

INTERNET USE FOR EXTENSION COMMUNICATION AMONG
AGRICULTURAL RESEARCH INSTITUTES AND FARMERS IN
NORTH-WEST NIGERIA

By

Abdul-Aziz HARUNA

Msc/SOC-SCIE/0035/09-10

A Thesis submitted to the School of Post Graduate Studies, Ahmadu Bello
University, Zaria, in partial fulfilment of the requirements for the Award of
Master Degree in Mass Communication.

Department of Mass Communication, Faculty of Social Sciences.

Ahmadu Bello University Zaria, Nigeria.

August, 2014

Declaration

I hereby declare that the work in this thesis titled “**Internet Use for Extension Communication among Agricultural Research Institutes and farmers in North – West Zone Nigeria.**” was performed by me in the Department of Mass Communication under the supervision of Dr Mahmud M. Umar and Mallam Shitu A. R. A. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this work has been presented for another degree or diploma at any institution.

Abdul-Aziz HARUNA
M.Sc/Soc-Scie/0035/09-10

Certification

This project thesis titled **Internet Use for Extension Communication among Agricultural Research Institutes and farmers in North – West Zone Nigeria** meets the regulations governing the award of the degree of M.Sc in Mass communication of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

Dr M. M. Umar
Major Supervisor

(Date)

Mallam Shittu. A. R. A
Minor Supervisor

(Date)

Dr S. Salau
Head of Department

(Date)

Prof. Adebayo A. Joshua
Dean, School of Postgraduate Studies

(Date)

Dedication

This study is dedicated to my late father Alhaji Haruna Sule, my family and my loving mother who's sacrificed resulted to all my life achievements, you have been my source of inspiration. May the almighty Allah reward you with Jannatul Firdausi.

Ameen

Acknowledgments

My profound gratitude goes to my Creator, whom Honour and Glory must be given to, Allah (SWT) for making it possible for me to come this far, ALHAMDU LILLAH.

My sincere appreciation goes to my supervisors, Dr. Mahmud M Umar and Mal. Shitu A. R. A for their time, patience and constant words of encouragement. God bless them.

I wish to equally thank all my lecturers for their painstaking efforts, scholarly input, warm disposition and professional guidance. Appreciation goes to the head of department, Dr. S. Salau and postgraduate coordinator, Dr. M. M. Umar of Mass Communication Department, A.B.U. Zaria.

Special recognition is accorded to my loving wife Mrs Maryam Adamu, my sister Aisha Haruna including all my brothers and sisters for their prayers, dedication, and support for the success of this study.

I would also like to acknowledge the support of my friends in school and as well as say a big thank you to Director NAERLS A.B.U. Zaria, my programme leader and NAERLS Farm Broadcast Unit Head, my colleagues in NAERLS and field assistants among others.

ABSTRACT

This, study was conducted to assess Internet use for extension communication among the agricultural research institutes and farmers in the north-west. Two agricultural research institutes in the North-West zone of Nigeria were selected for the study namely: National Animal Production Research Institute (NAPRI) and Institute of Agricultural Research (IAR). An investigation using a survey research method was adopted for the study. The research sample consisted of 200 researchers and technical staff, as well as 100 farmers aged in the age range 20yrs – 60years. The farmers were chosen from 5 states, i.e, Kaduna, Kano, Katsina, Jigawa and Zamfara states. Purposive sampling method was used in selecting the respondents. Data collected was analysed using simple descriptive statistics. Findings from the study revealed that 90% of respondents attested that the institutes have functional Internet facilities, even though with a poor service which tend to limit its effectiveness for agricultural extension. Also, 39-55% affirmed that the two research institutes does not use their internet for agricultural extension purposes but uses the Internet in the area of researches as confirmed by over 80% of the respondents. However, 52% of the farmers lack Internet skill as well as access to the Internet. More so 65% of farmers oppose the Internet as alternative source of agricultural information. Similarly, 75% of respondents identified that factors militating against the effective use of Internet for agricultural extension were:- lack of: Internet connectivity to farmers, Internet skills by some stakeholders, poor network, and frequent power failure. Further more, majority of respondents suggested the following solutions to enhance the use of Internet for extension communication: Internet connectivity to all stakeholders, increased bandwidth, staff/farmers training on Internet usage, regular subscription as well as power supply. The study concluded that Internet can offer opportunities for strengthening research – extension systems in Nigeria even though its advantages are yet to be realized due to the stated reasons above. The study recommended that; Agricultural stakeholders ie extension agents, research institutes and input agencies should make effort to have access by providing Internet facilities, train their staff in Internet skills, this will encourage two-way communication (downloading, uploading, interaction, question and answer for agricultural extension purposes. Also they should design awareness campaigns to sensitize the agricultural stakeholders on the possible uses of Internet services for extension communication.

