UTILIZATION OF MOBILE PHONES FOR AGRICULTURAL INFORMATION ACCESS AND USE BY RURAL FARMERS IN KARAYE LOCALGOVERNMENT AREA, KANO STATE, NIGERIA

BY

ALHASSAN YAHAYA KARAYE

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE,
AHMADU BELLO UNVERSITY,
ZARIA, NIGERIA

MARCH, 2017

UTILIZATION OF MOBILE PHONES FOR AGRICULTURAL INFORMATION ACCESS AND USE BY RURAL FARMERS IN KARAYE LOCAL GOVERNMENT AREA, KANO STATE, NIGERIA

BY

ALHASSAN Yahaya Karaye
(MLS/EDUC/34547/012-013)

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA

IN PARTIAL FULFILLMENT OF THE REQUIRMENTS FOR THE AWARD OF AMASTER DEGREE IN LIBRARY AND INFORMATION SCIENCE (MLIS).
DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE,

FACULTY OF EDUCATION
AHMADU BELLO UNVERSITY,
ZARIA, NIGERIA

MARCH, 2017

DECLARATION

I declare that the work in thisDissertation entitled Utilization of Mobile phones for Agricultural Information, Access and Use by Rural Farmers in Karaye Local Government Area, Kano State has been carried out by me in the Department of Library and Information Science. Theinformation derived from available literatures has been duly acknowledged and a list of references provided. No part of the Dissertation was previously presented for the award of another degree at this or any other Institution.

ALHASSAN Yahaya Karaye **……..**
……

Signature **Date**

CERTIFICATION

This Dissertation entitled "Utilization of Mobile phones for Agricultural Information Access and Use by Rural Farmers in Karaye Local Government Area, Kano States" by Yahaya Karaye ALHASSAN had meets the regulations governing the award of the degree of Master's Degree in Library and Information Science (MLIS) of Ahmadu Bello University, Zaria-Nigeria, and is approved for its contribution to knowledge and literary presentation.

Prof. Zakari Mohammed ---------- ----------
Chairman, Supervisory Committee **Signature** **Date**

Dr. Babangida Umar Dangani ---------- ----------
Member, Supervisory Committee **Signature** **Date**

Dr. Habibu Muhammed ---------- ----------
Head of Department of Department **Signature** **Date**

Prof. A. Z. Abubakar ---------- ----------
Dean Postgraduate School **Signature** **Date**
Ahmadu Bello University, Zaria

DEDICATION

To the blessed memory of my beloved father late Malam Alhassan Musa, tomy mother, sons and daughters i.e. Sadiya (Momi),Abubakar (Khalifa), Ibrahim, Khadija, Umar (Amir), Bilkisu, Aisha, Zhuwaira, Maryam, Abdullahi, Aliyu, Yusuf, and Usman Yahaya Karaye.

ACKNOWLEDGEMENT

First and foremost I wish to express my gratitude to Allah Subhanahu Wataala Who gives me the opportunity, courage and wisdom to successfully complete this programmed.

My profound gratitude and appreciation goes to my supervisors, Prof. Zakari Mohammed and Dr. Babangida Umar Dangani for their encouragement, constructive criticism, understanding and patience throughout the period of this work despite their tight schedules went through the manuscript and made corrections that reshaped the work, I once again say thank you.

I will like to thank my lecturers in the Department of Library and Information Science Ahmadu Bello University, Zaria for their support. They include: Dr. Habib Muhammad (Head of Department), prof. Umar Ibrahim, prof. Tijjani Abubakar, Prof. I. Ekoja, Prof. H. M. Daudu,Dr. Baba S. Aduku, Dr. Abdullahi Musa, Mal. M. M. Hayatu, Mrs. F.M. Mohammed, Mal. Aliyu Abdulkadir, Mal. Aliyu Lawal, and Mal. Jibril Abdurrahman for their support, contribution and encouragement towards the successful completion of this study. My appreciation also goes to my internal examinerProf. H. M. Daudu and external examiner Prof. L. I. Disu -Department of Library and Information SciencesBayero University, Kano for their valuable contribution in this study.

My appreciation also goes to Dr. Umar Lawal Gade, Prof. Muhammad Sani Sallau of Chemistry Department A.B.U. Zaria, and Mal. Aminu Bala Danyaro of English and Literary Studies Department Bayero University, Kano and Shu'aibu Sani Bagwai of Radio Nigeria Kaduna, and Malam Jibrin Mal. Muntari Hamisawa Karaye. This work would have not be successful without their tireless effort and unflinching support,

spiritually and morally. Your constant advice saw me through to the successful completion of this work. May Almighty Allah reward you with Jannatul Firdausi.

I wish to sincerely thank my course mates-Ibrahim Hassan Nasarawa, Halilu Sani Shuaibu, Mustapha Munnir, Umar Muktar Dandume, and my friends at home -Mustapha Maitama, Sule Ahmad Karaye, and Ibrahim Musa(Quartz)who had been my source of motivation and encouragement. I am indeed grateful to have you around throughout the period of this work. Miss Iheshiulor Deborah you are also unforgettable to me for wonderful and beautiful typesetting of this Dissertation.

I also appreciated the support of my family members: Kabiru Alhassan, Aminu Alhassan, Magaji Alhassan Rabi, Rukayyatu, Abubakar, Amina and Aisha Alhassan respectively.

I wish to also express my deep gratitude to all the extension workers in the Department of Agriculture in Karaye Local GovernmentArea, Kano State. Special, gratitude goes to my respondents-the rural farmers those I saw physically, and those that responded to the questionnaire. Thank you and God bless abundantly.

ABSTRACT

This study investigated the Utilisation of Mobile Phones for Agricultural Information Access and Use by Rural Farmers in Karaye Local Government Area, Kano State. Five (5) research questions and objectives were formulated. The research objectives sought to : ascertain how the rural farmers utilized mobile phones to access agricultural information for use in Karaye Local Government Area Kano State; determine the extent of use of mobile phones; find out the types of agricultural information that were accessed through mobile phones; investigate the extent to which the agricultural information accessed through mobile phones was utilized; and to reveal thechallenges to the utilization of mobile phones for agricultural information access.A survey research method was employed in the conduct of the study.The population of the study consists of all the registeredrural farmers in ten (10) wards of Karaye Local Government Area, Kano State of Nigeria. Out of the total population of 1,279 registered rural farmers, 121 farmers and three (3) wardswere purposively selected. A structured questionnaire containing closed-ended questionnaire was designed and used for data collection. Data related to the research questions were analysed using frequency tables and percentages. The findings of the study revealed that the major procedure through which the rural farmers utilized mobile phones to access agricultural information was through Short Text Message Service (SMS), majority of the rural farmersused mobile phones to access and utilize agricultural information monthly and occasionally, information about herbicide control was the major type of agricultural information accessed through mobile phone, majority of the rural farmers utilized information about pest and disease control as well as information about livestock management annually, and inability to access formal

channel of information was the major challenge to the rural farmers encountered with regards to the utilization of mobile phones for agricultural information access and use. The study recommended that rural farmers in Karaye Local Government Area, Kano State should stick to the use of short text message services (SMS) and make appropriate and timely use of mobile phones by making voice calls to accessagricultural information - so as to have direct contact with extension workers and other relevant stake holders, rural farmers should also be encouraged to access other different types of agricultural information such as information about new improved seeds; they should also be encouraged to make timely utilization of accessed agricultural information; and the government of Nigeria (through State and Local authorities) should enhance access to formal channel of information such as the extension workers by collaborating with telecommunication companies in establishing network services in rural areas for timely access to agricultural information that would improve agricultural productivity.

TABLE OF CONTENTS

TITLE PAGE i

DECLARATION ii

CERTIFICATION iii

DEDICATION iv

ACKNOWLEDGEMENTS v

ABSTRACT vii

TABLE OF CONTENTS viii

LISTS OF TABLES xi

LIST OF ABBREVIATIONS xii

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study 1

1.2 Statement of Problem 7

1.3 Research Questions 9

1.4 Objectives of the Study 9

1.5 Significance of the Study 10

1.6 Scope of the Study 11

1.7 Limitation of the Study 11

1.8 Operational Definition of Key Terms 12

References 13

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 Introduction….. 16

2.2Utilization of Mobile Phones for Agricultural Information Access and Use.. .17

2.3 Types of Agricultural Information .. .. .19

2.3.1 Sources of Agricultural Information 24

2.4 Access to Agricultural Information… .. .. .25

2.5 Utilization of Agricultural Information .. .. .26

2.5.1 Factors that Influence Access and Utilization of Agricultural Information.. .27

2.5.1.1Household's Personal and Demographic Variable 28

2.5.1.2 Household's Socio-economic Variable….. .. .. .30

2.5.1.3Institutional Factors 31

2.6 Challenges to the Utilization of Mobile Phones for Agricultural Information Access and Use .. .. .32

2.7 Summary of the Review 33

References 34

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction 38

3.2 Research Method Adopted for the Study 38

3.3 Population of the Study 39

3.4 Sample and Sampling Techniques 40

3.5 Instrument for Data Collection 42

3.5.1 Questionnaire 42

3.6 Validity of the Instrument.. .. .. .43

3.7 Reliability of the Instrument 43

3.8 Procedure for Data Collection 44

3.9 Procedure for Data Analysis 45

References 46

CHAPTER FOUR: DATA PRESNTATION, ANALYSIS AND DISCUSSION

4.1Introduction 47

4.2 Response Rate 47

4.3 Demographic Analysis of the Respondents 48

4.3.1 Gender Distribution of the Respondents 48

4.3.2 Age Distribution of the Respondents 49

4.3.3 Marital Status of the Respondents 50

4.3.4 RespondentsEducational Level 51

4.4Procedure for Utilising Mobile Phones in Accessing Agricultural Information 53

4.5 Extent of Use of Mobile Phones in Accessing Agricultural Information .. .57

4.6 Types of Agricultural Information Accessed through Mobile Phones .. .59

4.7 Extent of Utilization of Agricultural Information through Mobile Phones .65

4.8 Challengesto the Utilisation of MobilePhones for Agricultural Information Access 67

References 70

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction 71

5.2 Summary of the Study 71

5.3 Summary of the Major Findings 72

5.4Conclusion. .. .. .72

5.5 Contributions to knowledge .. .. .73

5.6 Recommendations 74

5.7 Suggestion for further Research… .. .. .75

BIBLIOGRAPHY 76

Appendix I 84

Appendix II 85

Appendix III 91

LIST OF TABLES

Table 3.1 Distribution of Registered Rural Farmers across Ten Wards in Karaye Local Government Area.. 40

Table 3.2 Sample Distribution of RuralFarmers across 3 Wards in Karaye L.G.A. ..42

Table 4.1 Response Rate Distribution of the Rural Farmers according to their Wards ..48

Table 4.2 Gender Distribution of the Respondents.. 48

Table 4.3 Age Distribution of the Respondents.. 49

Table 4.4 Distribution of the Marital Status of the Respondents.. 51

Table 4.5 Respondents EducationalLevel.. 52

Table 4.6 Procedures for Utilising Mobile Phones.. 54

Table4.6.1 Benefits ofMobile Phones in Accessing Agricultural.. 56

Table 4.7 Extent of Use of Mobile Phones to Access and Utilise Agricultural. .. 58

Table 4.8 Types of Agricultural Information that were Accessed through Mobile Phones by the Rural Farmers.... 60

Table 4.8.1 Sources of Access to Agricultural Information.. 62

Table 4.8.2 Types of Agricultural Activities Practiced by the Rural Farmers.. .. .64

Table 4.9 Extent of Agricultural Information Accessed through Mobile Phones ..66

Table 4.10 Challenges to the Utilisation of Mobile Phones for Agricultural Information Accessed and Used by the Rural Farmers.. 68

LIST OF ABBREVIATION

ABU: Ahmadu Bello University

ADB: Agricultural Development Bank

Dr.: Doctor

F: Frequency

FAO: Food and Agricultural Organization

GSM: Global System of Mobile Communication

ICT: Information and Communication Technology

LGA: Local Government Area

Mal.: Malam

MLS: Masters in Library and Information Science

Mis.:Miss

NGOs : Non-Governmental Organisations

No.: Number

PPMC: Pearson Product Moment Correlation

Prof. : Professor

SMS: Short Message Service

S/N: Serial Number

%: Percentage

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Agriculture is a vital economic activity in different third world countries where most population of the country lives in the rural areas and derives their livelihoods, directly or indirectly, from agriculture (Alila and Atieno, 2006). Anyanwu (1987) defined agriculture as involving cultivation of land, raising and rearing of animals for the purpose of providing food for man, feed for animals and raw materials for industries. It involves forestry, fishing, processing and marketing of the agricultural products. Therefore, agriculture in Nigeria is the most important sector of the economy from the standpoint of rural employment, sufficiency in food and fiber, and export earning prior to the discovery of oil and of course with current down fall of the oil prices in the global market. Muhammed (2007) asserted, indeed a high share of rural communities and especially the rural poor are directly or indirectly dependent on agriculture through farming, food processing, fishing, forestry, and trade. It employs nearly 80% of the people who are mostly rural or small-scale farmers and as well as contributes 40% to the nation's GDP (NPC, 2006). But more than 70% of these farms at subsistence level (Nigeria millennium Development Report, 2004). As a result of that Nigerian government is spending its enormous foreign exchange in food importation. Adesina (2012) asserted that the country spends about $11 billion a year importing key foodstuffs.

On the other hand, information has been identified as an important and crucial variable in transforming agricultural production of many developing countries.Morrow *et al*. (2002) and Oguya (2007) posit that informationis regarded as one of the most valuable resource in agricultural and rural development programmes. Mohammed (2012) defined information as "anything we physically or otherwise come across consciously or unconsciously and accidentally or intentionally that adds positively or otherwise to our existing knowledge, ideas and experiences.Agricultural information in particular is a key component in improving rural farmer's agricultural productivity. Insupport of this, Adebayo (2006) argued that agricultural information is no doubt central in enhancing agricultural productivity and facilitating poverty alleviation among rural farmers. Agricultural information, as suggested by Agbamu, (2006) is definedas all published or unpublished knowledge in all aspects of agriculture. Therefor, agricultural information is afactor which interacts with the other production factors that can helpinform decisions regarding land, labour,livestock, andcapital for the attainment of farmer's sufficient production. In the absence of timely and relevantinformation, agricultural researchers, extension workers and famers often find it difficult to make the right decisions(Aina, 1999).

Access and use of appropriate agricultural information however, is an overriding factor for the attainment of successful and sufficient agricultural production and rural development.This point to the fact that farmers can make a difference in any circumstance to the extent they are able and capable of accessing and utilizingagricultural information for their agricultural production. On the contrary, Nigerian farmers are reported not to feel the impact of agricultural innovation mainly because they have no

access to vital information or due to poor dissemination (Oguya, 2007).To enhance the production and productivity of agriculture, farmers should have access to well organize and relevant information, and proper and sufficient utilization of agricultural information requires good facilitation (Tadesse, 2008). Also, Blait (1996) pointed out that the least expensive input for improved agricultural development is adequate access to knowledge and information in areas of new agricultural technologies, early warning system (drought, pests, diseases etc.),improved seedlings, fertilizer, credit, market prices etc.

As such,in order to provide access to agricultural information that will profile solutions to rural farmers' agricultural production and productivity, researches proven technical information that will provide solutions to farmer's needs and problems becomes pertinent to makes these solutions available between researcher, extension and farmers subsystems. Poverty and Rural-urban migration prevail in Nigeria because there are weak linkages between researcher, extension and farmers. The agricultural extension agencies through Federal, State, Local Government and other related organization are established to ensure that information is disseminated through the various agricultural information sourcesso as to inform farmers about recent agricultural development and practices. The informal sources on the hand which farmers access information comprise of village head or ward, the school headmasters, religious leaders and other elite groups in the community which include friends and relatives, markets women as well as non-governmental organization (NGOs) (Finan,2012).

Extension ratio to farmers 1:3000 farm families and inadequate to mobility are other constraints toaccess and use of research proven and relevant agricultural technologies that aim at profile solution to hunger, poverty rural urban migration and untimely death of

many farmers in Nigeria. This situation undermines the timeliness of agricultural practices and need for timely delivery and use of agricultural information that will empower farmers so that they will have control over their farming environment. In view of this, it becomes essential to establish strong linkages between the Nigeria agricultural research, extension and farmer sub-system in order to empower capacity of farmers in production. An essential step toward achieving this aim is establishment of good communication and information network, through integration of ICT usage in the research, extension and farmer linkage systems.The advancements in the information and communication technologies (ICTs) such as mobile telephone provide anopportunity for developing countries to harness and utilize information and knowledge to improve productivity in various sectors including agriculture (Lwoga & Ngulubes, 2008).

