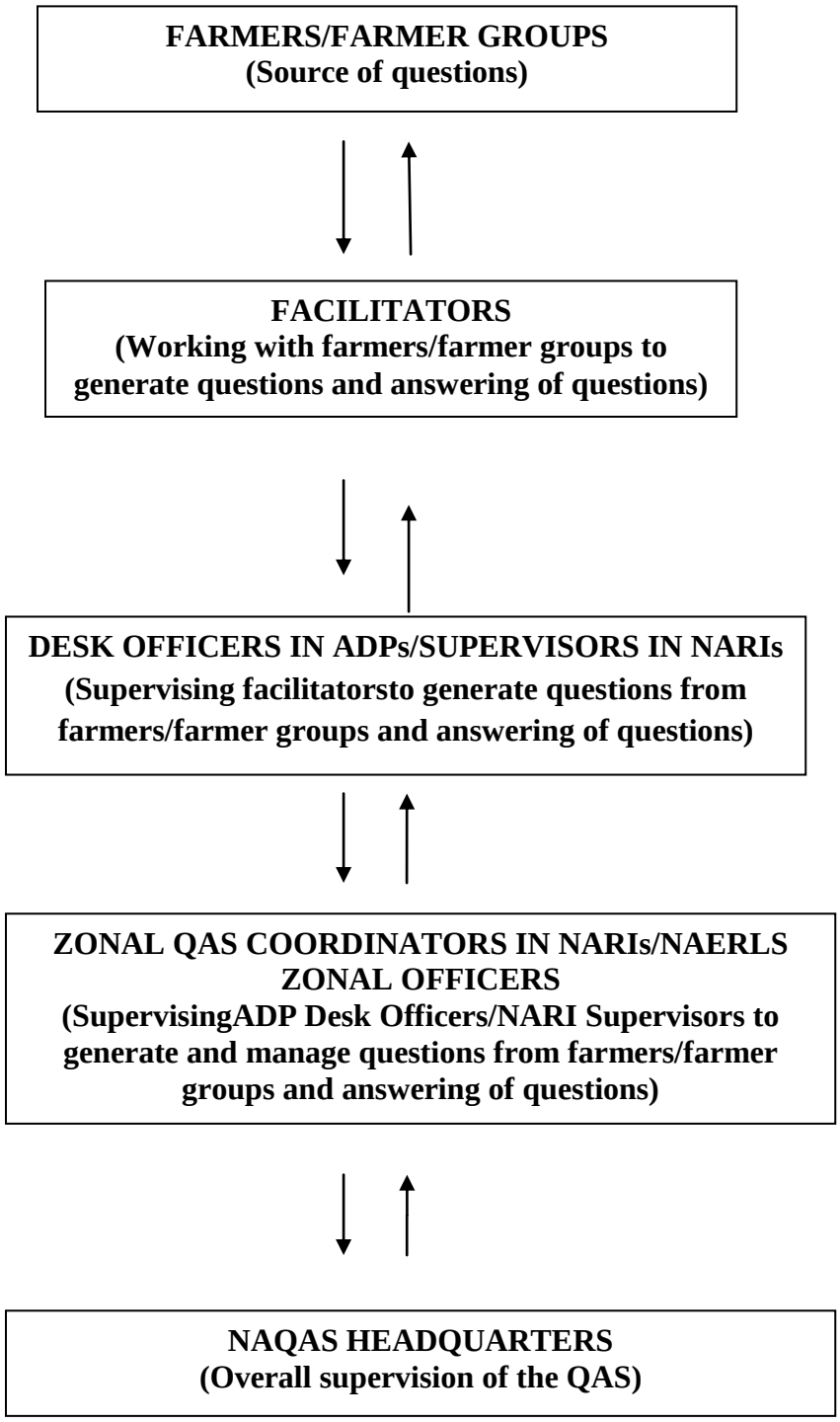
According to the Key Informant in the National Agricultural Extension and Research Liaison Service (NAERLS) of the Ahmadu Bello University, Zaria, the NAERLS has the national mandate to generate agricultural information and disseminate same through means of communication to Nigerian farmers. The channels 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).

The use of mobile phones in agricultural information dissemination in NAERLS 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, FCT Abuja, Kano, Kaduna and Ondo states.

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.