Table of Contents

CHAPTER ONE: INTRODUCTION	Pages
1.1 The study background - - - - -	1
1.2 Statement of the problem - - - - -	3
1.3 The research objectives - - - - -	5
1.4 The research questions - - - - -	5
1.5 Significance of the study - - - - -	6
1.6 Scope & Delimitation of the study - - - - -	7
1.7 Operational definitions - - - - -	7
CHAPTER TWO: LITERATURE REVIEW	
2.0 Introduction - - - - -	9
2.1 ICT policy on Agriculture in Nigeria - - - - -	9
2.2 The Internet - - - - -	10
2.3 Opportunities of Internet for Extension Communication - - - - -	12
2.4 Challenges of Internet use for Agricultural Extension - - - - -	17
2.5 Empirical Studies - - - - -	20
2.6 Theoretical framework - - - - -	22
2.7 Conceptual Framework - - - - -	25
CHAPTER THREE: METHODOLOGY	
3.1 Introduction - - - - -	26
3.2 The study area - - - - -	26
3.3 The study population - - - - -	28
3.4 Sampling technique - - - - -	28
3.5 The study variables - - - - -	29
3.6 Method of data collection - - - - -	30
3.7 Instruments for data collection - - - - -	31
3.8 Validity and Reliability - - - - -	31

3.9 Methods of data presentation	-	-	-	-	-	-	-	32
----------------------------------	---	---	---	---	---	---	---	----

CHAPTER FOUR: RESULT & DISCUSSION

4.1 Introduction	-	-	-	-	-	-	-	33
------------------	---	---	---	---	---	---	---	----

4.2 Discussion of findings	-	-	-	-	-	-	-	50
----------------------------	---	---	---	---	---	---	---	----

CHAPTER FIVE: SUMMARY & CONCLUSION

5.1 Introduction	-	-	-	-	-	-	-	55
------------------	---	---	---	---	---	---	---	----

5.2 Summary	-	-	-	-	-	-	-	55
-------------	---	---	---	---	---	---	---	----

5.3 Conclusion	-	-	-	-	-	-	-	57
----------------	---	---	---	---	---	---	---	----

5.4 Recommendations	-	-	-	-	-	-	-	59
---------------------	---	---	---	---	---	---	---	----

5.5 Suggestions for further studies	-	-	-	-	-	-	-	60
-------------------------------------	---	---	---	---	---	---	---	----