In Nigeria, the government in recognition of the importance ofcommunication devices in agricultural activities, established policies and projects in this regard; among which are;the launching of the Global System of Mobile (GSM) communication-making phone lines more accessible nationwideand the Growth Enhancement Support Scheme (GES), which was designed to deliver government subsidized farm inputs directly to the farmers via mobile phones (Egbule,*et, al*. 2013.Extension agencies can adequately serve the farmers with needed agricultural information in case ICT component such as mobile are employed alongside television and radio. Lawal (2008) Opined that there will be quick exchange of agricultural information between extension agents and farmers if ICT components are integrated in delivery of agricultural information to framers in Nigeria. In the same vein, extension agents will relay farmers' information needs to researchers and rapidly access large amount of information from the researchers through mobile phones

for onward dissemination to farmers. Mobile telephone is a ready platform that when adequately utilized can assure access and use of agricultural information to rural farmers in Nigeria and particularly in Karaye local government area predominantly occupied by farmers.

Mobile telephony is the predominant mode of information communication that has made a huge difference in the lives of farmers in some developing countries of Africa a continent where the agriculture sector is one of the largest employers. The uses of mobile phone only require basic literacy, and therefore, are accessibleto a large portionof the population.Onwuemele (2011) asserted that telecommunications companies have continued to expand their coverage, hence many rural communities, especially those along main roads, have access to mobile phone service, and consequently mobile phones have reached 80% of the populace (Iroko, 2012).

Meanwhile,Nigeria,with the total estimated population of177,155,754 has mobile telephone subscriptions of 167,371,945 that is 95.45% of the entire population and will also continue to be Africa's biggest mobile market as forecasted to have 168.99 million subscriptions at the end of 2017 (Nigerian Telecommunication Commission, 2013). With such fast growth in mobile telephony, mobile telephones become indispensable and can facilitate agricultural information access and use by rural farmers. Utilization of mobile telephone could stimulate increased production, linking farmers to remunerative markets,farmer groups, source and availability of seeds and other inputs, researchers, research institutes, and the extension workers and other major key stakeholders.

The mobile telephone is no longer just an audio communication tool but capable of providing additional integrated functions such as sending and receiving short messages (SMS), audio and video taping, and other multimedia services.The complexities of the agricultural production function imply that farmers need agricultural information on a variety of topics and at a variety of stages.Mobile phone-based services have proliferated in recent years, providing new ways to access price and market information, and coordinate input/output resources including transport and logistics, finance and production techniques (Gakuru, Winters & Stepman, 2009; and Qiang *et al.,* 2011).

Most rural areas in developing countries have information asymmetry problem, they live in information-deserted areas(Esselaar *et al*., 2001). Thus, traditional mechanisms such as face to face, the use of letters and radios are not yielding positive result for them in access and use of agricultural information.One major evidence being that farmers and small entrepreneurs generally have no reliable way of knowing prices and other agricultural related information before they travel to the markets due to poor communication facilities. Farmers' participation in market and transport management has been so poor that most of the time they are being forced to sell their products to local middlemen at low prices (Sood, 2006). Minot, (2005) is with the view that, farmers' level of access and awareness regarding agricultural information is low hence poor decisions on the use of scarce resources and farming technologies.

Understanding reasons behind such diversity and farmers current level of access and utilization of agricultural information is of paramount importance, especially the rural or small scale farmers who depend largely on agriculture for survival. Adhiguru *et*

al.,(2009) posit that, small and marginal farmers accessed less information, and from fewer sources, than medium and large-scale farmers. Studies like this show the heterogeneity of farmer's access and use of agricultural information.Given the fact that there are disparities to theaccessibility and utility of the mobile phonedevicesin developing world contexts, it is therefore, important to investigate the application of these tools for the attainmentof improved farming activities especially in the rural areas.

1.2Statement of the Problem

Among Information and Communication Technologydevices, there is no doubt that mobile telephone is an opportunity for developing countriesbecause; it isone of the most important driving forces behind globalization.As mobile phones diffusion started to grow in many developing countries, its application in agricultural and rural development began to draw the attention of both researchers and policy makers so much so that they can be used to enhance agricultural productivity.Mobile telephony is increasing day by day for greater and faster interaction within different groups of people from different societies especially among farmers (Khong *et al.,* 2009).

Bako (2007) states that mobile phone makes it easier to get access to certain information without going to the site of event. While,Ilahiane (2007) posits that, with mobile phones farmers have made tentative decisions much more easily than without them.It raised farmers' incomes, making agricultural market more efficient, lowering farming and transport costs. Working with and improving these information and communication systems ensure better delivery of agricultural services (Aker, 2008).

On the other hand,the traditional approaches toaccessanduse of agricultural information for agricultural production by farmers such as farm visit, radio programme, pamphlets, middlemen, neighbors and friendsare not yielding positive result. According to Salau and Saingbe (2008)given the urgent need for current agricultural information by farmers, the use of conventional communication methods such as farm and home visits and the use of contact farmers in accessing and utilization of agricultural information are counterproductive.Donner(2008) point out that withinagriculturalsector, access to information through the use of information and communication technologies is critical to economic growth, especially in resource-constrained environments.

Despite the opportunitiesoffered by the use of mobile phones for improved agricultural production, observation and preliminary investigation by the researcher revealed that rural farmers in Karaye Local Government Area, Kano State were inherently imprisoned by insufficient production and poor harvest.Consequences of this insufficient production and poor harvest are evident in; poverty, rural urban migration, and untimely death of many people. NNPC (2004) asserted that farming population comprises predominantly resource-poor peasants, cultivating an average of about two hectares of land usually on scattered holdings with low and declining productivity. Could this problem of insufficient production and poor harvest be attributed to utilization of mobile phones for agricultural information access and use? Erensein *et al.* (2004) argued that the low usage of mobile phones may be responsible for the relative low yield of 147kg/ha obtained by the sampled farmers compared with the average of 2100kgvv /ha obtained from NERICA rice trials conducted in 21 States by the National Rice/Maize Centre.

It wasagainst,insufficient production and poor harvestthat,this research was set out to investigate utilization of mobile phones for agricultural information access and useby rural farmers in Karaye Local Government Area, Kano State.

1.3 Research Questions

The study is set to answer the following research questions:

1. How do the rural farmers utilize mobile phones to access agricultural information in Karaye Local Government Area, Kano State?
2. To what extent do farmers usemobile phones to access and utilize agricultural information?
3. What types of agricultural information are accessed through mobile phones by rural farmers?
4. To what extent is the agricultural information accessed through mobile phones are utilized by farmers?
5. What challenges do these farmers face in the utilization of mobile phones to access and utilize agricultural informationin Karaye Local Government Area, Kano State?

1.4 Objectives of the study

The study is based on the following objectives:

1. To ascertain how the rural farmers utilize mobile phones to access agricultural informationin Karaye Local Government Area, Kano State.

2. To determine the extent to which these farmers use mobile phones to access and Utilize agricultural information.

3. To find out the types of agricultural informationthat wasaccessed through mobile

phone by these rural farmers.

4. To investigate the extent to which the agricultural information accessed through mobile phones were utilized by rural farmers.

5. To revealchallenges that these farmers face in the utilization of mobile phones to access and utilize agricultural informationin Karaye Local Government Area, Kano State.

1.5 Significance of the study

The study was timely as mobile telephony had become a predominant mode of communication,as such the findings of this study is hope to immensely contribute to the existing body of knowledge in informationresearchwork by exploring the implication of a communication device like mobile phone to access and use agricultural information for improved agricultural production. Also, to policy makers, government officials- (Federal; State;and Local),agricultural extension workers, and researchers the finding couldhelp them torealizemore aboutthe contributions of mobile telephony in agriculture, so as to promptly succeed in planning and taking strategic actions that could pave way to the development of agriculture in Nigeria.

Rural Farmers also,through this study could succeed in attaining sufficient production and bumper harvest by understanding the opportunities behind adequate and timely use of mobile phonesin accessing and utilization of agricultural information.Lastly, the finding is hope to provide an immense contribution to the society that would facilitate the bridging ofurban-rural digital and information divide that exists between urban and ruralareas, which could be a serious contributing factor to low agricultural productivity by the rural farmers.

1.6 Scope of the Study

The research was limited to Utilization of Mobile Phones for Agricultural Information Access and Use by Rural Farmers. It covered rural farmers in the Ten (10) wards of Karaye Local Government. These were: Magajin-Gari, Magaji-Haji, Yammedi, Kafin-Dabga, Kurugu, Kwanyawa, Tudun-Kaya, Daura, Turawa, and Yola. Specifically, the rural farmers involved in the study were literate rural farmers (those that can read and write). Simply, because they are leaders of rural farmers' groups who normally represent the farmers and that usually have more contact with extension workers and other relevant agricultural stakeholders.

1.7 Limitations of the Study

A number of difficulties were experienced during the data collection process. Although the researcher arranged thatagricultural extension workers would assistthe researcher while distributing questionnaire and also the farmers while filling in the questionnaires where necessary, many of them did not fill the questionnaire at the time expected. It took lots of the researcher's time to collect back the filled questionnairefrom the respondents because the wards involved in the studyand where the population of the study (rural farmers) lived are widely dispersed acrossthe ten wards of Karaye Local Government geographical areas. In some instances, the researcher observed, some rural farmers were not willing to fill the questionnaire possibly due to the fact that many of the rural farmers were not familiar with filling of questionnaire for research purpose like this one. As suchparticular attention was paid to those that can read and write so as to successfully fill the research questionnaire.

1.8 Operational definition of Key Terms

For understanding the context and usage of the work, the following key terms were defined operationally.

Access: is defined as getting information or receiving messages related to agricultural production activity from different sources such as mass media, extension agent, personal contact or visit, on-farm research, etc.Including its frequency.

Agricultural information: is operationally defined asthe various sets of information or messages that are relevant to agricultural production activities of therural farmers.

ICT: is broadly interpreted as any technology that facilitate communication and the processing and transition of information by electronic means.

Literate: those farmers that can read and write and use simple literacy skill to use mobile phone to communicate.

Mobile phone: is a device or tool that can be used in receiving and sending information across wide geographical areas.

Rural Farmers:are people living in a given community predominantly subsistence farmers with low income, access and use to agricultural information**.**

Use: in the context of this studyrelates to the utilization or converting into action the accessed agriculturalinformation or messagesfor the sustenanceof rural farmers'agricultural productivity. The frequency of converting received messages into action is also considered.

Utilization: Refers to use of something in an effective way.

References

Adebayo, K. (2006). Modeling the Uptake of Agricultural Knowledge and Information among Small Farmers in Ogun State, Nigeria.*Journal of Agricultural Extension*, 9: p.116.

Adesina, (2012). P*unch Newspaper*,December 28, 2012: Growth Enhancement Support Scheme saved Agric Sector, http://www.punchng.com/business/industry/growth-enhancementsupport-scheme-saved-agric-sector-adesina/

Adhiguru, P. P. S. Birthal, &B.G. Kumar (2009). ''Strengthening Pluralistic Agricultural Information Delivery System in India''.*Agricultural Economics Review*.22:71-79

Agbamu, J.U., (2006). *Essentials of Agricultural Communication in Nigeria*, Lagos: Malthouse press Ltd

Aina, L.O. (1999). Decision makers and agricultural information in Africa: the potential role of the Internet. *IAALD Quarterly Bulletin*, XLIV(l/2) 96-99.v

Aker, J. C. (2008). *Does Digital Divide or Provide? Impacts of Cell Phones on Grain Markets in Niger*, Working Paper Number 154, Centre for Global Development, Washington, USA. [http://www.cgdev.org/content/detail/894410] site visited on 8/12/2010.

Alila, P. O.,& Atieno, R. (2006).*Agricultural policy in Kenya: Issues and processes*. In the proceedings of the Future Agricultures Consortium Workshop, Institute of Development Studies. March 20-22.4.

Anyanwu, J.C. (1987). The Structure of Nigeria Economy.Onitsha Joannee Educational Publisher Ltd. Onitsha.

Bako, N. (2001). "*Information Technology And Nigeria Mass Media*". Retrieved From Http://Www.Mobilephonetool.Htm

Balit, S., Calvelo Rios, M., & Masias, L. (1996). Communication for development for Latin America: a regional experience. FAO, Rome Italy.

Donner,J. (2009). Mobile-based livelihood services in Africa: pilots and early deployments, in M. Fernandez-Ardevol & A. Ros (Eds) Communication Technologies in Latin America andAfrica: *A Multidisciplinary Perspective*: 37-58, Barcelona, IN3.

Ebgule, C.L., Agwu, A. E. & Uzokwe, U.N (2013).Availability and Use of Mobile Phones for Information Dissemination by Public Extension Agents in Delta State, Nigeria.*Journal of Agricultural Extension* Vol.17 (24)

Erenstein, O.,Lancon, F., Osiname, O. & Kebbeh, M. (2004). *Operationalizing the strategic framework for rice sector revitalization in Nigeria*.Project Report – The Nigerian rice economy in a competitive world constraints, opportunities and strategic choices.

Esselaar, P., Hesselmark, O., James, T.&Miller, J. (2001). Final report: A three country ICT survey for Rwanda, Tanzania, and Mozambique.[http://www.trigrammic.com/downloads/SIDA%20Final%20Project%20Report.pdf] site visited on 21/7/2010

Finan, M.B. (2012) A basic course in theory of interest and derivates markets. Preparation for the actuarial exam FM/2. Arkanas tech university.

Gakuru, M. Winters, K.& Stepman, F. (2009) and Qiang *et, al.* (2011) Inventory of innovative farmer advisory services using ICTs, Forum for Agricultural Research in Africa. [On-line] http://www.faraafrica.org/media/uploads/File/NSF2/RAILS/Innovative_Farmer_Advisory_Systems.pdf

Ilahiane, H., 2007. *Impacts of ICTs in agriculture: Farmers and mobile phones in Morocco.* Paper Presented at the American Anthropological Association Conference, Washington, D.C. United States of America. 1. -3 December 2007.

Iroko M. "FG Abandons $200M Rural Telephony Project" Zimbio Inc., 2012.Retrieved , 22/07/12 at http://www. zimbio.com/Nigeria/articles/GnjWJ99uezp/FG+ABANDONS+200M+RURAL+TELEPHONY+PROJECT

Khong Siong,&Binshan Lin (2009), Internet-based ICT adoption: evidence from Malaysian SMEs, *Industrial Management & Data Systems,* 109(2),: 45-58,. 25.

Lawal, A.O. (2008) Information and Communication Technology Usage in ResearchExtension-Farmers Linkages system for Agricultural Development in South West Nigeria Unpublished PhD Thesis of University of Agriculture Abeokuta Nigeria

Lwoga, E. T. &Ngulube, P. 2008. Managing indigenous and exogenous knowledge through information and communication technologies for agricultural development and achievement of the UN Millennium Development Goals. In Njobvu, B. & Koopman, S. (Eds).*Libraries and information services towards the attainment of the UN MillenniumDevelopment Goals* (pp. 73-88). Berlin: Walter de Gruyter.

Minot, N. (2005). Are Poor, Remote Areas Left Behind in Agricultural Development: The Case of Tanzania. *MTID Discussion Paper No.90, International Food Policy Research Institute.* Washington D.C. 243pp.

Mohammed,Z. (2012).*The Dynamics of Information: Embracing the Present to Cope with the Future.*Seventh Tai Solarin National Memorial Lecture held on 27th September, 2012,Victoria Island, Lagos.

Morrow, K; Nielse, F.& Wettasinha, C. (2002) *Changing Information Flows. LEISA* 18 (12): 4-5.

Muhammed, M.A.S (2007). Rural Development and Enterprise Development, Alexandria: Sustainable Development Association.

National Population Commission (NPC): "The Nigeria Population Census, 2006." Retrieved from http://www.population.gov.ng/index.php?option=com_content&view=artide&id=89 (verified on 12 December, 2011).

Nigerian National planning Commission (2004). Meeting Everyone's Needs- National Economic Empowerment and Development Strategy: Nigerian National Planning Commission, Abuja.

Nigerian Telecommunication Commission (2013)"Industry Statistics-> Subscriber Data". Retrieved on 2013-07-28.

Oguya, V. (2007).*CTA Vision for the Question and Answer Service (QAS)*. Paper Presented at NAQAS Stakeholders meeting on Strategies to involve farmers in NAQAS Service in Nigeria held at NAERLS/ABU Zaria. 8Pp

Onwuemele A. (2011). "Impact of Mobile Phones on Rural Livelihoods Assets in Rural Nigeria: A CaseStudy of Ovia North East Local Government Area" *JORIND* 9 (2): 223-236.