Figure 19: Flow of information chart in NAQAS Mobile



Source: NAQAS/CTA (2010)

The Key Informant noted that the approaches for using the mobile phone service for information delivery is yet to fully take up, because at present, they lack some basic facilities like enough data mobile phones for contacts but at present multi-media services is used such as the Internet, CD Rom, books among others.

4.5. DISCUSSION OF FINDINGS

The five research questions guided the discussion of the findings of the study. Five questions were set to be answered by the study.

RQ1.Do extension workers use mobile-phone in the FADAMA project for extension purposes?

This research question was generated to give an answer to objective number 1 which seeks to know if mobile phones are used for extension in the FADAMA programme in Gombe. The key informants provided an answer to the question. Both the ADP and the FADAMA in Gombe State were not using mobile phone for extension. The only time mobile phone was used was during the mobile fertilizer distribution, which was part of the Federal Government Agricultural Transformation Agenda. The FADAMA on their part use mobile phone to communicate with their facilitators in the Local Government, when someone is visiting their area or when calling them for a meeting.

Figure 4.14 of the quantitative data also shows that, mobile phone was never used to contact farmers with any agricultural information. Majority of respondents 76.7% indicated they have never received or send inquiries from or to the FADAMA office for agricultural information. Therefore, the findings indicated that mobile phone is yet to be incorporated into extension in Gombe State. Several factors may hinder the adoption of mobile phones for extension. One of the several reasons

forwarded for the adoption of mobile phones in extension in the literature review include the reduction of man power, ease of communication. For the fadama facilitators staying in the office and communicate with the FUGs in their villages means reduction in income. The funds meant for field work will drastically reduce and it could also means relieving some people from their jobs. Or could it be the Fadama project facilitators can be categorized under late majority.

Sometimes management can encourage (or discourage) adoption explicitly through expressed preferences and mandates (Leonard-Barton and Deschamps 1988; Moore and Benbasat 1991), or implicitly through reward systems and incentives (Leonard-Barton 1987). In addition, immediate supervisors typically control access to the infrastructure supporting adoption, such as training and consulting, and may even control physical access to the hardware and/or software needed to use innovation (Leonard-Barton 1987; Leonard-Barton and Deschamps 1988).

RQ2.How participatory is the use of mobile-phone in extension?

The second research question was asked to determine the extent of participation in the use of mobile phone for extension. This was answered by table 8 on the contact of FUGs with the FADAMA office. Their contact with the FADAMA office was only when the visit their communities and or when they (the FUGs) visit the FADAMA office. Since no use of mobile phone was mentioned by both official of FADAMA and the ADP, it is obvious to see that the only time contact is made was a visit by either FADAMA officials to communities or the FUGs visit FADAMA office. The potentials offered by the mobile phone is not utilized by the fadama office, which would have assisted it in achieving the Demand-driven extension as indicated in their objectives.

RQ3.What are the problems and prospects of using mobile-phone for extension?

One of the key informant answered this question, when he said mobile phone in extension is yet to fully take off, however it can be used to corroborate the efforts been put in Radio, TV and publication to disseminate information to farmers. Also figure 8, 9 and 11, where 59.7% of the respondents indicated that the contact between FADAMA office and the FUGs and FCAs is when they visit their areas, normally for community meetings and they have never been contacted through their mobile phones.

The major problems identified with the use of mobile phones for extension was identified by the key informant. During the mobile phone fertiliser distribution, the ADP encountered problemswhen it was time for the actual distribution of the fertiliser. These problems include wrong mobile phones' numbers supplied by farmers, while others supplied numbers which were not their own personal numbers.On figure 21 the respondents indicated that poor network is their major problem in their areas. This is in line with a research conducted by Adomi (2006) on mobile phone usage patterns of library and communication science students atDelta State University, Abraka, Nigeria. He enumerated some of shortcomings of mobile phones usage as frequent network failure, high cost of recharge cards/airtime, limited area of coverage and power outage.

RQ4. Is mobile phone the appropriate means of communicating to farmers easily by extension agents?

This question was asked to answer the objective of the study in determining the appropriateness of using mobile-phones as a communication medium. The answer

to this question was answered by respondents. In figure 13 respondents were asked their preferences when communicating with the FADAMA office, majority of respondents (50.3%) indicated that they would like to do so using their mobile phones. His can be situated in DOI theory as early adopters, whose acceptance of the new idea will trigger its acceptance by the rest of the community based on the perceived usefulness and ease of use (Dishaw & Strong, 1999).