5.6 Contribution to Knowledge	-	-	-	-	-	-	-	61
-------------------------------	---	---	---	---	---	---	---	----

Reference	-	-	-	-	-	-	-	62
-----------	---	---	---	---	---	---	---	----

Appendix	-	-	-	-	-	-	-	
----------	---	---	---	---	---	---	---	--

List of Figures

Figure 1: Stakeholders Communication Chain	-	-	-	-	-	25
Figure 2: Gender of Respondents	-	-	-	-	-	33
Figure 3: Respondents Status	-	-	-	-	-	34
Figure 4: Respondents level of Internet Skill	-	-	-	-	-	36
Figure 5: Whether the Institutes have functional Internet facilities	-	-	-	-	-	36
Figure 6: Rating the Institutes Internet facilities	-	-	-	-	-	37
Figure 7: Assessing the Institutes Web Site	-	-	-	-	-	37
Figure 8: Institutes use their web site for Agricultural Extension	-	-	-	-	-	38
Figure 9: Opportunities of Internet provides to Agricultural Research Institutes	-	-	-	-	-	39
Figure 10: Institutes hosting completed research projects on their Web Site	-	-	-	-	-	39
Figure 11: The Rate at which the Institutes Update their Web Site	-	-	-	-	-	40
Figure 12: Respondents knowledge of blogging on the Internet	-	-	-	-	-	40
Figure 13: Respondents having an Email account.	-	-	-	-	-	41
Figure 14: Rate of checking their Email account	-	-	-	-	-	41
Figure 15: Respondents Interacting with other Research Institutes via the Internet	-	-	-	-	-	42
Figure 16: Knowledge of various Internet resources for Interacting	-	-	-	-	-	43
Figure 17: Institutes use of Internet tools for Agric extension	-	-	-	-	-	43
Figure 18: Types of Internet resources Institutes use for Agricultural Extension	-	-	-	-	-	44
Figure 19: Challenges of Internet use in the Institutes	-	-	-	-	-	44
Figure 20: Ways Internet utilization can be enhanced by the Research Institutes	-	-	-	-	-	45
Figure 21: Best practices for Internet use in agricultural extension	-	-	-	-	-	46
Figure 22: Educational level of the farmers	-	-	-	-	-	47
Figure 23: Farmers constraints in using the Internet	-	-	-	-	-	49

List of Tables

Table 1: Age group respondents	-	-	-	-	-	-	34
Table 2: Respondents years of working experience				-	-	-	35
Table 3: Educational level of respondents	-	-	-	-	-	-	35
Table 4: Farmers level of Internet awareness				-	-	-	47
Table 5: Assessing famers Internet Skill	-	-	-	-	-	-	47
Table 6: Farmers access to Internet	-	-	-	-	-	-	48
Table 7: Ever use the Internet to source information				-	-	-	48
Table 8: Internet as alternative source of agric information					-	-	49

List of Appendices

Appendix A: Letter of Introduction	-	-	-	-	-	-	-
Appendix B: Questionnaire	-	-	-	-	-	-	-
Appendix C: Farmers Checklist	-	-	-	-	-	-	-

CHAPTER ONE

INTRODUCTION

1.1 THE STUDY BACKGROUND

A major constraint to agricultural development in Nigeria is lack of inappropriate channels to deliver extension messages. Access to information is one of the most critical resources in agricultural sector, as well as economic development in Nigeria. Farmers need information on opportunities and threats in which the Internet can be of significant in accessing agricultural information. The Internet is one tool that can enhance flow of information between and among agricultural research institutes, Extension Agents (EAs) and the farmers. African, Caribbean and Pacific (CTA, 2003) and Food and Agriculture Organisation (FAO, 1998) defined Internet as one technology involved in collecting, processing, storing, retrieving, disseminating and implementing data and information using microelectronics, optics, telecommunications and computers.

Meera, Jhamtani, and Rao. (2004) noted that Internet can bring new information services to rural areas where farmers (end users) will have much greater access to new agricultural innovations and information, than ever before. Access to such new information source is a crucial requirement for the sustainable development of farming systems. The Internet can be of immense help by enabling extension workers to gather, store, retrieve and disseminate a broad range of information needed by farmers. Van den Ban and Hawkins (1998) argued that in many countries the costs of maintaining full complement of extension agents are increasing progressively while the price of computers in the global market has decreased rapidly. This, therefore, makes the use of Internet for information dissemination more economical.

The aim of research and extension in Nigeria is to help farmers increase their agricultural productivity and so facilitate income generation, development, adoption and evaluation of appropriate agricultural technologies. Salau and Saingbe (2008) opine that Internet is important for networking among and between the key agricultural stakeholders in the Research-Extension-Farmers-Inputs-Linkage System (REFILS). The Research-Extension-Farmer-Input-Linkage System (REFILLS) is basically a strategy to bring together all the key stakeholders in agricultural development: researchers, extension agents, farmers, policy makers and the private sector for the effective management of research and extension delivery for sustainable agricultural development in Nigeria. Extension Communication is information exchange between and among various agricultural stakeholders ie farmers extension agents and agricultural research institutes, is an area in which Internet can have significant impact, research scientists can relate directly with the farmers through the Internet.

Agricultural extension by its nature has an important role in promoting the adoption of new innovations. The trend from supply-driven extension to demand-driven extension requires a new approach, which opens the door for using Internet as a practical communication tool to address the needs and demands of rural population.