Salau, E.S.&Saingbe, N.D. (2008). Access and Utilization of Information and Communication Technologies(ICTs) among Agricultural Researchers and Extension Workers in Selected institutions in Nasarawa State, Nigeria.*Production and Technology (PTA)* 2008; 4 (2): 1-11Accessed on 23rd April, 2012 from http//www.patnsukjournal.com

Sood, D. (2006). The Mobile Development Report: The Socio-Economic Dynamics of Mobile Communications in Rural Areas and their Consequences for Development.[http://cks.in/mdr/Mobile%20Development %20Report_updated.pdf] site visited on 21/3/2010.

Tadesse, D. (2008). Access and Utilization of agricultural Information by Resettler Farming Households: The case of MetemaWoreda, North Gondar, Ethiopia M. Sc. Thesis.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1Introduction

This chapter reviewedliteratures that are related to this study. According to Mgenda and Mgenda (1999) the review of literature involves the systematic identification, location and analysis of documents containing information related to the research problem being investigated.The literature was derived from textbooks, journals (online and print) and other reference sources with the aim of putting the study in proper perspective. In order to achieve that effectively, the reviewed literatures were organized under the following headings:

2.2 Utilization of Mobile Phones for Agricultural Information Access and Use

2.3 Types of Agricultural Information

2.4 Sources of agricultural information

2.5 Access to agricultural information

2.5 Utilization ofagricultural information

2.5.1Factors that influence access and utilization of agricultural information

2.6 Challenges to the utilization of mobile phone use for agricultural information access and use.

2.7 Summary of the review

2.2 Utilization of Mobile Phones for Agricultural Information Access and Use

Mobile phones without doubt are amongst the main instruments that can help agriculture community especially to ease the communication process, so agriculture community must be encouraged to utilize it wisely. It has great role to play for agricultural information access and use as investigated in some previous studies.

In a research carried out by Brandie (2011) on Mobile phones and rural livelihoods: An exploration of mobile phone diffusion, uses, and perceived impacts of uses among small- to medium- size farm holders in Kamuli District, Uganda. The study introduction states that, according to the Global System for Mobile Communications, there are more than 2.5 billion mobile phone subscribers all over the world. It is projected that by 2010, mobile phones will cover 90 percent of the planet (GSM, 2008). The study used quantitative methodology, survey research method, qualitative interviews as instrument and the research questions were: What are the agricultural-based uses of the mobile phone? When was the mobile phone adopted? In terms of innovation attributes, what determined adoption of the mobile phone? How have mobile phone applications been altered to fit the needs of the user? What is the perceived impact of agricultural-based uses of the mobile phone to individual adopters? Etc. Findings includes, more than half of the farmers were using mobile phones to coordinate access to agricultural inputs, obtain market information, and to monitor agriculture emergency situations and financial transactions and slightly less than half were consulting with experts via mobile phones, etc. Recommendations include, development planners should provide specialized training in order to promote the productive use of mobile phones.

Johanes (2013) conducted a research titled, the Role of Mobile Phone Communication in Diffusion of Dairy Goats Rearing in Mutonguni Division, Kitui County. Kenya. Qualitative methodology was used, with survey research method; instruments were observation, interview, and questionnaire while research questions include: What proportion of farmers own or have access to mobile Phones? What mobile phone products are used by dairy goat farmers? What constraints do dairy goat farmers face in using mobile phone communication? The findings were; mobile phone communication among farmers helped in enhancing rate of diffusion of dairy goat rearing, and farmers own or have access to mobile phones and yet no farmer communicates over mobile phones on a daily basis and the constraint cited is high cost of airtime. Recommendations were, the government puts measures that will lower the variables around ownership and use of mobile phones in keeping of dairy goats, some research should be done among farmers in different parts of the country to bring out their views on the improvements that they think can enhance their use of mobile phones to improve agricultural productivity in their farms, etc.

In a study by Baumüller (2012) titled, Facilitating agricultural technology adoption among the poor: The role of service delivery through mobile phones. Introduction shows that, the use of mobile phones in poverty reduction and rural development has ignited much interest over the past decade and has become the most ubiquitous telecommunication technology in developing countries. The methodology in the research used was quantitative, with survey method, focus group discussions and individual interviews as instruments. Findings states that, government agencies and non-governmental organisations are increasingly turning their attention to the delivery of

services through mobile phones in areas such as health, education and agriculture, and it argues that m-services could help to overcome some of the obstacles to technology adoption by facilitating access to information and learning. Recommendation suggests that, further research is needed to understand how their particular challenges could be addressed through m- services and other support activities.

2.3 Types of Agricultural Information

Agricultural information is the collection and distribution of the output of agricultural research and development aimed at enhancing agriculture-world-wide.World Bank (1996) posits that agricultural informationare the production and beaming of audio and visual media packages, publication of extension literatures and the organization of training workshops and seminars. Agriculture information is defined as information related to activities in the agricultural sector(Ocholla, 2002).

Umali(1994)classified agricultural information into two broad groups: pure agricultural information and agricultural information inherently tied to new physical inventions.Pure agricultural information refers to any information which can be used without the acquisition of a specific physical technology. On the other hand, agricultural inventions or technologies are those that come in the form of agricultural inputs,management technologies facilitating farm management, and marketing and processing equipment. Therefore,rural farmers need a wide variety of information at all level of production.Information need is an individual or group's desire to locate and obtain information to satisfy a conscious or unconscious need.According to FAO (2002) rural communes need a wide variety of information such as availability of agricultural support

services, Government regulations, crop production and managements, disease/pests outbreaks, adaptation of technologies by other farmers, wages rates, and so on.Moser(2003) argued that,rural communitiesneed information on farming systems, pest and diseases, cropping, education, credit management, livestock management, marketingandpricing, harvest management, health and nutrition, farm security, finance and credit other information which included farming without chemical fertilizers; and drought resistant crops. According to Ekoja (2003)agricultural information is available through the National Agricultural Extension and Research Liaison Services (NAERLS) and its allied information centers.As such the researcher, for the purpose of this work conceptualized agricultural information as both any relevant information and messages that are relevant to agricultural production activities of farmers which includes:

- Marketing and Pricing Information
- Agricultural Inputs Information
- Weather Information
- Agricultural Technologies
- Agricultural Extension Information
- Agricultural Credit / Finance Information
- livestock management information
- Farming systems Information

Marketing and Pricing Information: It is a type of information in which farmers get access to valuable market data, linked to accurate and timely market information, particularly of perishable items, animals and other produce to significantly reduce transaction and travel costs so as to improve agricultural productivity. By using mobile

phones and messaging technology, farmers get access to valuable market data (Campbell, 2005). Thus, improving access to market information may help farmers' choice of what to produce, how much to sell, where to sell, and the prices farmers receive for their output. Market information needs of small scale farmers include:

- Information on product planning. This is information on what crop and variety to grow at a given season with marketability of such a crop as an important deciding factor.
- Information on current prices.
- Information on forecast of market trends. This type of information assists farmers in planning their market products.
- Information on sales timing. This assists farmers in ensuring that they do not cause a market glut. It enables them to stagger harvesting and quantity for marketing.
- Information on improved marketing practices.
- Information on group marketing. This enables small scale farmers to have organized sales of marketable surplus and bulk transport of produce.

Agricultural Inputs Information: This type of information assists farmers with the knowledge that facilitates the purchase and access to agricultural technologies and associated inputs, either bilaterally or collectively. For instance, in some countries, there is programme that provides a directory of input suppliers, including location and contact information, which farmers can access by contacting a Community Knowledge Worker (CKW) or through an SMS-searchable database.

Weather Information: It is information about the prevailing situation within the production environment that helps farmers to better access and manages risk related to weather events and diseases.For instance, the government-run Radio and Internet for the Communication of Hydro-Meteorological Information (RANET) project in Zambia collects weather data from farmers (sent by SMS) and satellites and disseminates information on extreme weather events and seasonal climatic information to farmers via SMS (Mumbi & Ghazi, 2011).

Agricultural Technologies Information: Is information about new ways of doing things or ideas.The farmers need information on production technology that involves cultivating, fertilizing, pest control, weeding and harvesting. This sort of information is at the moment being diffused by extension workers, other farmers, government parastatals and agricultural equipment dealers. The impact is yet to be felt. Manda (2002) pointed out that the majority of farmers do not necessarily make critical agricultural decisions on the basis of scientific, technical and marketing information.

Agricultural Extension Information: Agricultural extension is an educational service which brings information and new technologies to farming communities to enable them improve their production, incomes and standards of living. It is information which is functional rather than formal. It is generated by researchers from research institutes, acquired and disseminated by public extension agents to farmers and other stakeholders whose main task is to convey information in a meaningful form to farmers. One of the ways they do this is by training a group of model farmers with the hope that such farmers come in contact with other farmers. The attainment and sustenance of high levels of

agricultural production and income is not possible without an effective agricultural extension and appropriate tools that is relevant to farmers' needs (Anil, 2008). In the same vein, Bolarinwa&Oyeyinka (2011) stated that there will be quick exchange of agricultural information between the extension agents and farmers if ICTs components are integrated in delivery of agricultural information to farmers in Nigeria. Also, experts have also found out that cell phone, could be used as a tool to reduce extension farmers' ratio of 1:2000 per farm families in Nigeria (Agwu & Uchemba, 2004).

Agricultural Credit/Finance Information: Agricultural credit encompasses all loans and advances granted borrowers to finance and service production activities relating to agriculture, fisheries and forestry and also for processing, marketing, storage and distribution of products resulting from these activities. Small scale farmers are among the potential beneficiaries of agricultural credit in Nigeria but because of their low level of access to and use of information they are mostly unaware of existing loan facilities. To reap the benefit of credit, farmers need information relating to sources of loan such as names of lenders, location and types of existing credit sources. They need information on the terms of loans such as the interest rates, loanable amount and mode of repayment.

Information regarding agricultural credit gets to small scale farmers usually through channels such as relations, friends, neighbors, government officials, commercial and credit banks. Grassroots organs such as village heads and local government officials are used to diffuse such information because of their personal touch with small scale farmers.

2.3.1 Sources of Agricultural Information

According to Pipy (2006) farmers' access to different information sources helps them to get information about improved technologies and enhance the adoption of new innovations. It is important to realize that information is dynamic and continuously changing to respond to the changing environment. The information can be used to meet the famer's agricultural information need on their production activities and for decision making which can be accessed from different sources. Samuel (2001) posit that there are three major organizations or sources, which generate agricultural information. These are Government, agricultural extension systems both at federal and regional levels, and research institutions.

In the opinion of Adomi *et al.,* (2003) other sources of Agricultural information are the various Agricultural research institutes and Schools of Agriculture in the Universities as well as the Federal and State Ministries of Agriculture. According to Fekadu (1997) though knowledge is produced through agricultural research, it is not the only avenue for knowledge generation. Learning from experience, interaction and farmers' experimentation are other sources. Salomon&Engel (1997) indicated that farmers have been innovators for centuries, based on their own on-farm experimentation.Never the less farming families, agricultural cooperatives, agri-businesses, agricultural press, television, newspapers and libraries can serve as other sources of agricultural information for the farmers.

2.4 Access to Agricultural Information

Access, according to Tadesse (2008) is the ability to get or know more and have ways of evaluatingan innovation, quite apart from hearing about it earlier. Access to information is the availability of information and the ability to interact with the information for use in everyday life(Katz, 2000). Access to agriculture information is both physical and intellectual. Physical access is getting to the actual source while intellectual access implies other skills and processes for the comprehension and sustainableuse of information. According to Harris (1992)the capacity of local communities to cope with economic and social change depends heavily on access to information and if communities do not function, other policy measures will fail.

Rural farmers faces many challenges, one of these is the access to information. In fact, inadequacy of information facilities among other infrastructure for agricultural activities may lead to rural/urban migration by farming household. This (rural-urban drift) is having serious implication on agricultural activities today (Sanusi, 2006). The challenge with the access to agricultural information primarily lies in the fact that many small scale farmers live in remote areas where information does not get through.Bessei (1988) reported inaccessibility of information on rural agricultural production as a major constraint to development.

Munyua (2000) argued that, when the rural farmers lack access to information that would help them achieve maximum agricultural yield, they are not only grope in the dark but are driven to the urban centres in search of formal employment, as the only option for survival. Iraba&Venter (2011) posits poverty among male and female farmers is due

topoor agricultural information facilities and inadequate access of agricultural information and knowledge by farmers. Due to limited agricultural information, most rural people in developing countries face difficulties in decision making regarding their economic activities such as crop production, livestock keeping and marketing information (Obayeluand Ogunlade, 2006). Information Communication Technology (ICT) devices like mobile phones would play important roles in addressing these challenges and enhancing the standard of living of rural farmers. They are set of technologies that facilitate information processing, storage, retrieval and transmission. In view of this, (ADB, 2003) assert that, ICTs such as mobile phone, is thought to achieve information transfer more effectively than other communication methods in extension and has played a major role in diffusing information to rural communities, and show great unexpected potential. The potential of mobile phone is almost limitless.

2.5 Utilization of Agricultural Information

Utilization refers to the actual systematic implementation of a scientifically sound, research-based innovation with an accompanying process to access the outcome(s) of the change. (http://stti.awards.confex.com). To access, assess, and apply the content of information, users must have economic resources, including money, skills and technology, and social resources, such as motivation, trust, confidence, and knowledge (Heeks, 2005). Individuals must be able not only to access that content, assess its relevance, and apply it to a specific decision, but ultimately to act upon the information. This requires further resources and capacity. For example, content may be available to a community, but it may not be accessed because of, for instance, low use of

communication devices, or it may be accessed but not acted upon because of poor financial capacity to buy the necessary inputs.

Some studies have shown that farmers who have access to information technology are more likely to participate in agricultural and rural development programmes and other political, social and cultural practices (Anastasios *et al.,* 2010). According to Coudel& Tonneau (2010) information may seem appropriate, usable, relevant, but it can only be useful if the actors have the capacity to use it and if their environment offers them the opportunity to use it. Positive interaction with information results in, solution of a problem, taking a decision, some activity which is task related, feedback on personal attitude, feedback to need, the generation of new information or a combination of any of these outcomes (Smith, 1996).

2.5.1Factors that Influence Access and Utilization of Agricultural Information

Harris *et.al,* (2001) argues that the main challenge with information is that people do not have equal access to it. Information carries the implication that access can be broadened or restricted meaning that, action either on the part of the person seeking access or on the part of a person empowered to allow access. On the other hand, there is limitation of empirical studies related to the factors influencing access and utilization of agricultural information.The literature review mainly based on different utilization of agricultural technologies. For simple presentation, the variables are categorized as household personal and demographic variables, socio-economic factors, psychological variables and institutional factors.

2.5.1.1Household’s personal and demographic variables

Household’s personal and demographic variables are among the most common household characteristics which are mostly associated with farmers' access and utilization behavior. From this category of variables age, sex and education were reviewed in this study.

Age is also one of demographic character important to describe households and can provide a clue as to age structure of the sample and the population too. Young farmers are keen to get knowledge and information than older farmers. It may be also older farmers are more risk averse and less likely to be flexible than younger farmers and thus have a lesser likelihood of information utilization and new technologies.

With regard to age, different studies report different results. Haba (2004), he assessed that the willingness to pay for agricultural information delivery technologies such as print, radio, farmer-to-farmer, expert visit, and television. He revealed that, as age increased, the willingness to pay for these agricultural information delivery technologies decreased, meaning that older farmers.Therefore, from these result, getting of agricultural information and utilization resemble to the younger age.

Gender is another factor that limits access to and utilization of agricultural information. Due to the prevailing socio-cultural values and norms males have freedom of mobility, participate in different meetings and trainings consequently have greater access to information. Male-headed households are said to have better access to agricultural information than female- headed households, which is attributed to negative influence of cultural norms and traditions (Habtemariam, 2004).

A study conducted by Pipy (2006) reveals that, there were significant difference between male and female in poultry production information source and utilization of information. According to FAO (2002), "Rural women and girls usually have less access than men to information and new technologies. Without equal access to information, they are at a disadvantage in making informed choices about what to produce and when to sell their products".

With regard to education, there is a general agreement that education is associated with receiving, absorbing, agricultural information and utilization of information. Because education is believed to increase farmers' ability to obtain, process and analyze information accessed or disseminated by different sources and helps him to make appropriate decision to utilize agricultural information through reading and analyzing in a better way. Pipy, (2006) found that, significant difference between different educational level in poultry production sources of information and utilization of information.