Measuring the extent to which the mobile phones can be used as appropriate means for extension can be answered by comparing the media being used for extension and the use of mobile phones. When the FUGs were asked to indicate their preferences in communicating with the FADAMA office, majority (50.3%) indicated the use of mobile phones. With 82.5% having access to mobile phones and 72.4% who can use the SMS facility, the incorporation of mobile phones in extension by the FADAMA in Gombe state can be appropriate.

4.6. SUMMARY OF FINDINGS

Based on the questions raised, the major findings in this study are as follows: Mobile phones are not used for extension in the FADAMA project.

i. The study investigated the potential use of mobile phones for extension in the FADAMA project in Gombe state. In all the areas under study, Akko, Billiri and Funakaye, the FADAMA project is not using mobile phones for extension. The study discovered that majority of respondents have access to mobile phones and use it to make calls. Also, majority indicated that they use the SMS facility on their mobile phone.

ii. Majority of respondents and members of the Fadama User Groups 50.3% prefer to communicate with the Fadama office through their mobile

phones. However, majority of them have never been contacted through their mobile phone.

iii. The major problems faced when using mobile phones for extension include from the pilot study conducted by NAQAS, NAERLS Abia, Akwa-Ibon, Bauchi, Benue, FCT Abuja, Kano, Kaduna and Ondo states was shortage of funds. While poor network, shortage of power were some of the problems identified by farmers. The ADP also identified farmers supplying other people's mobile phone numbers as the major problem they encountered during the mobile phone fertiliser distribution. Other problems include lack of network completely in very many villages.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. SUMMARY

This chapter delves into summary of major findings, conclusion and proffers recommendations on the potential use of mobile phones for extension in the Gombe State FADAMA project

The study is an attempt to look at the potentials of incorporating mobile phones into extension in the Fadama project in Gombe state. Chapter one gave a general background of the study by looking at the role agriculture plays in the socio-economic life of Nigeria. Chapter two was a review of related literature on mobile phones and agricultural extension. Conceptual and empirical literatures were consulted to establish the gap in knowledge. The chapter also explained the working theories for this study. Chapter three was the methodology used in data gathering, while chapter four covered presentation and interpretation of data as well as analysis of the data. Chapter five offers a summary of the study draws conclusions and offers recommendations based on the findings of the study.

Change is not something most people look forward to, humans seem to have a remarkable propensity for rapidly assimilating new ideas, products and services once they are perceived to fit into their personal and cultural definitions of reality. Over the past fifteen years, there has been increasing interest in applying the power of technology like the mobile phone and the Internet to agriculture. The developments in information and communication technologies (ICTs) around the world over the past few years have led to the phenomenal growth rates in the mobile telephony sector. This resulted in making isolated communities to have unprecedented access to communication flows.

One area which has received significant attention is in the provision of information services in the field of agriculture and rural development. This interest has focused on the potential for mobile phone-based technologies to enhance the flow of information to farmers as part of extension services, as well as to enable farmers to access more accurate and timely information on market prices at different stages in the value chain.

The process of adopting new innovations has been studied for over 50 years. Diffusion of innovation is one of the most popular models described by Rogers in his book, Diffusion of Innovations (Sherry & Gibson, 2002). In this study the theory was used to expand understanding of the potentials of adopting mobile phone for extension in a developing country like ours. Like all technological devices, mobile phones may have a differential impact on people and societies. All forms of communication are tightly woven into the fabric of the human communication system and cannot exist independently from one another in our culture. As each new form emerges and develops, it influences, over time and to varying degrees, the development of every other existing form. Co evolution and coexistence, rather than sequential evolution and replacement, have been the norm (Fidler, 1993).

While much has been written on the global digital divide between rich and poor countries, considerably less is known about the local digital divide within poor countries (Jensen, 2007).Social, political, economic forces play powerful roles in development of technologies. Inventions and innovations are not widely adopted on the merits of technology alone. There must always be an opportunity as well as a motivating social, political, economic reason.

Survey was used to gather data for the study. It employed the multi-stage sampling technique and Key Informant Interview. A total of 400 questionnaires were

distributed to FUGs in different communities in Akko, Billiri and Funakaye. Of the 400 questionnaire distributed 380 were returned. Statistical method was used to analyse the data. The variables were analysed using the SPSS 13.0. The key informants were selected from Gombe ADP, FADAMA office, Gombe and NAERLS, A.B.U. Zaria.