Farming experience is another important household related variable that has relationship with the production process. Longer farming experience implies accumulated farming knowledge and skill which contributes to utilization of agricultural technologies. Many studies supported this argument. A study in Ghana on factors influencing adoption of recommended cocoa production practices by Asante&Seepersad (1992) indicated positive relationship of experience in cocoa farming with adoption of recommended cocoa production practices.

2.5.1.2Household's socio-economic variables

Knowledge systems are dynamic, people adapt to changes in their environment and absorb and assimilate ideas from a variety of sources. However, knowledge and access to knowledge are not spread evenly throughout a community or between communities. People may have different objectives, interests, perceptions, beliefs and access to information and resources. Differences in social status can affect perceptions, access to knowledge and, crucially, the importance and credibility attached to what someone knows. Often, the knowledge possessed by the rural poor, in particular women, is overlooked and ignored (FAO, 2004).Therefore, the access to information highly depends on the individual social and economic status.

Among different factors, annual farm income obtained from sale of crop and/or livestock are important income sources in the rural households. Off-farm activities are the other important activities through which rural households get additional income. The households' income position is one of the important factors determining access to and utilization of agricultural information and different improved technologies. The income obtained from off-farm activities helps farmers to purchase farm outputs. Review of some of the past empirical studies shows that, the influence of off-farm income on adoption varies from one study to the other. However, majority of the studies reported positive contribution of off-farm income to household's adoption of improved agricultural technologies. For instance, Getahun (2004);&Mesfin (2005) have found positive significant relationship of off-farm income with adoption.

2.5.1.3Institutional factors

In the context of this study, institutional factors include various formal and informal institutions, and organizations. These factors facilitating and enhancing the access and utilization of agricultural information such as credit, social participation, enhancing farmers' participation and joint planning, development agents' support, visiting market place and different formal and informal social organizations.

Credit has strong and significant influence in determining use of combined packages depending on the production type. It helps in alleviating current financial constraints enhancing the use of technology packages correspondingly. Survey results by Saito *et al*. (1994) in Nigeria showed that a major reason for smallholders not using fertilizer was lack of cash, highlighting the importance of short-term credit. Different studies have shown that access to credit plays a significant role in enhancing the use of improved varieties.Tesfaye *et al*., (2001) reported that access to credit, had a significant and positive influence on the adoption behavior of farmers regarding improved technologies.

Market distance and frequency of market visiting is also another factor in the dissemination of agricultural information and utilization. A study conducted in Uganda explained that, market serve as forum for the exchange of goods, and organized weekly, biweekly or monthly and constitute an important place where agricultural information is exchanged and men go to markets more often than women (Katungi, 2006). Moreover farmers located near to a market will have a chance to get information from other farmers and input suppliers. The closer they are to the nearest market, the more likely it is that the farmer will receive valuable information (Roy, 1999). Therefore, the frequency of market

and distance from residence play important role in the access and utilization of agricultural information.

2.6Challenges to the Utilization of Mobile Phonesfor Agricultural Information Access and Use

There has been some general consensus on the determinants or constraints to technology adoption, particularly in the agricultural context. This includes levels of education, wealth, risk preferences, expected returns, tastes and access to information (Djankov *et al.*, 2001).

The growth of mobile phone coverage across Africa has shown a strong positive correlation with population density, but other factors matter as well, for instance;using a spatially disaggregated dataset of mobile phone coverage and geographic characteristics, Buys *et al.* (2009) found that the probability of having a mobile phone tower in a particular location is strongly and positively associated with potential demand factors, such as population density and per capita income, as well as the competitiveness of the mobile phone sector within the country. They also found that factors associated with higher costs namely, higher elevation, steeper slopes, and distance from a main road and major urban centers are negatively associated with mobile phone coverage.

According to Samuel *et al.* (2005), Factors that affect adoption and utilization of agricultural technology include; technological or innovation factors, institutional factors, individual factors and the nature of agricultural information to be communicated (Rashid, 2007). Technological factors include issues like relative advantages of the innovation, its complexity, compatibility, cost and the image surrounding it as viewed by the customers. Institutional factors include the size of the firm, the quality of the existing information

systems, and intensity of the information being processed, urgency of information, the level of specialization of the firm as well as the level of support by management.On the other hand, individual factors affecting innovation adoption and use incorporate the decision makers' innovativeness as well as their knowledge of technology. Other individual factors include; gender, age and literacy level (Rashid, 2007).

2.7Summary of the Review

In this chapter various works that bordered in general with this research were reviewed. The review was presented from previous studies to give a proper perspective to this study. They explore the access and utilization to wide range of agricultural information very similar to this study. The utilization of mobilephones for agricultural informationaccess and use for agricultural production by rural farmers in Karaye was more concern to the study. It must be noted that most of the work reviewed in the study emanated from developed or developing countries that differ from Nigeria in the utilization of mobile phones for access and use of agricultural information from various sources. It's therefore; hope that the result of this study would serve as literature for further study on utilization of mobile phonesfor agricultural informationaccess and use in general.

References

Agwu, A.E. & Uchemba, U. (2004): *Congruency, Agreement and Accuracy Among Researchers, Extension Workers and Farmers on the Role of ICTs in Nigeria's Agricultural Development.*Presentation transcript.Department of Agricultural Extension, University of Nigeria.

Anastasios, M., A. Koutsouris& M. Konstadinos (2010) Information and Communication Technology as Agricultural Extension Tools: A Survey among Farmers in West Macedonia, Greece.*Journal of Education and Extension* 16 (3): 249-263.

Anil, N. (2008).ICT for Agricultural and Rural Development. Accessed from: http://en.wikieducator.org/image/c/ce/information-&-communication(a-k-sahu)ppt.pdf on March15th, 2013.

Asian Development Bank (ADB, 2003).Strategic Approval to Information and Communication Technology Towards e-Development in Asia and Pacific.

Baumüller.H. (2012). Facilitating Agricultural Technology Adoption Among the Poor: The role of service delivery through mobile phones .Heike Baumüller Center for Development Research (ZEF), University of Bonn, Walter-Flex-Str. 3, 53113 Bonn, Germany T el. +49 (0)228-73 1913 E-mail: heike@uni-bonn.de.

Bolarinwa, K. K., & Oyeyinka, R. A.(2011). Use of Cell Phone by Farmers and its

Implication on Farmers‟ Production Capacity in Oyo State Nigeria

Brandie, L. M. &Eric, A. (2011).Mobile Phones and Rural Livelihoods: Diffusion, Uses, and Perceived Impacts Among Farmers in Rural Uganda. *International Journal of Computer Science and Security* (IJCSS), 4 (3):361-372

Buys, P., Susmita D., Timothy S. &David, W. (2009).Determinants of a Digital Divide in Sub-Saharan Africa: A Spatial Econometric Analysis of Cell Phone Coverage. *World Development* 37(9): 351-378.

Campbell, A. (2005). Mobile phones for small African farmers.Retrieved August 6, 2010, http://smallbiztrends.com/2005/03/mobile-phones-for-small-african.html. Cecchin

Coudel, E.& Tonneau, P. (2010). How Can Information Contribute to Innovative Learning Processes? Insight from a Farmer University in Brazil.*Agricultural Information Worldwide* 3 (2): 56-63.

Djankov, S., McLeish, C., Nenova, T. &Sheifer, A. (2001). Who owns the media? *Journal of Law and Economics* 46(2): 123-146.

Duncombe, R. & Heeks, R. (2001). Enterprise across the digital divide: Information systems and rural micro-enterprise in Botswana. *Journal of International Development* 14(1): 61-74.

Ekoja, I.I. (2003). Farmers' access to agricultural information in Nigeria.*Bulletin of the American Society for Information Science and Technology,* August/September. Pp. 21 – 23.

Fekadu, B. (1997). Integration of Farmers' Knowledge into Agricultural Research: Challenges and Strategies: the case of Ada'a District, Central Oromia (Ethiopia),

Food and Agricultural Organization (2002).Report of the Second Consultation on Agricultural Information Management. Rome, Italy. [On line]. Available on http://www.fao.org/docrep/MEETING/005/Y7963E/

Getahun, D. (2004). Assessment of Factors Affecting Adoption of Wheat Technologies and Its Impact: The Case of Hula Woreda, Ethiopia. MSc. Thesis (Unpublished) Presented To School of Graduate Studies of Alemaya University, Pp. 1.

Haba, S. (2004). Factors influencing the willingness to pay for agricultural information delivery technologies by cooperative-oriented agribusinesses in Rwanda: evidence from the Abahuzamugambi Coffee Growers Cooperative of Maraba. Master's thesis, Texas A&M University.

Habtemariam, A. (2004). The comparative influence of intervening variables in the adoption behavior of maize and dairy farmers in Shashemene and Debre Zeit, Ethiopia.Ph. D. Thesis, University of Pretoria, Pretoria, 294p.

Heeks, R (2005) Reframing the role of Tele-centres in Development, e-development briefing, No.2 Development Informatics group, University of Manchester

Iraba, L. M.& Venter, I. M. (2011). Empowerment of rural farmers through information Sharing using inexpensive technologies.In Proceedings of the South African Institute ofComputer Scientists and Information Technologists Conference on Knowledge, Innovation and Leadership in a Diverse, *Multidisciplinary Environment* (SAICSIT '11). ACM, New York, NY, USA, 279-282

Johanes, M.A. (2013) The Role Played by Mobile Phone Communication in Diffusion of Dairy Goats Rearing in Mutonguni Division, Kitui County, (Unpublished Dissertation Kenya, 2013).

Katungi, E. (2006). Gender, Social Capital and Information Exchange in Rural Uganda IFPRI and Melinda Smale, IFPRI (International Food Policy Research Institute) CAPRi Working Paper No. 59, University of Pretoria. Uganda. [On line].Available on http://www.capri.cgiar.org/pdf/capriwp59.pdf.Accessed March 31, 2008.

Manda, P. (2002) Information and Agricultural Development in Tanzania: a critique. *Information Development;* 18; 181. http://idv.sagepub.com/cgi/content/abstract/18/3/181

Mgenda, O.L. & Mgenda, A.G. (1999). Research methods: quantitative and qualitative approaches. Nairobi: African Centre for Technology Studies (ACTS) Press.

Mumbi, R.&Ghazi, P. (2011). Zambia: Climate Information Alerts Boost Poor Farmers. All Africa.com, July 14.

Munyua, H. (2000). Application of information communication technologies in the agricultural sector in Africa: a gender perspective. In: Rathgeber, E, & Adera, E.O. (Eds.) *Gender and Information Revolution in Africa*IDRC/ECA. Pp. 85-123.

Pipy F. O.(2006). Poultry Farmers' Utilization of Information in Lagelu Local Government Area, Oyo State of Nigeria *International Journal of Poultry Science 5 (5): Pp. 499-501*. [On line].Available on http://www.pjbs.org/ijps/fin542.pdf.Accessed March 20, 2008.

Rashid, A. T. & Elder, L. (2007). Mobile Phones and Development: An Analysis of IDRCsupported Projects. *Electronic Journal of Information Systems in Developing Countries* 36(2): 1-16.

Rice, R. E.& Katz, J. E. (2003). Comparing Internet and Mobile Phone Usage: Digital Divide of Usage, Adoption and Dropouts. *Journal of Telecommunication Policy* 27(10): 597-623.

Roy, M. (2012). Agricultural Marketing: New Challenges. *International Journal of*

Humanities and Applied Sciences 1 (2):54-57.

Saito, K., Hailu Mekonen, & Spurling, D. (1994).Raising the Productivity of Women in Sub- Saharan Africa.The International Bank for Construction and Development of the World Bank, Washington D.C, USA. 110pp.

Salomon, L. & Engel, (1997).Networking for innovation: A participatory actor-oriented methodology. Royal Tropical Institute, KIT Press, Amsterdam, The NetherlandsSamuel Gebre-selassie, 2001, The Development of Integrated Management Information SystemFor Agricultural Extensions institutions of Developing Countries, The Case of Oromia Agricultural Development Bureau of Ethiopia, Shaker Verlag. Germany. [On line]. Available on, http://www.future-

Samuel, J., Shah, N. & Hadingham, W. (2005). Mobile Communications in South Africa, Tanzania and Egypt: Results from Community and Business Surveys. *The Vodafone Policy Paper Series* 2(1): 44–52.

Sanusi, R. A.(2004). *Analysis of Coffee Trade in Selected Coffee Growing Areas of Nigeria.*20th International Coffee Science Conference. Bangalore, India. www.asic-café.org/htm/eng/section.php.agricultures.org/pdf%20files/SG_paper_1.pdf.Accessed March, 31, 2008.

Tadesse, D. (2008). Access and Utilization of Agricultural Information by Resettler Farming Households: The case of MetemaWoreda, North Gondar, Ethiopia M. Sc. Thesis. P.1.

Tesfaye Zegeye, Bedassa Tadesse, & Shiferaw Tesfaye, (2001).Determinants of high yielding maize technology adoption.Empirical evidence from Southwestern Oromia. Research Report No. 38. *Ethiopia Agricultural Research Organization (EARO)*, 2001. 39p.

Umali, L. & Dina, L.(1994).*Public and private agricultural extension: Beyond traditional frontiers*. World Bank Discussion Papers. 236, 15-26.

World Bank (1996) Nigeria: Targeting communities for poverty Alleviation. African Region number 68.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapterdiscussed the research design and methodology that was adopted in the conduct of the research, population of the study, sample size and sampling technique, the instrument used for data collection, as well as procedure for data collection and analysis.

3.2Research Method Adopted for the Study

Quantitative research methodology was used in this study. It is defined as the systematic empirical investigation of social observable phenomena via statistical, mathematical or computational technique (Kamba, 2014).The researcher adopted survey research method. According to Kerlinger (1973)& Aborisade (1997) survey is the study of large and small population by selecting and studying samples drawn from the population to discover the relative incidence, distribution and interaction of sociological and psychological variables.Also, (Wegner,2000;Aina, 2003; and Sambo2005) asserted that survey research is a systematic and comprehensive collection of information that reflects the opinions, attitudes, feelings, beliefs and behaviors of people on an issue. This involves the collection of data about a target population using a selected sample and putting together the results of findings obtained from analysis of the sample as representative of the whole population later generalise the results obtained from the whole population.

Cruswell (2009) argued that most researchers use survey design which is suitable for original data collection from a large sample of a population. It also provides a high level of general capability in representing a large population. A survey is based on the assumptions that samples from a population can often furnish the same information at

much less cost, with greater efficiency,and sometimes greater accuracy (The American Statistical Association 1997, Kerlinger in Kimani 2001).Since the researcher was concerned with the utilization of mobile phones for agricultural informationaccess and use by rural farmers in Karaye Local Government survey methodwas considered appropriate for this study.

3.3Population of the Study

The population of the study comprised of all therural farmers in Karaye Local Government, Area. It involved registered and literate (those that can read and write) rural farmers in the ten wards of the Karaye local government. These were: Magajin Gari, Magaji Hajji, Yammedi, Kafin Dabga, Kurugu, Kwanyawa, Tudun Kaya, Yola, Daura, and Turawa. Osuala (2002) defined population as any group of individuals that have one or more characteristics in common that is of interest to the researcher. Is the whole group on which the researcher wants to collect data (Mbachu, 2011).Hence, it is a group of individuals, persons, objects or items from which samples are taken for measurement in a research. The choice of this population was based on the fact that rural farmers are supposed to access and use agricultural information on their areas of agricultural production activities which they can use this information to influence their decision making that would help them in achieving higher productivity. A visit to the Record office of the Department of Agriculture, Karaye Local Government Area, showed that there are 1,279 registered rural farmers in the ten wards. The distribution of this population is as shown in table 3.1.

Table3.1 Distribution of Registered Rural Farmers acrossTen Wards in Karaye Local Government Area.

S/N	Wards of the Respondents	Number of Registered Rural Farmers in Co-operative Societies from the Ten Wards.
1.	Magajin-Gari	176
2.	Magaji-Haji	110
3.	Yammedi	120
4.	Kafin Dabga	152
5.	Kurugu	140
6.	Kwanyawa	120
7.	Tudun Kaya	140
8.	Daura	133
9.	Turawa	88
10	Yola	100
Total		**1,279**

Source: Registry Unit, Department of Agriculture Karaye LGA (as at 24th March, 2015)

3.4 Sample Size and Sampling Technique

Sample refers to the systematic and carefully selected representative of the population of the study. Usually, if the population is too large for the researcher to survey all its members, a small, but carefully chosen sample can be used to represent the population. Sampling is necessary when the researcher is unable to investigate all the members of the target population (Akuezuilo, 1993 and Ibrahim, 2014).The research was basically on utilization of mobile phones for agriculturalinformation access and use by rural farmers in Karaye Local Government and there are ten (10)wards with total 1,279 registered rural farmers out of the 10 wards in KarayeLocal Government.

Therefore, to arrive at the sample size, purposive sampling technique was used. Purposive sampling is defined as non-probability technique of selecting certain units or cases based on a specific purpose rather than randomly Teddlie and Yu (2007). This sampling involves a nonrandom sampling which the researcher solicits persons with specific characteristics to participate in a research study. Purposive sampling was adopted in the selection of both the wards and the sample size of the subjects (rural farmers). The reason being that, not all the wards have different and effective mobile telecommunication networks in their areas. Hence the researcher's position to select three (3) wards that havedifferent and effective mobile telecommunication networks. The selected wards were: Magajin-Gari; Tudun-Kaya and Turawa respectively. The researcher went further too carefully selected the sample size of the rural farmers based on their ability to read and write and manipulate telecommunication device like the mobile phone. Apart from that, these subjects were the officials of the farmers' co-operative societies who mostly have contact with the agricultural extension workers. Therefore, a total of 121 registered rural farmers were used for this study from the three wards that were purposively selected. Table 3.2 below indicates the distribution of the rural farmers selected across 3 wards.

Table 3.2 Sample Distribution of RuralFarmers across 3Wards in Karaye LGA

S/N	Wards	Rural Farmers from each Ward
1.	Magajin Gari	53
2.	Tudun Kaya	42
3.	Turawa	26
	Total	**121**

3.5Instrument for Data Collection

The instrument used for collecting data in this research was a questionnaire. Questionnaire is commonly used in studies that the respondents cannot be easily reached.

3.5.1 Questionnaire

The researcher constructed one set of questionnaire which was used for data collection from the respondents. Questionnaire is an instrument consisting of a set of items that are usually written and the respondent is expected to respond in writing (Michael, 1993). The questionnaire was divided in to six sections. Section A dealt with the demographic information of the respondents; sectionB on how the rural farmers utilize mobile phones to access agricultural information; Section C extent of the use of mobile phones to access and utilize agricultural information; Section Dthe types of agricultural information accessed through mobile phones; Section Ethe extent to which agricultural information accessed through mobile phonesutilized; Section F on challenges to the utilization of mobile phones to access and utilize agricultural information.

The choice of this instrument was based on the fact thatall therespondents wereliterate(they can read and write), mostly the leaders of the farmers' cooperatives and they were capable of completing the questionnaire with or no further assistance from the researcher and/or agricultural extension workers. Secondly, this type of questionnaire is suitable in research because it encourages a short or single-word answer without stressing the respondents (Ibrahim, 2014).

3.6Validity of the Instrument

In order for the instrument to provide the required data for the study, the researcher subjected his questionnaire to face and content validation through research experts, colleagues and supervisors. Validation of research instrument by expert in the field is an effective way of validating research instrument (Kerlinger, 1973). Therefore the validity of the questionnaire was ascertained by the two supervisors of theresearcher in the Department of Library and Information Science, A.B.U, Zaria.The instrument was corrected, and comments of the supervisors improved the items, structure and format.

3.7Reliability of the Instrument

Reliability is the degree of consistency with which the instrument measures an attribute. It further refers to the extent to which independent administration of the same instrument yield the same result under comparable conditions (Polit&Hungler, 1999). The reliability of the instrument in this research was established by conducting pilot study within 7 days (1week) in Rogo Local government Area.Ten (10) rural farmers werepurposively selected and issuedthe research instrument that contained 8 items by the researcher and with the assistance of an extension worker from the Department of Agriculture. The area

was suitable for the pilot study because they share some common characteristics with the population under study. Olvera (2001) had the view that pilot testing is usually done on a much smaller scale than the main study but under similar conditions. The pilot study, specially determine the following: the time taken to complete the questionnaire; clarity and appropriateness of the questions. After collecting the completed instrumentGuttmann Split-Half reliabilitywas used where the main questions in the instrument were divided into odd and even numbers considering the construct of interest in each of the questions. The number of respondents that chose the constructs of interest was used. Also, X and Y were used to replace the values of odd and even numbers respectively using Pearson Product Moment Correlation (PPMC). Therefore, after calculating the PPMC result, Spearman Brown formula was used where the reliabilityco-efficient of (0.75) was obtained. This means that the instrument is highly reliable. For the detailed calculation of the reliability in this study see AppendixIII.

3.8Procedure for Data Collection

The researcher administered the instruments personally and with the help of three research assistants (Agricultural Extension Workers). This was because the research covered three wards in Karaye, the researcher took 1 ward and the three research assistants covered 2 wards. The research assistants were extension workers who use to have interaction with some of the farmers. With a little training coupled with their knowledge of agricultural extension,it was easy for them to administer the instruments andguide the respondents on how to fill the questionnaire.

Five weeks were used, in which two weeks was given to the respondentsto fill in the questionnaire; and three weeks was used to collect the completedquestionnaires. That was

done so as to give them chance of filling the questionnaire at their own convenient time and three weeks to collect back filled questionnaire because of the dispersed geographical nature of the three wards under study,that is, Magajin-Gari ward at central part of Karaye; Tudun-Kaya ward at western part; and Turawa ward at southern part neighbouring Kiru Local Government Area, Kano State.

3.9 Procedure for Data Analysis

The data collected for this research was presented and analysed using the frequency and percentage. Descriptive statistics were used considering frequency distribution tables, and simple percentages to compute and present the result of the findings of the research descriptively.

References

Afolabi, M. (1993) *Introduction to Research Method for Writing Project and Thesis, Zaria,* Alpha Publishers.

Aina, L.O. (2002) Research Methodologies in Information Sciences in Aina, L.O. (2002) (Eds) Research in Information Sciences: African Perspective. Ibadan: Stirling-HordenPublishers.

Akuezuilo, E.O. (1993) Research Methodology and Statistics (NUC/NBTE/NCCE MinimumStandard Edition), Awka: NUEL

AmericanStatistical Association (1997). What is a survey? [Online],Available:http://www.arnstat.orglsections/srms/brochures/surwhat.html [accessed 23/9/02].

Creswell, J. W. (2009). *Research design:* qualitative, quantitative, and mixed methods approach(3rd Ed.).Thousand Oaks, CA: Sages

Ibrahim, U. (2013) Techniques for Writing and Presentation of Thesis/Dissertation: A Companion Guide for Postgraduate Students in Nigeria University System. ABUPress: Zaria.

Kamba, A. (2014). The Research Hierarchy: Understanding the Paradigms and the Practice of Research in the Disciplineof Library and Information Science. Paper Presented in the Department of Library and Information Science A B U, Zaria (Unpublished).

Kerlinger, F.N (1973) Foundation for Behavioral Research (2nd Ed). New York. Holt Reinhart and WinstonInc.

Mbachu, O. (2010) *SocialscienceResearchMethods*: *for Policy and Strategic Studies*. Kaduna: Medusa Academic Publishers.

Osuala, E. C. (2005). Introduction to Research Methodology (3rd Ed.) Ibadan: African publishers. ''Post Offices-with map of LGA'' NIPOST. Retrieved 2009-10-20

Polit and Hungler (1999) Basic Research Methods for Librarians (2nd Ed.) Greenwich, Conn: Ablex Publishing Corp.

Sambo, A. (2005) Research Methods in Education. Ibadan: sterling –Horden publishers.

Teddlie, C. and Yu, F (2007).Mixed Methods Sampling: A Typology With Examples.*Journal of Mixed Methods Research, 1 (1) DOI: 10.1177/2345678906292430* accessed and retrieved 2 March, 2017

Wegner, T. (2000).Quantitative methodsfor marketingdecisions. Cape Town, Kenwyn: Juta& Co.

CHAPTERFOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presented the data collected for the study, analysed and discussed under the following sub-headings:

4.2Response Rate

4.3 Demographic Analysis

4.4Procedures for Utilising Mobile Phones in Accessing Agricultural Information for Use by the Rural Farmers.

4.5Extent of Use of Mobile Phones in Accessing Agricultural Information

4.6Types of Agricultural Information Accessed through Mobile Phones

4.7Extent of Agricultural Information Accessed through Mobile Phones

4.8Challenges to the Utilization of Mobile Phones for Agricultural Information Access

4.2Response Rate

Out of the 121 copies of questionnaire distributed to the rural farmers in Karaye Local Government Area, a total of 95 (78.4%) copies were returned, duly completed and found usable for analysis in this study. The high response rate was recorded due to the fact that respondents were given up to five weeks within which to complete and returned the duly completed copies of the questionnaire. Table 4.1 presented the distribution of the response rate.

Table 4.1Response Rate Distribution of the Rural Farmers according to their Wards.

S/N	Wards of the Respondents	No. of Questionnaire Distributed	No. of Questionnaire Retrieved	% of QuestionnaireRetrieved
1.	Magajin Gari	53	47	38.8
2.	Tudun kaya	42	23	19.0
3.	Turawa	26	25	20.6
Total		**121**	**95**	**78.4**

4.3 Demographic Analysis of the Respondents

This section presented the demographic information of the respondents. This included their gender, age, marital status and level of education.

4.3.1Gender Distribution of the Respondents

The respondents in this study comprised of both male and female rural farmers in Karaye Local Government Area. The inclusion of gender as a variable in this study is very important because it will make the study free from gender bias. The distribution of the gender of the respondents was presented in table 4.2

Table 4.2 Gender Distribution of the Respondents

S/N	Gender	F	%
1.	Male	88	92.7
2.	Female	7	7.4
Total		**95**	**100**

The table 4.2 revealed that 88 (92.7%) of the respondents were male. While 7 (7.4%) of them were females. This finding revealed that there are more male rural farmers than the females in Karaye Local Government Area. The reason was that in Karaye Local Government more male farmers were predominately involved in farming activities and possibly they are responsible for taking care of their family. This discovery confirmed the dominant factor of male in agricultural activities in Nigeria. It also agreed with the finding of Adedoyin *et al.* (1999) who reported that males dominated the agricultural work force in Nigeria. This could be as a result of the energy demand required of the occupation.

4.3.2 Age Distribution of the Respondents

The respondents in this study comprisedrural farmers of different age level in Karaye Local Government Area, Kano State. The reason for inclusion of the age was that people of different age were observed to be involved in agricultural activities.Table 4.3presented the age distribution of the respondents.

Table 4.3 AgeDistribution of the Respondents

S/N.	**Age of the Respondents**	**Total**	
		F	**%**
1.	21-30	11	11.6
2.	31-40	24	25.3
3.	41-50	13	13.6
4.	51 and above	47	49.5
Total		**95**	**100**

Table 4.3 revealed that more elderly respondents were involved in agricultural activities with 51 and above year representing 47 (49.5%) response scores.This may not be unconnected with the fact that farming is one of the most predominantly economic activities engaged by the rural people in Karaye. Followed by24 (25.3%) of the respondents which indicated that their age bracket was between 31-40 years. It also revealed that 13 (13.6%) were within the year 41-50 respectively.Frequency 11 (11.6 %) which is 21-30 years represented the lowest age of the respondents involved in agricultural activities.It can be deduce that people within that age bracket are considered to be youth. By implication this finding revealed that, there was low participation of youth in agricultural activities. Therefore, there is need for the youth toactively participate in agriculture in order to attain sufficiency in food and reduced the high rate of unemployment in our rural communities.

4.3.3 Marital Status of the Respondents

The respondents in this study comprisedsingle, married, divorced and widowedfarmers. The reason for inclusion of marital status was based on the fact that, both married and unmarriedrespondents in Karaye were observed, to directly or indirectlyget involved in agricultural activities. Table 4.4 showed the distribution of respondents' marital status.

Table 4.4 Distribution of the Marital Status of the respondents

S/N	Marital Status	Total	
		F	%
1.	Single	10	10.5
2.	Married	79	83.1
3.	Divorced	3	3.2
4.	Widow	3	3.2
Total		**95**	**100**

The table 4.4 revealed that 79 (83.1%) were married. While 10 (10.5%) of them were single, followed by 3 (3.2%) as the least response scores. The reason for the highest percentage of married respondents compared to the widow responses was that possibly married respondents may have more family responsibilities to take care of based on the tradition of the community.By implication both of them are struggling to survive.

4.3.4 RespondentsEducationalLevel

The respondents in this study comprisedrural farmers with different educational background. The reason for the inclusion of educational backgrounds was to make clarification based on the understanding that rural communities comprise people of different educational levels that involved in agricultural production. Table 4.5 presented the educational level of the respondents.

Table 4.5 Respondents Educational Level

S/N	Level of Education	Total	
		F	%
1.	Primary	9	9.5
2.	Secondary	5	5.2
3.	Tertiary	17	17.9
4.	Adult Education Class	64	67.4
Total		**95**	**100**

Table 4.5 shows the responses of the rural farmers' educational qualification. It can be seen that 64 (67.4%) representing Adult Education Class has the highest figure which17 (17.9%)attended tertiary institution and 9 (9.5%) obtained primary education respectively. Whereas, 5(5.2%) as the lowest figure of the responses indicated that they obtained secondary education.From the above analyses, it was revealed that majority of the rural farmers,attended adult education class to acquire literacy skills.Arokoyo (2005) identified high level of illiteracy as a serious constraint to ICTs tools utilization by extension workers and farmers.Pipy, (2006), also found that, significant difference between different educational level in poultry production sources of information and utilization of information.Therefore either directly or indirectly understanding farmers' educational levelshave role in agricultural development.

4.4Procedures for Utilising Mobile Phones in Accessing Agricultural Information for Use by the Rural Farmers.

The first research question was raised to ascertain how the rural farmers utilise mobile phones to access agricultural information for use in Karaye Local Government. In order to answer this research question, a list of procedures for utilising mobile phones in accessing agricultural informationwas provided for the respondents to tick as many procedures as applicable. Table 4.6 presented the responses of the respondents.

Table 4.6: Procedures for Utilising Mobile Phones in Accessing Agricultural Information

S/N	Procedures for Utilising Mobile Phones	Wards						Total	
		Magajin Gari		Tudun Kaya		Turawa			
		F	%	F	%	F	%	F	%
1.	Through short messages service (SMS)	23	48.9	7	30.4	10	40.0	40	42.1
2.	Through email	11	23.4	1	4.3	10	40.0	22	23.2
3.	Through voice calls	1	2.1	0	0.0	2	8.0	3	3.2
4.	Through browsing	0	0.0	8	34.7	10	40.0	18	18.9
5.	Through multimedia services	6	12.7	3	13.0	3	12.0	12	12.6

From table 4.6 it can be deduced that majority of the respondents 40 (42.2%)accessed agricultural information through short text message service.That may possibly be as result of federal government programme of Growth Enhancement Scheme. Punch (2012) farmers could have direct redemption of farm inputs through the e-wallet system-in which farm inputs information are directly sent to farmers through text messages.The table also indicated that only 3 (3.2%) of the respondents, accessed agricultural information through voice calls. The findings show low use of mobile phones as a procedure to which the rural farmers accessagricultural information. The table also showed 1(2.1%) used emails as procedure for utilizing mobile phone.This finding corresponds to that of Adomi *et al*., (2003) which found that few farmers had used Internet and email services for knowledge acquisition.