Overall, the findings of the study should ease the concerns expressed by some people on the adoption of mobile phones in agricultural extension in a developing country like Nigeria. The results indicated that majority of the FUG members have access to mobile phones and majority can use the SMS facility on their mobile phones. The Agricultural Transformation Agenda of the Federal Ministry Agriculture on extension include a phone-based that involved phone to phone SMS (both voiced and text), computer to phone SMS (both voiced and text), computer to phone voice mail and phone to phone voice mail.

5.2. CONCLUSION

Despite the identified problems associated with using mobile phones for extension in Nigeria, there are potentials for using the device in agricultural information service. The Fadama project should be the first to start using mobile phone for extension, because majority of their members have mobile phones. They use the SMS facility on the phone and also prefer to be contacted through their mobile phones.

Based on these findings, the study made the following conclusions; mobile phones are minimally used by the Gombe ADP and the Fadama office in Gombe for agricultural extension. Majority of Fadama User Groups in Gombe state have access to mobile phones and can use the SMS facility on their mobile phones. Majority of Fadama User Group members in Gombe state preferred mobile phones as a means

through which to communicate with the Fadama office. The major problems identified in using mobile phones for agricultural extension in Gombe state was lack of funds on the part of technical officers involved in extension services. While the major problems identified by this study facing farmers in using mobile phones problems of poor network and power outages.

5.3. RECOMMENDATIONS

Based on the findings and conclusions of this study it can be recommended that:

i. Since majority of respondents indicated preference of using mobile phones to communicate with the FADAMA office, they should be incorporated in the Fadama facilitation programme, where the Fadama office can be reaching its members through the use of facilities the mobile phone can offer. For instance, the Nokia phone has facilities like the WeChat, where users can communicate by text or recorded voice. The application is cheap and affordable.

ii. In view of the finding that majority of the respondents can use the sms facility on their mobile phones the study recommends the extension of the use of mobile phone for extension to the agricultural development project in Gombe state.

iii. To solve the problem of poor network, we recommend service providers to reach areas that are still yet to be connected to the Global Satellite Mobile. This bothers on policy issues, security and accessibility of some areas, but the government both at state and federal level should provide an enabling environment for these companies to operate.

iv. To address the issue of funding the study recommends the need for more collaboration between agricultural ministries both at Federal and State level with donor agencies and technical partners like CTA, and ICT4D to provide funds and technical assistance for the uptake of the use of mobile phones for extension.

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APPENDIX I

QUESTIONNAIRE

DEPARTMENT OF MASS COMMUNICATION, AHMADU BELLO UNIVERSITY, ZARIA-NIGERIA

Dear Respondent,

I am a Post Graduate student of the Department of Mass Communication, Ahmadu Bello University, Zaria. I am carrying out a study on the "The Potential Use of Mobile-Phones for Effective Participatory Extension in the FADAMA Project in Gombe State".Note: information provided will be used only for academic research and nothing else.

Tick the appropriate option

SECTION A

1. Sex:
   Male { } Female: { }

2. Age:
   18 – 25 { } 26 – 35 { } 36 – 45 { } 46 and above { }

3. Educational Level
   SSCE { } Diploma { } Degree { } Others { } specify ……..

4. Income of Respondents per Annum
   N10,000 – N20,000 { } 20,000 – 30,000 { } 30,000 – 40,000 { } 40,000 above { }

5. Marital Status:
   Single { } Married { } Divorced { } Widowed { }

SECTION B

1. Do you own a mobile phone?
   Yes { } No { }

2. If the answer to one above is yes, what do you use the device for?
   i. To call friends { }
   ii. To play games { }
   iii. To send and receive SMS messages { }

3. What network do you use in your area?
   MTN { } Airtel { } Etisalat { } Glo { } Others { } specify …….

4. If you have any problem concerning your farming activities, how do you contact the Fadama Office?
   Mobile phone { } Sending someone to the Fadama Office { } We wait till they visit our area { }

5. How do youcontact the FADAMA office if you have questions to ask them?
   Compile a list of questions and send them { } Community meetings { } Individual meetings { } Radio Programme { }

6. Duration of these contacts?
   Everyday { } 3 Days { } Weekly { } Monthly { }

7. How often have you been contacted through your mobile phone by the FADAMA office?
   Monthly { } Weekly { } Daily { } All the time { }