Also, the researcher further asked the respondents to indicate the benefits of utilising mobile phonesfor agricultural information access and use. In order to achieve that, respondents were provided with statements to indicate their level of agreement or disagreement as contained in table 4.6.1

Table 4.6.1Benefits ofMobile Phones in Accessing Agricultural Information

S/N	Benefits of Mobile Phone	Wards of the Respondents									
		Magajin-Gari			Tudun-Kaya			Turawa			Total
		A	D	U	A	D	U	A	D	U	
		F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	
1.	Helps to easily send request on agricultural information anytime the need arose	23 (24.2)	20 (21.1)	4 (4.2)	10 (10.5)	8 (8.4)	5 (5.3)	15 (15.8)	7 (7.4)	3 (3.2)	95 (100)
2.	Reduces the need to travel	8 (8.4)	23 (24.2)	16 (16.8)	11 (11.6)	9 (9.5`)	3 (3.2)	2 (2.1)	17 (17.9)	6 (6.3)	95 (100)
3.	Promotes interpersonal relationships	19 (20.0)	13 (13.7)	12 (12.6)	18 (18.9)	1 (1.2)	4 (4.2)	12 (12.6)	11 (11.6)	2 (2.1)	95 (100)
4.	Assist in accessing agricultural information quickly	32 (33.7)	6 (6.3)	9 (9.5)	11 (11.6)	8 (8.4)	4 (4.2)	12 (12.6)	6 (6.3)	7 (7.4)	95 (100)
5.	Increase income of the people in the community	14 (14.7)	18 (18.9)	15 (15.8)	14 (14.7)	9 (9.5)	0 (0.0)	7 (7.4)	13 (13.7)	5 (5.3)	95 (100)
6.	Enhance strong social cohesion	18 (18.4)	11 (11.6)	18 (18.9)	13 (13.7)	9 (9.5)	1 (1.1)	7 (7.4)	4 (4.2)	14 (14.7)	95 (100)
7.	Allow more contacts amongst farmers	13 (13.7)	17 (17.9)	17 (17.9)	11 (11.6)	8 (8.4)	4 (4.2)	10 (10.5)	9 (9.5)	6 (6.3)	95 (100)
8.	Easy contact with local customers/suppliers	32 (33.7)	3 (3.2)	12 (12.6)	13 (13.7)	6 (6.3)	4 (4.2)	11 (11.6)	9 (9.5)	5 (5.3)	95 (100)
9.	Easy to get in touch with fellow farmers	21 (22.2)	18 (18.9)	8 (8.4)	18 (18.9)	2 (2.1)	3 (3.2)	10 (10.5)	7 (7.4)	8 (8.4)	95 (100)

Key: Agree, A=Agree, D=Disagree and U=Undecided

Table 4.6.1 revealed that majority of the respondents agreed that benefit of utilizing mobile phones wasassist in accessing agricultural information quickly and provide easy contact with local customers/suppliers with 32 (33.7) from Magajin-Gari, Tudun Kaya 11 (11%), 13 (13.7%) and Turawa 12 (12.6%, 11.6%) respectively. However, only 2 (2.1%) of the respondents indicated that they disagreed the benefit of utilizing mobile phone was easy to get information with the fellow farmers.Lehr(2007) asserts that mobile phones are transforming the lives of many users in developing countries and are widely recognized as an important current and future technology platform for developing nations.This indicated the need for research of this kind to investigate utilization of this device. There have been quite a few studies that explored how mobile phones impact livelihoods of farmers (Rashid and Elder, 2009).

4.5 Extent of Use of Mobile Phones in Accessing Agricultural Information

This question was aimed at determining the extent of use of mobile phones to access and utilize agricultural information by the respondents for their agricultural activities. Table 4.7presented the data collected and analyzed with regards to the extent of use of mobile phones to access and utilize agricultural information.

Table 4.7 Extent of Use of Mobile Phones to Access Agricultural Information

S/N	Extent of Use of Mobile Phones	Wards of the Respondents									Total
		Magajin-Gari			Tudun-Kaya			Turawa			
		A	D	U	A	D	U	A	D	U	
		F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	F (%)	
1.	I use mobile phone to access agricultural information daily	25 (26.3)	20 (21.1)	2 (2.1)	11 (11.6)	8 (8.4)	4 (4.2)	14 (14.7)	8 (8.4)	3 (3.2)	95 (100)
2.	I use mobile phone to access agricultural information weekly	26 (27.4)	18 (18.9)	3 (3.2)	12 (12.6)	9 (9.5`)	2 (2.1)	15 (15.8)	8 (8.4)	2 (2.1)	95 (100)
3.	I use mobile phone to access agricultural information monthly	35 (36.8)	9 (9.5)	3 (3.2)	15 (15.8)	5 (5.3)	3 (3.2)	15 (15.8)	7 (7.4)	3 (3.2)	95 (100)
4.	I use mobile phone to access agricultural information occasionally	33 (34.7)	10 (10.5)	4 (4.2)	13 (13.7)	8 (8.4)	2 (2.1)	20 (21.1)	2 (2.1)	3 (3.2)	95 (100)
5.	I use mobile phone to access agricultural information forthrightly	28 (29.4)	15 (15.8)	4 (4.2)	10 (10.5)	10 (10.5)	3 (3.2)	13 (17.7)	9 (9.5)	3 (3.2)	95 (100)
6.	I use mobile phone to access agricultural information annually	25 (26.3)	20 (21.1)	2 (2.1)	11 (11.6)	8 (8.4)	4 (4.2)	21 (22.1)	3 (3.2)	1 (1.1)	95 (100)
7.	I use mobile phone to access agricultural information frequently	28 (29.4)	13 (13.7)	6 (6.3)	14 (14.7)	5 (5.3)	4 (4.2)	18 (18.9)	4 (4.2)	3 (3.2)	95 (100)

Key: A=Agree, D=Disagree, U=Undecided

Table 4.7shows the responses of the rural farmers with regard to the extent of use of mobile phone. In their responses, 35 (36.8%), 33 (34%) from Magajin – Gari, 15 (15.8%), 13 (13.7%) from Tudun Kaya and 15 (15.8%), 20 (21.1%) from Turawa agreed that the used mobile phone to access agricultural information monthly and occasionally respectively. This finding corresponded to the finding of the Eamin Ali Akanda and Roknuzzaman (2012) which showed that farmers depend sometimes on mobilein order to get information**.**However, the table showed that only 1 (1.1%) of the respondent chose undecided that mobile phones was used to access agricultural information annually. It can be deduced from the finding of this study that there was low and untimely use of mobile phones by the rural farmers to access and utilize agricultural information for their agricultural production.

4.6Types of Agricultural InformationAccessedthrough Mobile Phones

This question sought to find out the types of agricultural information that were accessed through mobile phones by the rural farmers. Table 4.8 presented the data collected and analysed with regards to the types of agricultural information that are accessed through mobile phones.

Table 4.8: Types of Agricultural Information Accessed through Mobile Phones

S/N	Types of Agricultural Information	Wards						Total	
		Magajin Gari		Tudun Kaya		Turawa			
		F	%	F	%	F	%	F	%
1.	Information about better marketing and prices of agricultural products	8	17.0	6	26.0	0	0.0	14	14.8
2.	Information about agricultural pest and diseases control	3	6.3	2	8.6	0	0.0	5	5.2
3.	Information about method of herbicide control	7	14.8	11	47.8	12	48.0	30	31.6
4.	Information about farming systems	0	0.0	0	0.0	3	12.0	3	3.2
5.	Information about new improved seeds	1	2.1	0	0.0	0	0.0	1	1.0
6.	Information about drought resistant crops	2	4.2	3	13.0	21	84.0	26	27.4
7.	Information about credit facilities	5	10.6	4	17.3	2	8.0	11	11.6
8.	Information about soil fertility	0	0.0	0	0.0	0	0.0	0	0.0
9.	Information about soil erosion control	0	0.0	0	0.0	0	0.0	0	0.0
10.	Information about harvest management	0	0.0	0	0.0	5	20.0	5	5.2
11.	Information about livestock management	0	0.0	0	0.0	0	0.0	0	0.0

Table 4.8showed that majority of the respondents that is, 30 (31.6%) indicated that the types of agricultural information they accessed through mobile phones, was information about herbicide control. That may be as a result of low level of farmer's income that can help in employing some labor force. However, only 1(1.0%) of the respondents showedinformation they accessed through mobile phones was information about new improved seeds. Therefore, poor harvest experienced by farmers may be the result of unimproved seeds being plantedfor decade by farmers.. Improved seeds will help farmersto achieve higher productivity. The researcher further asked the respondents to indicate the sources they access agricultural informationas indicated in table 4.8.1

Table 4.8.1 SourcesofAccess to Agricultural Information

S/N	Sources	Wards						Total	
		Magajin Gari		Tudun Kaya		Turawa			
		F	%	F	%	F	%	F	%
1.	From other farmers	7	14.8	11	47.8	12	48.0	30	31.6
2.	Research institute	0	0.0	0	0.0	0	0.0	0	0.0
3.	Radio	5	10.6	4	17.3	2	8.0	11	11.6
4.	Newspaper	0	0.0	0	0.0	3	12.0	3	3.1
5.	Television	1	2.1	0	0.0	0	0.0	1	1.0
6.	Neighbors	2	4.2	3	13.0	21	84.0	26	27.4
7.	Library	0	0.0	0	0.0	5	20.0	5	5.3
8.	Researchers	0	0.0	0	0.0	0	0.0	0	0.0
9.	Extension agent	8	17.0	6	26.0	0	0.0	14	14.7
10.	Mobile phones	3	6.3	2	8.6	0	0.0	5	5.3

Table 4.8.1 reveals that a majority of the farmers 30 (31.6%) sourced information from other farmers. This may be the result of their closeness with other famers andespecially leaders of the farmers group that sometimes do have more contact with agricultural extension agents. It also revealed that, farmers were not sourcing information from research institutes and researcherswith 0(0.0%)respectively. Thismay consequently be as a result of theabsence of anyresearchinstitute in the area and also the absence of any identifiable researcher around the farmers that they would be sourcing the information from. However, the researcher also asked the respondents to indicate the types of agricultural activities they engaged. In order to achieve this, respondents were provided with different types of agricultural activities to tick as many as applicable, as contained in table 4.8.2

Table 4.8.2 Types of Agricultural Activities Practiced by the Rural Farmers

S/N	Types of Agricultural Activities	Wards						Total	
		Magajin Gari		Tudun Kaya		Turawa			
		F	%	F	%	F	%	F	%
1.	Keeping animals only	3	6.3	11	47.8	4	16.0	18	19.0
2.	Growing crops only	15	31.9	29	126.0	13	52.0	57	60.0
3.	Keeping animals and growing crops	5	10.6	8	34.7	7	28.0	20	21.0

Table 4.8.2 above presented the types of agricultural activities being practiced by the rural farmers.From the table it was discovered thatmajority of the respondents 57 (60.0%) engaged in growing crops only, followed by 20 (21.0%) who were engaged in keeping animals and crops. However, the lowest figures from the total responses revealed 18 (18.9%) wereengaged in keeping animals only. This may possibly be a contributing factor to high level of animals cost and insufficient meat in the community. Therefore, there is need for the rural farmers to enhance their engagement in growing more crops and animals keeping respectively.

4.7Extent of Agricultural Information Accessed through Mobile Phones

This question was set to find out the extent to which the agricultural information accessed through mobile phonesutilized. Therefore, table 4.9 presenteddata collected and analyzed with regards to that extent.

Table 4.9 Extent of Agricultural Information Accessed through Mobile Phones

		Wards of the Respondents															
S/N	**Extent of Agricultural Information Accessed through Mobile Phones**	**Magajin-Gari**					**Tudun - Kaya**					**Turawa**					**Total**
		D	**W**	**M**	**A**	**O**	**D**	**W**	**M**	**A**	**O**	**D**	**W**	**M**	**A**	**O**	
		F %	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**	**F %**
1.	I Utilised information for better marketing and prices of agricultural products	3 (3.2)	8 (8.4)	10 (10.5)	22 (23.2)	4 (4.2)	0 (0.0)	4 (4.2)	5 (5.3)	11 (11.6)	3 (3.2)	8 (8.4)	2 (2.1)	1 (1.1)	9 (9.5)	4 (4.2)	95 (100)
2.	I utilized Information about pest and diseases control	5 (5.3)	6 (6.3)	6 (6.3)	28 (29.5)	2 (2.1)	4 (4.2)	2 (2.1)	3 (3.2)	12 (12.6)	2 (2.1)	4 (4.2)	4 (4.2)	6 (6.3)	11 (11.6)	0 (0.0)	95 (100)
3.	I utilized information about method of herbicide control	5 (5.3)	6 (6.3)	10 (10.5)	21 (22.1)	5 (5.3)	2 (2.4)	4 (4.2)	4 (4.2)	10 (10.5)	3 (3.2)	5 (5.3)	3 (3.2)	7 (7.4)	8 (8.4)	2 (2.1)	95 (100)
4.	I Utilised information about farming systems	7 (7.4)	7 (7.4)	7 (7.4)	20 (21.1)	6 (6.3)	3 (3.2)	2 (2.1)	6 (6.3)	9 (9.5)	3 (3.2)	2 (2.1)	5 (5.3)	4 (4.2)	9 (9.5)	5 (5.3)	95 (100)
5.	I Utilised information about soil fertility and soil erosion control	6 (3.2)	8 (8.4)	7 (7.4)	20 (21.1)	6 (6.3)	7 (7.4)	6 (6.3)	5 (5.3)	3 (3.2)	2 (2.1)	5 (5.3)	5 (5.3)	7 (7.4)	5 (5.3)	3 (3.2)	95 (100)
6.	I Utilised information about livestock management	6 (6.3)	8 (8.4)	8 (8.4)	23 (24.2)	2 (2.1)	6 (6.3)	5 (5.3)	4 (4.2)	8 (8.4)	0 (0.0)	5 (5.3)	3 (3.2)	3 (3.2)	11 (11.6)	3 (3.2)	95 (100)
7.	I Utilised information about new improved seed and drought resistant crops	10 (10.5)	9 (9.5)	13 (13.7)	12 (12.6)	3 (3.2)	5 (5.3)	7 (7.4)	3 (3.2)	8 (8.4)	0 (0.0)	3 (3.2)	3 (3.2)	6 (6.3)	9 (9.5)	4 (4.2)	95 (100)

Key: D = Daily, W = Weekly, M = Monthly, A = Annually and O = Occasionally
NB: The Numbers in bracket is the percentage of the frequency

Table 4.9 depicts the responses of the rural farmers in three (3) wards in relation to extent to which the agricultural information accessed through mobile phone were utilized. It reveals that the utilized information about pest and diseases control as well as livestock management annually with 28 (29.5%), 23 (24.2%) from Magajin–Gari, 12 (12.6%, 8 (8.4%) from Tudun Kaya and Turawa had 11 (11.6%) respectively. The finding showed untimely use of pest and diseases and livestock management information by the farmers. The utilization of livestock management information annually may possibly be a result of annual cattle vaccination popularly known as (Huji) by the Department of Agriculture in the Local Government.Also, by implication the untimely utilization of pest and diseases information may probably be the consequences of high losses by tomato producing farmers caused by the recent outbreak in tomatoes disease called Tuta absoluta (tomato-ebola). Ogbeh (2016) stated that tomato Ebola's destruction hits six states. However,only1 (1.1%) from Turawa ward chose information for better marketing was accceesd through mobile phone monthly.By implication rural farmers were not making timely and relevant utilization of agricultural information to cope with the present information age.

4.8 Challenges to the Utilization of Mobile Phones for Agricultural Information Access

This question was asked to find out the challenges to the utilization of mobile phones for agricultural information access and use. Table 4.10 presented the data collected and analyzed with regards to the challenges encountered by the respondents.

Table 4.10Challenges to the Utilization of Mobile Phones Agricultural Information Access

S/N	Challenges	WardRespondents						Total	
		Magajin Gari		Tudun Kaya		Turawa			
		F	%	F	%	F	%	F	%
1.	High call charges	5	10.6	4	17.3	2	8.0	11	11.6
2.	Inaccessibility to rural areas by the NGO	0	0.0	0	0.0	0	0.0	0	0.0
3.	Complexity of the mobile phone technology	0	0.0	0	0.0	0	0.0	0	0.0
4.	Inadequate contact to extension agent	0	0.0	0	0.0	3	12.0	3	3.1
5.	Lack of access to mobile connectivity in the community	1	2.1	0	0.0	0	0.0	1	1.0
6.	Slow mobile connectivity in the community	2	4.2	3	13.0	21	84.0	26	27.4
7.	Inappropriate time of information dissemination	0	0.0	0	0.0	5	20.0	5	5.3
8.	Lack of electricity to recharge mobile phone	0	0.0	0	0.0	0	0.0	0	0.0
9.	Frequent power failure to recharge mobile phone	8	17.0	6	26.0	0	0.0	14	14.7
10.	Household commitment	3	6.3	2	8.6	0	0.0	5	5.3
11.	Inability to access formal channel of information	7	14.8	11	47.8	12	48.0	30	31.6

Table 4.10 showed that majority of the respondents, 30 (31.5%) indicated inability to access formal channel of information as the challenge they encountered with regards to the utilization of mobile phones for agricultural information access and use. Thus, may be due to inadequate extension workers or research institutes in the area that are responsible for providing access to agricultural information to farmers. However, the table also revealed that 1 (1.0%) of the respondents, revealed that the challenge they encountered was lack of access to mobile connectivity in the community. This finding corresponded with one of the findings of Arokoyo (2005) who reported that the constraints that severely restricts the use of ICTs facilities (such as mobile phones) in agricultural extension are poor ICT infrastructure - connectivity, erratic power supply, high illiteracy among information users (farmers) and low computer skills.Aigbeakaen (2007) asserted that the major constraints in GSM (Mobile Phones) use by farmers were network coverage and financial.

References

Adedoyin, S.F.; Fapojuwo, O.E & Torimiro, D. (1999) Educational Communication materials in Agric. Technology promotion: A survey of extension agents in Ijebu area of Ogun State. Proceedings of the fifth annual National Conference of the AESON 12th – 14th April.

Adomi, E. E., Ogbomo, M. O. & Inoni, O. E. (2003). Gender factor in crop farmers' access to agricultural information in rural areas of Delta State, Nigeria. *Library Review*, 52, 8, 388-393.

Aigbeakaen, E. O., Sanusi, R. A.& Ndagi, I. (2007)Constraints to the Use of Global System of Mobile Communication(GSM) by Crop Farming Household in South-west Nigeria

Arokoyo, T. (2005) ICTs application in Agricultural Extension Service delivery. In: Adedoyin, F.S (Ed) Agricultural Extension in Nigeria.

Conroy (2003). New Direction for Nigeria's Basic Agricultural Services: *A Discussion Paper. Vol. 1 and Vol. 2: National Stakeholders Workshop on Basic Agricultural Services for Poor Farmers in Nigeria, Abuja. Pp. 1 – 63.*

Eamin Ali Akanda, A.K.M. & Roknuzzaman, Md. (2012) Agricultural Information Literacy of Farmers in the Northern Region of Bangladesh.*Information and Knowledge Management Vol. 2, No.6,*

Lehr, D. (2007): Going Wireless: Dialing for Development (working paper).

Ogbeh, A. (2016) Tomato: Tomato Ebola's Destruction Hits Six State. Punch Newspaper. Retrieved 25, May, 2016 from http://www.com

Pipy F. O, 2006.Poultry Farmers' Utilization of Information in Lagelu Local Government Area, Oyo State of Nigeria.*International Journal of Poultry Science 5 (5): Pp. 499-501*. [On line].Available on http://www.pjbs.org/ijps/fin542.pdf.Accessed March 20, 2008.

Punch Newspaper, December 28, 2012: Growth Enhancement Support Scheme saved AgaricSector, http://www.punchng.com/business/industry/growth-enhancementsupport-scheme-saved-agric-sector-adesina/

Rashid A. T & Elder, L. (2009). Mobile Phones and Development: An Analysis of IDARC-Supported Projects. *The Electronic Journal on Information Systems in Developing Countries* (EJISDC) 36: 2, 1-16

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter provides the summary of the study, summary of findings, conclusion, recommendations, contributions to knowledge and also advancedsuggestion for further researches.

5.2 Summary of the Study

This study was carried out to investigate the utilization of mobile phones for agricultural information access and use by rural farmers in Karaye Local Area, Kano States of Nigeria. In order to achieve this five (5) research questions were formulated as follows:How dothe rural farmers utilize mobile phones to access agricultural information for use in Karaye Local Government Area?What is the extent of the use of mobile phones to access and utilize agricultural information?What types of agricultural information are accessed through mobile phones? To what extent is the agricultural information accessed through mobile phones by the rural farmers are utilized? What are the challenges to the utilization of mobile phones to access and utilize agriculturalinformation by rural farmers in KarayeLocal Government? Review of relevant literature was also conducted in which it was established that utilization of mobile phone for agricultural information access and use improved agricultural productivity of farmers.

Survey research method was employed in the conduct of this study. The population of the study was made up of all the registered and literate farmers in ten (10) wards totaling,

1279in rural areas of Karaye Local Government Area, Kano State. The subject of the study was made up 3 wards and 121 farmers thatwere purposively selected. Thus, the purposively 3 selected wards were: Magajin-Gari, Tudun-Kaya and Turawa.The data collected for the study was presented and analysed using descriptive statistics. Frequency distribution tables and percentages were used to analyze the data collected.

5.3 Summary of theMajor Findings.

Based on the analyses of the data collected, the following are the major findings:

1. The study found that, the major procedure through which the rural farmers utilized mobile phones to access agricultural information for use in Karaye Local GovernmentArea was through Short Message Service (SMS).
2. Majorityof the rural farmersusedmobile phones to access agricultural information monthly and occasionally.
3. Information about herbicide control was the major type of agricultural information accessed through mobile phones for use by the rural farmers in Karaye Local Government.
4. Majority of the rural farmersutilized information about pest and diseases control as well as livestock management annually.
5. Inability to access formal channel of informationwas the major challenge to the rural farmersencountered with regards to the utilization of mobile phones for agricultural information access and use.

5.4 Conclusion

Information is a dynamic entity inherent in the society that is both powerful and important in our complex modern society. An ever-widening range of agricultural activities depend on wide access and use of information through appropriate communication medium or tools. From the analysis and summary of the findings of this study, it could be concluded that agriculture is the major economic activity of the rural

farmers as engaged by the people ofKaraye which can be sufficiently attained through adequate access to and utilization of agricultural information. Mobile telephony could be the most important mode of accessing that information looking at the level of mobile phones subscriptions in Nigeria.

Adequate and timely utilization of the mobile phones through relevant agricultural information sources would ensure higher productivity. And it could help in bridging the rural-urban digital and information divide. Despite the challenges faced by the rural farmers in accessing agricultural information among which were farmers inability to access formal channel of information.

5.5Contribution to Knowledge

The following are the researchcontributions to knowledge.

The study established that access to formal channelof information such as the extension workers, and agriculturalresearchers was the major challenge the rural farmers encountered with regards to the utilization of mobile phones for agricultural information access and use.

The study established that majority of the rural farmers used mobile phones to access agricultural information monthly and occasionally instead of daily, for current and up-to-date information that would enhance higher agricultural productivity.

The study found that, the major procedure through which the rural farmers utilized mobile phones to access agricultural information for use in Karaye Local Government Area was through Short Message Service (SMS)instead of direct call to the formalsources

of agricultural information such as the extension workers, agricultural researchers etc. Because sometime some information received from SMS may need to be interpreted to their understanding.

5.6Recommendations

In the light of the findings of the study, it is recommended that:

1. The Government of Nigeria should through the National Communication Commission (NCC) liaise with telecommunication companies to reduce rate of call charges, so that rural farmers could make a direct call to extension workers or any other agricultural stakeholders at a lower price for their agricultural information access and use apart from Short Message Service (SMS).
2. The rural farmers shouldmake daily or weekly use of mobile phones to access and utilize of agricultural information so astohave updateagricultural information which is possible with the apparent development in this information and communication technology age.
3. Rural Farmers should not rely on information about pest and disease control but should also access other different types of agricultural information such as information better marketing and prices of agricultural product and also of new improved seeds. This can be done through relevant agricultural research institutes and extension workers awareness campaign. By implication inadequate use of newly improved seeds and seedlings is most a times the outcome of low or insufficient crop production.
4. They shouldmake timely utilisation of agricultural information accessed through mobile phones which can be doneby explaining to the rural farmers the benefits behind proper utilisation of agricultural information for improved agricultural productivity.
5. Formal channel of accessing information should be made accessible to the farmers by the government of Nigeria (via the state and local authorities). Thiscan

be donethrough the provision of adequate extension workers that would disseminate relevant and accessible agricultural information to farmers in the rural areas.

5.7Suggestion for Further Research

In some typical researches, some silent areas are bound to be left out for further investigation. In the light of the findings and conclusion of this study, it is suggested that research on the following areas shouldbe carried out:

1. Utilization of Mobile Phones for Agricultural Information Dissemination by the Agricultural Extension Agents in Karaye Local Government Area, Kano State.
2. Effects of Information Literacy on Access to and Utilization of Agricultural Information for Household Food Security through Mobile Phones in Some Selected Wards of Rogo Local Government Area, Kano State.

Bibliography

Adebayo, K. (2006). Modeling the Uptake of Agricultural Knowledge and Information among Small Farmers in Ogun State, Nigeria.*Journal of Agricultural Extension*, 9: p.116.

Adedoyin, S.F.; Fapojuwo, O.E and Torimiro, D. (1999) Educational Communication materials in Agric. Technology promotion: A survey of extension agents in Ijebu area of Ogun State.Proceedings of the fifth annual National Conference of the AESON 12th – 14th April.

Adesina (2012). In Punch Newspaper, December 28, 2012: Growth Enhancement Support Scheme saved Agric. Sector, http://www.punchng.com/business/industry/growth-enhancementsupport-scheme-saved-agric-sector-adesina/

Adhiguru, P. P. S. Birthal, and B.G. Kumar (2009). ''Strengthening Pluralistic Agricultural Information Delivery System in India'' .*Agricultural Economics Review*.22:71-79

Adomi, E. E., Ogbomo, M. O. & Inoni, O. E. (2003). Gender factor in crop farmers' access to agricultural information in rural areas of Delta State, Nigeria. *Library Review,* 52, 8, 388-393.

Afolabi, M. (1993) Introduction to Research Method for Writing Project and Thesis, Zaria, Alpha Publishers.

Agbamu, J.U., 2006. Essentials of Agricultural Communication in Nigeria, Lagos: Malthouse.

Agwu, A.E. and Uchemba, U. (2004): Congruency, Agreement and Accuracy Among Researchers, Extension Workers and Farmers on the Role of ICTs in Nigeria's Agricultural Development. Presentation transcript.Department of Agricultural Extension, University of Nigeria.

Aigbeakaen, E. O., Sanusi, R. A. and Ndagi, I. (2007)Constraints to the Use of Global System of Mobile Communication(GSM) by Crop Farming Household in South-west Nigeria.

Aina, L.O. (2002) Research Methodologies in Information Sciences in Aina, L.O. (2002) (Eds) Research in Information Sciences: African Perspective. Ibadan: Stirling-Horden Publishers.

Aina.L.O. (1999). Decision makers and agricultural information in Africa: the potential role of the Internet. IAALD Quarterly Bulletin, XLIV(l/2) 96-99.v

Aker, J. C. (2008). Does Digital Divide or Provide? Impacts of Cell Phones on Grain Markets in Niger, Working Paper Number 154, Centre for Global Development, Washington, USA. [http://www.cgdev.org/content/detail/894410] site visited on 8/12/2010.

Akuezuilo, E.O. (1993) Research Methodology and Statistics (NUC/NBTE/NCCE Minimum Standard Edition), Awka: NUELAmerican Statistical Association (1997). What is a survey? [Online],Available:http://www.arnstat.orglsections/srms/brochures/surwhat.html [accessed 23/9/02].

Alila, P. O.,and Atieno, R. (2006).Agricultural policy in Kenya: Issues and processes. In the proceedings of the Future Agricultures Consortium Workshop, Institute of Development Studies. March 20-22.4.

Anastasios, M., A. Koutsouris and M. Konstadinos (2010) Information and CommunicationTechnology as Agricultural Extension Tools: A Survey among Farmers in West Macedonia, Greece.*Journal of Education and Extension* 16 (3): 249-263.

Anil, N. (2008).ICT for Agricultural and Rural Development. Accessed from: http://en.wikieducator.org/image/c/ce/information-&-communication(a-k-sahu)ppt.pdf on March15th, 2013.

Anyanwu, J.C. (1987). The Structure of Nigeria Economy. Onitsha Joannee Educational Publisher Ltd. Onitsha

Arokoyo, T. (2005) ICTs application in Agricultural Extension Service delivery. In: Adedoyin, F.S (ed) Agricultural Extension in Nigeria.

Asian Development Bank (ADB, 2003).Strategic Approval to Information and Communication Technology Towards e-Development in Asia and Pacific.November.

Bako, N. (2001). "Information Technology And Nigeria Mass Media". Retrieved From Http://Www.Mobilephonetool.Htm.

Balit, S., Calvelo Rios, M., and Masias, L. (1996). Communication for development for Latin

Baumüller.H. (2012). Facilitating Agricultural Technology Adoption Among the Poor: The role of service delivery through mobile phones .Heike Baumüller Center for Development Research (ZEF), University of Bonn, Walter-Flex-Str. 3, 53113 Bonn, Germany T el. +49 (0)228-73 1913 E-mail: heike@uni-bonn.de.

Brandie, L. M. and Eric, A. (2011).Mobile Phones and Rural Livelihoods: Diffusion, Uses, and Perceived Impacts Among Farmers in Rural Uganda. *International Journal of Computer Science and Security* (IJCSS), 4 (3):361-372

Buys, P., Susmita D., Timothy S. and David, W. (2009).Determinants of a Digital Divide in Sub-Saharan Africa: A Spatial Econometric Analysis of Cell Phone Coverage. *World Development* 37(9): 351-378.

Campbell, A. (2005). Mobile phones for small African farmers.Retrieved August 6, 2010, http://smallbiztrends.com/2005/03/mobile-phones-for-small-african.html. Cecchin

Conroy (2003).*New Direction for Nigeria's Basic Agricultural Services: A Discussion Paper. Vol. 1 and Vol. 2:* National Stakeholders Workshop on Basic Agricultural Services for Poor Farmers in Nigeria, Abuja. Pp. 1 – 63.

Coudel, E. and Tonneau, P. (2010). How Can Information Contribute to Innovative Learning Processes? Insight from a Farmer University in Brazil.*Agricultural Information Worldwide* 3 (2): 56-63.

Creswell, J. W. (2009). *Research design:* qualitative, quantitative, and mixed methods approach(3rd ed.).Thousand Oaks, CA: Sages

Dada, O.M. and Adedoyin, S.F. (2006).Constraints militating against the attainment of household food and nutrition security in Ogun State.*Proceeding of the Fifteenth Annual Congress of the Nigeria Rural Sociological Association, pp. 65-72.*

Davis, F. D. (1989). Perceived Usefulness, Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly* 13: 319-340.

Djankov, S., McLeish, C., Nenova, T. and Sheifer, A. (2001). Who owns the media? *Journal of Law and Economics* 46(2): 123-146.

Donner,J. (2009). Mobile-based livelihood services in Africa: pilots and early deployments, in M. Fernandez-Ardevol & A. Ros (eds) Communication Technologies in Latin America and Africa: *A Multidisciplinary Perspective: 37-58, Barcelona, IN3.*

Duncombe, R. and Heeks, R. (2001). Enterprise across the digital divide: Information systems and rural micro-enterprise in Botswana. *Journal of International Development* 14(1): 61-74.

Ebgule, C.L., Agwu, A. E. and Uzokwe, U.N (2013).Availability and Use of Mobile Phones for Information Dissemination by Public Extension Agents in Delta State, Nigeria.*Journal of Agricultural Extension Vol.17 (24)*

Ekoja, I.I. (2003). Farmers' access to agricultural information in Nigeria.*Bulletin of the American Society for Information Science and Technology, August/September. Pp. 21 – 23.*

Erenstein,O.,Lancon, F., Osiname, O. and Kebbeh, M. (2004). Operationalizing the strategic framework for rice sector revitalization in Nigeria.Project Report – The Nigerian rice economy in a competitive world constraints, opportunities and strategic choices.

Esselaar, P., Hesselmark, O., James, T. and Miller, J. (2001). Final report: A three country ICT survey for Rwanda, Tanzania, and Mozambique.[http://www.trigrammic.com/downloads/SIDA%20Final%20Project%20Report.pdf] site visited on 21/7/2010

Fekadu, B. (1997). Integration of Farmers' Knowledge into Agricultural Research: Challenges and Strategies: the case of Ada'a District, Central Oromia (Ethiopia),

Food and Agricultural Organization (2002). Report of The Second Consultation on Agricultural Information Management. Rome, Italy. [On line]. Available on http://www.fao.org/docrep/MEETING/005/Y7963E/

Gakuru, M. Winters, K. and Stepman, F. (2009) and Qiang et, al. (2011) Inventory of innovative farmer advisory services using ICTs, Forum for Agricultural Research in Africa. [On-line] http://www.faraafrica.org/media/uploads/File/NSF2/RAILS/Innovative_Farmer_Advisory_Systems.pdf

Getahun, D. (2004). Assessment of Factors Affecting Adoption of Wheat Technologies and Its Impact: The Case of Hula Woreda, Ethiopia. MSc. Thesis (Unpublished) Presented To School of Graduate Studies of Alemaya University, Pp. 1.

Haba, S. (2004). Factors influencing the willingness to pay for agricultural information delivery technologies by cooperative-oriented agribusinesses in Rwanda: evidence from the Abahuzamugambi Coffee Growers Cooperative of Maraba. Master's thesis, Texas A&M University.

Habtemariam, A. (2004). The comparative influence of intervening variables in the adoption behavior of maize and dairy farmers in Shashemene and Debre Zeit, Ethiopia.Ph. D. Thesis, University of Pretoria, Pretoria, 294p.

Ibrahim, U. (2013) Techniques for Writing and Presentation of Thesis/Dissertation: A Companion Guide for Postgraduate Students in Nigeria University System. ABU Press: Zaria.

Ilahiane, H., 2007. Impacts of ICTs in agriculture: Farmers and mobile phones in Morocco.Paper Presented at the American Anthropological Association Conference, Washington, D.C. United States of America. 1. -3 December 2007.