8. What kind of information do you exchange between you and the Fadamaoffice
   Personal { } Official { }

9. How do you prefer to contact the Fadamaoffice?
   Visiting the office { } Radio { } T.V. { } Mobile Phone { }

10. Have ever been given an opportunity by the Fadamaofficials to ask them questions on how to improve your farming activities:
    Yes { } No { }

11. If yes, what kind of information do you receive from them?
    i. How to improve my fish farm
    ii. How to vaccinate my cows
    iii. Information on prices of agricultural products

12. From what channel do you receive agricultural information?
    Radio { } T.V. { } Extension Publications { } Neighbours { }

13. Have you ever used your mobile phone to receive or ask questions about Fadamaactivities?
    Never { } Once { } Twice { } Not at all { }

14. What kind of information do you receive from Fadama office?
    How to get fertiliser { } Commodity price { } Information on Livestock Vaccination { } Improving my fish and poultry farm { }

15. Using SMS (text) facility on your mobile phone.
    Read and write SMS { } Read SMS only { } Cannot read or write SMS { }

16. Do you use it yourself or do you get somebody else?
    Use it myself { } Get somebody else { } Not at all { }

17. What problem do you face when using your mobile phone?
    Poor Network { } Lack of power to charge my phone { } cannot read or write SMS { }

APPENDIX II
KEY INFORMANT INTERVIEW GUIDE

1. Do Gombe State ADP extension workers use mobile-phone for extension purposes?
2. Do you think mobile-phones can be appropriate means for extension?
3. Do you think the use of mobile phones can increase farmers' participation in extension services?
4. What are the problems and prospects of using mobile phones for extension in Gombe State?
5. What are the problems faced by NAQAS in testing mobile phones for extension?

APPENDIX III

Mobile Phone Monthly Subscriber Data from Oct 2012-Feb, 2013

	OPERATOR	**Feb 13**	**Jan 13**	**Dec 12**	**Nov 12**	**Oct 12**
Connected Lines	Mobile (GSM)	143,327,286	138,081,740	135,253,599	134,354,814	121,660,815
	Mobile (CDMA)	14,113,574	14,041,460	14,041,464	14,005,220	13,965,730
	Fixed	2,438,435	2,438,824	2,419,587	2,405,688	2,403,092
	Total	159,879,295	154,562,024	151,714,650	150,765,722	138,029,637
Active Lines	Mobile (GSM)	113,399,984	111,195,207	109,829,223	106,869,544	105,913,889
	Mobile (CDMA)	2,790,989	2,890,955	2,948,562	3,045,688	3,131,349
	Fixed	405,625	410,664	406,222	418,166	432,899
	Total	116,601,637	114,492,384	113,195,951	110,348,131	109,499,882
Installed Capacity	Mobile (GSM)	196,879,408	196,849,070	182,065,415	182,052,805	189,488,035
	Mobile (CDMA)	18,400,000	18,400,000	18,400,000	18,400,000	18,400,000
	Fixed	11,362,677	11,362,677	11,342,677	11,293,317	11,293,317
	Total	226,642,085	226,611,747	211,808,092	211,746,122	219,181,352
	Teledencity	83.29	81.78	80.85	78.82	78.21

Source: National Communication Commission, (NCC) 2013

Mobile Phone Monthly Subscriber Data from March-July, 2013

	OPERATOR	July 13	June 13	May 13	April 13	Mar 13
Connected Lines	Mobile (GSM)	153,665,051	164,642,742	150,888,100	148,161,358	145,233,707
	Mobile (CDMA)	11,462,206	14,250,514	14,217,718	14,248,485	14,248,537
	Fixed	2,370,289	2,452,697	2,450,260	2,448,538	2,446,521
	Total	167,497,931	181,345,953	167,556,078	164,892,379	161,928,765
Active Lines	Mobile (GSM)	111,866,933	117,412,363	117,765,609	116,325,790	114,172,440
	Mobile (CDMA)	2,519,602	2,567,177	2,593,253	2,633,936	2,703,604
	Fixed	373,871	382,678	389,892	396,939	405,625
	Total	114,760,406	120,362,218	120,748,754	119,356,665	117,281,669
Installed Capacity	Mobile (GSM)	204,242,114	204,242,114	207,705,431	207,683,434	207,653,213
	Mobile (CDMA)	18,400,000	18,400,000	18,400,000	18,400,000	18,400,000
	Fixed	11,431,677	11,384,677	11,384,677	11,364,677	11,362,677
	Total	234,073,791	237,488,111	237,490,108	237,488,111	237,397,890
	Teledencity	81.97	85.25	86.25	85.25	83.77

Source: National Communication Commission, (NCC) 2013

Mobile Phone Monthly Subscriber Data August to December, 2013.