Iraba, L. M. and Venter, I. M. (2011). Empowerment of rural farmers through information sharing using inexpensive technologies.In Proceedings of the South African Institute of Computer Scientists and Information Technologists Conference on Knowledge, Innovationand Leadership in a Diverse, Multidisciplinary Environment (SAICSIT '11). ACM, New York, NY, USA, 279-282

Iroko M. "FG Abandons $200M Rural Telephony Project" Zimbio Inc, 2012.Retrieved , 22/07/12 at http://www. zimbio.com/Nigeria/articles/GnjWJ99uezp/FG+ABANDONS+200M+RURAL+TELEPHONY+PROJECT

Johanes, M.A. (2013) The Role Played by Mobile Phone Communication in Diffusion of Dairy Goats Rearing in Mutonguni Division, Kitui County, (Unpublished Dissertation Kenya, 2013).

Kamba, A. (2014). The Research Hierarchy: Understanding the Paradigms and the Practice of Research in the Disciplineof Library and Information Science. Paper Presented in the Department of Library and Information Science A B U, Zaria (Unpublished).

Katungi, E. (2006). Gender, Social Capital and Information Exchange in Rural Uganda IFPRI and Melinda Smale, IFPRI (International Food Policy Research Institute) CAPRi Working Paper No. 59, University of Pretoria. Uganda. [On line].Available on http://www.capri.cgiar.org/pdf/capriwp59.pdf.Accessed March 31, 2008.

Kearsley, G. (2008). Explorations in Learning & Instruction: The Theory into Practice Database. [Online]. Available on http://tip.psychology.org/attitude.html

Kerlinger, F.N (1973) Foundation for Behavioral Research 2nded. New York. Holt Reinhart and WinstonInc.

Khong Siong, and Binshan Lin (2009), Internet-based ICT adoption: evidence from Malaysian SMEs, *Industrial Management & Data Systems*, 109(2),: 45-58,. 25.

Lehr, D. (2007): Going Wireless: Dialing for Development (working paper).

Lwoga, E. T. and Ngulube, P. 2008. Managing indigenous and exogenous knowledge through information and communication technologies for agricultural development and achievement of the UN Millennium Development Goals. In Njobvu, B. & Koopman, S.(Eds). *Libraries and information services towards the attainment of the UN Millennium Development Goals* (pp. 73-88). Berlin: Walter de Gruyter.

Manda, P. (2002) Information and Agricultural Development in Tanzania: a critique. *InformationDevelopment;* 18; 181. http://idv.sagepub.com/cgi/content/abstract/18/3/181

Mbachu, O. (2010) *SocialscienceResearchMethods*: *for Policy and Strategic Studies*. Kaduna: Medusa Academic Publishers.

Mgenda, O.L. and Mgenda, A.G. (1999). Research methods: quantitative and qualitative approaches. Nairobi: African Centre for Technology Studies (ACTS) Press.

Minot, N. (2005). Are Poor, Remote Areas Left Behind in Agricultural Development: The Case of Tanzania. MTID Discussion Paper No.90, *International Food Policy Research Institute*. Washington D.C. 243pp.

Mohammed, Z. (2012). The Dynamics of Information: Embracing the Present to Cope with the Future. Seventh Tai Solarin National Memorial Lecture held on 27th September, 2012,Victoria Island, Lagos.

Morrow, K; Nielse, F.and Wettasinha, C. (2002) Changing Information Flows. *LEISA 18 (12): 4-5.*

Muhammed,M.A.S (2007). Rural Development and Enterprise Development, Alexandria: Sustainable Development Association.

Mumbi, R.&Ghazi, P. (2011). Zambia: Climate Information Alerts Boost Poor Farmers. All Africa.com, July 14.

Munyua, H. (2000). Application of information communication technologies in the agricultural sector in Africa: a gender perspective. In: Rathgeber, E, & Adera, E.O. (Eds.) Gender and *Information Revolution in Africa*IDRC/ECA. Pp. 85-123.

National Population Commission (2006).: "The Nigeria Population Census, 2006." Retrieved from http://www.population.gov.ng/index.php?option=com_content&view=artide&id=89 (retrieved on 12 December, 2013).

Nigerian National planning Commission (2004). Meeting Everyone's Needs- National Economic Empowerment and Development Strategy: Nigerian National Planning Commission, Abuja

Nigerian Telecommunication Commission(2013)"Industry Statistics-> Subscriber Data". Retrieved on 2013-07-28.

Ogbeh, A. (2016)Tomato: TomatoEbola's Destruction Hits Six State. Punch Newspaper. Retrieved 25, May, 2016 from http://www.com.

Oguya, V. (2007).CTA Vision for the Question and Answer Service (QAS). Paper Presented at NAQAS Stakeholders meeting on Strategies to involve farmers in NAQAS Service in Nigeria held at NAERLS/ABU Zaria. 8Pp

Onwuemele A. (2011). "Impact of Mobile Phones on Rural Livelihoods Assets in Rural Nigeria: ACaseStudy of Ovia North East Local Government Area" *JORIND* 9 (2): 223-236.

Osuala, E. C. (2005). Introduction to Research Methodology 3rd ed. Ibadan: African publishers. 'Post Offices-with map of LGA'' NIPOST. Retrieved 2009-10-20

Pipy F. O, 2006.Poultry Farmers' Utilization of Information in Lagelu Local Government Area, Oyo State of Nigeria.*International Journal of Poultry Science 5 (5): Pp. 499-501*.[On line].Available on http://www.pjbs.org/ijps/fin542.pdf.Accessed March 20, 2008.

Polit and Hungler (1999) Basic Research Methods for Librarians 2nd ed. Greenwich, Conn: Ablex Publishing Corp press Ltd.

Rashid A. T and Elder, L. (2009). Mobile Phones and Development: An Analysis of IDARC-Supported Projects. *The Electronic Journal on Information Systems in Developing Countries* (EJISDC) 36: 2, 1-16

Rice, R. E. and Katz, J. E. (2003). Comparing Internet and Mobile Phone Usage: Digital Divide of Usage, Adoption and Dropouts. *Journal of Telecommunication Policy* 27(10): 597-623.

Saito, K., Hailu Mekonen, and Spurling, D.(1994). Raising the Productivity of Women in Sub- Saharan Africa.The International Bank for Construction and Development of the World Bank, Washington D.C, USA. 110pp.

Salau, E.S. and Saingbe, N.D. (2008). Access and Utilization of Information and Communication Technologies (ICTs) among Agricultural Researchers and Extension Workers in Selected institutions in Nasarawa State, Nigeria. *Production and Technology (PTA) 2008; 4 (2): 1-11*Accessed on 23rd April, 2012 from http//www.patnsukjournal.com

Salomon, L. and Engel, (1997). Networking for innovation: A participatory actor-oriented methodology. Royal Tropical Institute, KIT Press, Amsterdam.

Sambo, A. (2005) Research Methods in Education. Ibadan: sterling –Horden publishers.

Samuel, J., Shah, N. and Hadingham, W. (2005). Mobile Communications in South Africa, Tanzania and Egypt: Results from Community and Business Surveys. *The Vodafone Policy Paper Series* 2(1): 44–52.

Sanusi, R. A. (2004). Analysis of Coffee Trade in Selected Coffee Growing Areas of Nigeria.20th International Coffee Science Conference. Bangalore, India. www.asic-café.org/htm/eng/section.php.agricultures.org/pdf%20files/SG_paper_1.pdf.Accessed March 31, 2008.

Sood, D. (2006). The Mobile Development Report: The Socio-Economic Dynamics of Mobile Communications in Rural Areas and their Consequences for Development.[http://cks.in/mdr/Mobile%20Development 20Report_updated.pdf] site visited on 21/3/2010.

Tadesse, D. (2008). Access and Utilization of Agricultural Information by Resettler

Farming Households: The case of Metema Woreda, North Gondar, Ethiopia M. Sc. Thesis. P. 1.

Tesfaye Zegeye, Bedassa Tadesse, and Shiferaw Tesfaye, 2001.Determinants of high yielding maize technology adoption.Empirical evidence from Southwestern Oromia. Research Report No. 38. Ethiopia Agricultural Research Organization (EARO), 2001. 39p.

Umali, L. and Dina, L. (1994). Public and private agricultural extension: Beyond traditional frontiers. World Bank Discussion Papers. 236, 15-26.

Wegner, T. (2000).Quantitative methods for marketing decisions. Cape Town, Kenwyn: Juta& C

APPENDIX I

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

AHMADU BELLO UNIVERSITY, ZARIA, NIGERIA

Vice Chancellor: Professor Ibrahim Garba, B.Sc. (Hons) Geology, M.Sc. (Mineral Exploration) ABU, Ph.D Geology (London), D.I.C., FNMGS
Head of Department: Abdullahi Ibrahim Musa, Ph.D (Emporia, USA), MBA, MLS, PGDPA, PGDM, BA (LS)
e-Mail: lis@abu.edu.ng Tel: 08174568401/09033706447

MLS/EDUC/34547/2012-2013

23rd November, 2015

TO WHOM IT MAY CONCERN

Dear Sir,

INTRODUCTORY LETTER: YAHAYA ALHASSAN KARAYE

I write to introduce to you *YAHAYA ALHASSAN KARAYE* a Post graduate student with registration number *MLS/EDUC/34547/2012-2013* in the Department of Library and Information Science. He is carrying out a Research work on the Topic: "Utilization of Mobile Phones for Agricultural Information Access and Use by Rural Farmers in Karaye Local Government".

Please assist him in any capacity he required.

Thank you.

Yours faithfully,

Abdullahi I. Musa, Ph.D
Head of Department

APPENDIXII

Department of Library and Information Science,
Ahmadu Bello University, Zaria.

21st, October, 2015.

Dear Respondent,

Iam a postgraduate student in the above named department conducting a research entitled **"Utilization of Mobile Phones for Agricultural Information Access and Useby Rural Farmers in Karaye Local Government Area, Kano State".** This research is essentially for academic purposes. Kindly assist to respond to the questions in this questionnaire. All the information given will be used strictly for the research purpose only.

Thank you very much for your time and cooperation.

Yours faithfully,

Alhassan, Yahaya Karaye
Mls/Educ/34547/2012-2013
07034526706

QUESTIONNAIRE FOR THERURAL FARMERS OF KARAYE LOCAL GOVERNMENT AREA, KANO STATE

SECTIONA: Demographic Information

Please, tick(√) in the appropriate box provided.

1. Indicate your gender: a. Male ( ) b. Female ( )

2. What is your age? a.21 – 30 ( ) b. 31 – 40 ( ) c. 41 – 50 ( ) d. 51 and above ( )

3. What is your marital Status? a. Single ( ) b. married ( ) c. divorced ( ) d. widow ( )

4. What level of education have you attained?

a. Primary ( )

c. Secondary ( )

d. Tertiary ( )

e. Adult Education class ( )

SECTION B: How rural farmers utilize mobile phones to access agricultural information for use

5. How do the rural farmers utilizemobile phones to access agricultural information for use in Karaye Local Government? Tick (√) the appropriate option.

a. Through Short text Messages (SMs) ( )

b. Through Voice Calls ( )

c. Through email ( )

d. Through browsing ( )

e. Through multimedia services ( )

f. Others Specify……

6.What benefits do you get from utilizing mobile phone for agricultural information access and use? Please indicate your level of agreement based on the following options:

A= Agreed, D = Disagreed U= Undecided.

S/N	Benefitsofutilizingmobile phones	A	D	U
1	Helpsto easily send request on agricultural information			

	anytime the need arose			
2	Reduces the need to travel			
3	Promotesinterpersonal relationships			
4	Assist in accessing agricultural information quickly			
5	Increase income of the people in the community			
6	Enhance strong social cohesion			
7	Allow more contacts amongst farmers			
8.	Easy contact with local customers/suppliers			
9.	Easy to get in touch with fellow farmers			

SECTION C: Extent ofuse of mobile phones to accessagricultural information

7. What is the extent of the use of mobile phones to access and utilize agricultural information by rural farmers in Karaye Local Government?

A= Agreed, D = Disagreed U= Undecided.

S/N	Extent of Use of Mobile Phones	A	D	U

1.	I use mobile phone to access agricultural information daily			
2.	I use mobile phone to access agricultural information weekly			
3.	I use mobile phone to access agricultural information monthly			
4.	I use mobile phone to access agricultural information forthrightly			
5.	I use mobile phone to access agricultural information occasionally			
6.	I use mobile phone to access agricultural information annually			
7.	I use mobile phone to access agricultural information occasionally			
8.	I use mobile phone to access agricultural information frequently			

SECTION D:Types of agricultural information that are accessed through mobile phones.

8. What types of agricultural information are accessed through mobile phones by rural farmers for use in Karaye Local Government? Tick (√) the space provided as many as possible;

a. Information for better marketing and prices of agricultural products ( )

b. Information about agricultural pest and diseases control ( )

c. Information about method of herbicide control ( )

d. Information about farming systems ( )

e. Information about new improved seeds ( )

f. Information about drought resistant crops ( )

g. Information about credit facilities ( )

h. Information about soil fertility ( )

i. Information about soil erosion ( )

j. Information about harvest management ( )

k.Information about livestock management ( )

9. What types of agricultural activities do you practice? Tick only activities that you deal with;

a. Keeping animals only ( )

b. Growing crops only ( )

c. Keeping animals and growing crops ( )

Section E: Extent of information utilization.

10. To what extent is the agricultural information utilized by farmers? Please indicate your level of agreement based on the following options; **Daily, Weekly, Monthly, Annually, and Occasionally.**

S/N	Information	Extent of Utilization				
		Daily	Weekly	Monthly	Annually	Occasionally
1.	Marketing and prices of agricultural products					
2.	Information about pest and diseases control					
3.	Information about method of herbicide control					
4.	Information about farming systems					
5.	Information about soil fertility and soil erosion control					
6.	Information about livestock management					
7.	Information about new improved seeds and drought resistant crops					

11.Which sourcedoes you access agricultural information? Tick (√) as many as possible;

a.From other farmers ()

b. Research institute ( )

c. Radio ()

d. Newspaper ( )

e. Television ( )

f. Neighbors ( )

g. Library ( )

h. Researchers ( )

i. Extension agents ( )

j. Mobile phones ( )

Section F: Challenges to theutilization of mobile phones for agriculturalinformationaccess and use

12. What are the challenges to the utilization of mobile phones for agriculturalinformationaccess and use by rural farmers in Karaye Local Government?(Tick (√) as many options as applicable)

a. High call charges ()

b. Inaccessibility to rural areas by the NGO ()

c. Complexity of the mobile phone technology ()

d. Inadequate contact to extension agent ()

e. Lack of access to mobile connectivity in the community ()

f. Slow mobile connectivity in the community ()

g. Inappropriate time of information dissemination ()

h. Lack of electricity to recharge mobile phone ()

i. Frequent power failure to recharge mobile phone ()

j. Household commitment ()

k. Inability to access formal channel of information ()

l. Others (s), please specify (if any)……

APPENDIX III

Result of the Pilot Study with the Questionnaire for Utilization of Mobile Phones for Agricultural Information Access and Use by Rural Farmers in Karaye L.G.A., Kano State using Split Half Reliability

ODD NOS.		EVEN NOS	
Q5	8	Q2	4
Q7	10	Q2	10
Q9	0	Q2	1
Q11	2	Q2	4

Let X be Odd Nos.

Y be Even Nos.

Pearson Product Moment correlation (PPMC) Table

X	Y	$X-\overline{X}$	$(Y-\overline{Y})$	$(X-\overline{X})(Y-\overline{Y})$	$(X-\overline{X})^2$	$(Y-\overline{Y})^2$
8	4	3	-0.8	-2.4	9	0.64
10	10	5	5.2	26	25	27.04
0	1	0	-3.8	0.	0	14.4
2	4	-3	-0.8	2.4	9	0.64
				26	**43**	**42.72**

$\overline{X} = 8 + 10 + 0 + 2 = \frac{20}{4} = 5$

$\overline{Y} = 4 + 10 + 1 + 4 = \frac{19}{4} = 4.8$

$r = \sum(X-\overline{X})(Y-\overline{Y})$

$$\sqrt{\sum(X-\overline{X})^2 \sum (Y-\overline{Y})^2}$$

$$r = \frac{26}{\sqrt{43 \times 42.72}}$$

$$r = \frac{26}{\sqrt{1836.96}}$$

$$= \frac{26}{43}$$

$$= 0.6$$

$$S_B = \frac{2r}{1+r}$$

$$= \frac{2 \times 0.6}{1+0.6} = \frac{1.2}{1.6}$$

$$= 0.75$$