	OPERATOR	DEC 13	NOV. 13	OCT. 13	SEPT 13	AUGUST 13
Connected Lines	Mobile(GSM)	159,758,538	155,938,379	156,129,961	158,239,230	150,891,051
	Mobile(CDMA)	7,684,028	11,241,343	11,341,578	11,307,307	11,344,675
	Fixed	2,233,981	2,459,530	2,458,077	2,414,988	2,362,487
	Total	169,676,545	169,639,252	169,929,616	171,961,525	164,598,213
Active Lines	Mobile(GSM)	124,841,315	121,000,000	119,101,719	118,470,236	109,846,288
	Mobile(CDMA)	2,404,777	2,377,790	2,423,746	2,438,590	2,440,934
	Fixed	360,537	362,434	362,549	382,392	375,217
	Total	127,606,629	123,740,224	121,888,014	121,271,218	112,271,439
Installed Capacity	Mobile(GSM)	-	-	-	210,847,482	210,010,140
	Mobile(CDMA)	-	-	-	18,400,000	18,400,000
	Fixed	-	-	-	11,384,159	11,431,677
	Total	-	-	-	240,679,111	239,842,017
	Teledensity	91.15	88.39	87.06	86.62	80.47

Source: National Communication Commission, (NCC) 2014

Monthly Subscriber Data Jan – April, 2014

	OPERATOR	**April 14**	**Mar 14**	**Feb 14**	**Jan 14**
Connected Lines	Mobile (GSM)	172,913,989	168,595,831	167,371,945	162,719,517
	Mobile (CDMA)	4,076,933	4,083,672	7,620,525	7,667,314
	Fixed	328,388	327,524	2,238,458	2,238,894
	Total	177,319,310	173,007,027	177,230,928	172,625,725
Active Lines	Mobile (GSM)	126,958,904	124,884,842	126,246,648	125,173,177
	Mobile (CDMA)	2,256,612	2,039,391	2,398,581	2,421,970
	Fixed	172,876	172,963	357,612	365,433
	Total	129,391,392	127,097,196	129,002,841	127,960,580
	Teledencity	92.42	90.78	92.14	91.40

Source: National Communication Commission, (NCC) 2014

Quarterly Summary of Operator Data Dec 2012 – Sept 2013

OPERATORS	Dec-12	Mar-13	Jun-13	Sept-13	Q4-Q1	Q1-Q2	Q2-Q3
MTNNigeria	47,440,991	51,294,654	55,238,430	55,596,025	8.12	7.69	0.65
GlobacomLimited	24,124,716	23,833,796	25,019,862	24,129,183	-1.21	4.98	(3.56)
Airtel	23,092,195	23,670,986	21,591,904	22,726,698	2.51	-8.78	5.26
M-TelLimited	258,520	258,520	258,520	258,520	-	-	-
EMTSLimited	14,912,801	15,114,484	15,303,647	15,759,810	1.35	1.25	2.98
Sub-Total(GSM)	109,829,223	114,172,440	117,412,363	118,470,236	3.95	2.84	0.90
StarcommsLimited	307,844	246,501	209,627	118,053	-19.93	-14.96	(10.29)
VisafoneLimited	2,265,874	2,138,154	2,094,785	2,054,410	-5.64	-2.03	(1.93)
MultilinksTelkom	263,767	207,872	151,688	85,050	-21.19	-27.03	(43.93)
RelianceTelecoms	111,077	111,077	111,077	111,077	-	-	-
Sub-Total(CDMAMobile)	2,948,562	2,703,604	2,567,177	2,438,590	(8.31)	(5.05)	(5.01)
StarcommsLimited	109,918	81,015	60,627	43,716	(26.30)	(25.17)	(27.89)
VisafoneLimited	28,552	30,222	31,937	35,443	5.85	5.67	10.98
MultilinksTelkom	44,868	37,667	31,646	24,182	(16.05)	(15.98)	(23.59)
RelianceTelecoms(Reltel)	10,849	10,849	10,849	10,849	-	-	-
IntercellullarNig.Limited	1,053	1,053	1,053	1.053	-	-	-
VGC/MTN	12,912	16,361	16,264	16,956	26.71	(0.59)	4.25
MTS1stCommunications	19,744	19,744	19,744	19,744	-	-	
21stCenturyTechnologies	80,712	88,554	90,938	83,479	9.72	2.08	(7.65)
discCommunications	176	176	176	176	-	-	-
WiTel	80	80	80	80	-	-	-
O'Net(OduaTelecom)	35,421	35,421	35,421	35,421	-	-	-
RainbownetLimited	14,169	14,169	14,169	14,169	-	-	-
MonarchCommunication	513	513	513	513	-	-	-
XSBROADBAND	329	329	329	329	-	-	-
Webcom	120	120	120	120	-	-	-
IPNX	10,602	10,602	10,602	10,602	-	-	-
NITEL	58,750	58,750	58,750	58,750	-	-	-
GlobacomLimited				6,810			
Sub-Total(Fixed/FixedWir	428,768	405,625	382,678	362,392	(5.40)	(5.66)	(5.30)
TOTAL	113,206,553	117,281,669	120,362,218	121.271,218	3.60	2.63	0.76
%OfMobile(GSM)	97.02	97.35	97.55	97.69			
%OfMobile(CDMA)	2.60	2.31	2.13	2.01			
%OfFixed/FixedWireless	0.38	0.35	0.32	0.30			

Source: National Communication Comission, (NCC) 2014

Quarterly Summary of Telecoms Subscribers in Nigeria (Jun '13 – Mar '14)

OPERATORS	Dec-13	Mar-14	Q2-Q3	Q3-Q4	Q4-Q1
MTNNigeria	56,766,085	57,224,316	0.65	2.10	0.81
GlobacomLimited	25,933,867	23,416,867	(3.56)	7.48	(9.71)
Airtel	24,847,567	25,521,046	5.26	9.33	2.71
M-TelLimited	258,520	258,520	-	-	-
EMTSLimited	17,035,276	18,722,613	2.98	8.09	9.90
Sub-Total(GSM)	**124,582,795**	**124,884,842**	**0.90**	**5.39**	**0.24**
StarcommsLimited	180,235	180,235	(10.29)	(4.16)	(4.16)
VisafoneLimited	2,063,330	2,004,010	(1.93)	0.43	(2.87)
MultilinksTelkom	50,135	35,381	(43.93)	(41.05)	(29.43)
RelianceTelecoms	111,077	111,077	-	-	-
Sub-Total(CDMAMobile	**2,404,777**	**2,039,391**	**(4.54)**	**(1.16)**	**(3.33)**
StarcommsLimited	36,631	36,631	(27.89)	(16.21)	(16.21)
VisafoneLimited	38,190	46,046	10.98	7.75	20.57
MultilinksTelkom	16,309	11,061	(23.59)	(32.56)	(32.18)
RelianceTelecoms(Reltel	10,849	10,849	-	-	-
IntercellullarNig.Limited	1,053	1,053	-	-	-
VGC/MTN	17,322	15,169	4.25	2.16	(12.43)
MTS1stCommunications	19,744	19,744		-	
21stCenturyTechnologies	93,346	93,692	(7.65)	11.82	0.37
discCommunications	176	176	-	-	-
WiTel	80	80	-	-	-
O'Net(OduaTelecom)	35,421	35,421	-	-	-
RainbownetLimited	14,169	14,169	-	-	-
MonarchCommunications	513	513	-	-	-
XSBROADBAND	329	329	-	-	-
Webcom	120	120	-	-	-
IPNX	10,602	10,602	-	-	-
NITEL	58,750	58,750	-	-	-
GlobacomLimited					
Sub-Total(Fixed/FixedWi	**172,100**	**172,963**	**(1.98)**	**3.13**	**0.50**
TOTAL	**127,167,874**	**127,097,196**	**0.78**	**5.25**	**0.18**
%OfMobile(GSM)	97.97	98.26			
%OfMobile(CDMA)	1.75	1.60			
%OfFixed/FixedWireless	0.28	0.14			

NOTE: Inactive Operators are not included in Total Calculations

Source: National Communication Comission, (NCC) 2014