Umar (2005) noted that extension services recognized worldwide as a means by which most service oriented organisations can speedily realize their set objectives, has not been accorded the priority attention it deserves. The failure of the various extension delivery approaches to effectively engineer significant and sustainable agricultural development in Nigeria has become a major concern to all agricultural stakeholders. Agricultural Research Institutes are being challenged to deliver research outputs that will improve agriculture in Nigeria; however one obstacle to the realization of this delivery to farmers according to National Agricultural Extension and Research Liaison Services (NAERLS) agricultural performers' survey report, (APS, 2010) is the shortage of Extension Agents (EAs) ratio

which stood at 1:2500 farmers. Therefore re-thinking the way agricultural researches is delivered to farmers becomes necessary.

However, the Nigerian agricultural research institutes are coordinated and supervised by the Agricultural Research Council of Nigeria (ARC), there are **17 agricultural research institutes** in Nigeria out of which **4 are based in the North – Western region**; namely **i)** Institute for Agricultural Research (IAR) ABU Zaria. **ii)** National Agricultural Extension and Research Liaison Services (NAERLS) ABU Zaria. **iii)** National Animal Production Research Institute (NAPRI) ABU Zaria. **iv).** Nigerian Institutes for Trypanosoma-Miasis Research, Kaduna. Their mandates were:- to promote the agricultural and related sectors through research, technology development and technology transfer in order to: enhance the natural resource base and environment; sustain a competitive agricultural economy; provide new economic opportunities; ensure high quality and safe food / food security; support an informed society on new agricultural technologies and modern farm practices and encourage the national growth and development of Nigerian agricultural sector.

Going by the institutes' objectives, with shortage of extension agents who facilitates adoption of new innovations in Nigeria, it is therefore paramount for the agricultural research institutes to effectively utilize the potential of Internet to enhance their activities in terms of information and communication dissemination.

1.2 STATEMENT OF THE PROBLEM

Agricultural Research Institutes in Nigeria are facing challenges in the area of extension communication delivery due to a number of reasons among which is shortage of extension workers in Nigeria and inappropriate channels for extension delivery. Extension workers are agents for communicating new agricultural innovation to farmers. The current extension/farmer ratio according National Agricultural Extension and Research Liaison

Services (NAERLS) (2011) Agricultural Performers Survey (APS) report stood at 1: 3500 farm families, even with these the institutes are required to respond effectively to the demands of policy makers, private sector investors and donor agencies, farmers and other stakeholders in the agricultural business. They are being asked to deliver research outputs that will improve agricultural productivity, food security, in order to increase their countries competitiveness in global markets, and contribute to sustainable development. Therefore, this calls for need of agricultural research institutes to prioritize and strategize their responses in-terms of agricultural extension services. Consolata and Evans (2010) opine that Internet offers opportunity to livestock farmers in Tanzania in-terms of accessibility to e-resources, information sharing and feedbacks. In the same vain, Kapange (2002) reported that, Internet is crucial in facilitating extension communication and access to information for agricultural and rural development.

Inspite of many years of research, the agricultural research institutes in Nigeria have not been fully utilizing the Internet particularly web based as information data base for the purpose of food security and agricultural extension delivery in Nigeria (Oduwale, 2004, Bonati and Gelb, 2005, World Bank, 2007). Researches have proved the use of Internet for economic development. Meera, et all (2004) as well as Salau and Saingbe, (2008) opine that access to Internet a is crucial requirement for sustainable agricultural development. However, there were arguments on the use of Internet for agricultural extension. Adeyanju, Haruna and Abubakar, (2011) argued that researchers, extension agents and farmers are yet to take the advantage that the Internet offers due to lack of connectivity and low computer literacy by some stakeholders.

Oduwale (2010) examined the impact of Internet use on agricultural research institute work. His findings did not indicate that the internet is being use for agricultural extension communication. Inspite of this, the Internet can still enhance information exchange among

the research institutes, extension agents and farmers. This underscores the need for research on the use of Internet for agricultural extension communication, challenges of inappropriate use of Internet channels and the Internet potentials for agricultural development in Nigeria.

This study therefore seeks to find out the availability of internet facilities in the two selected agricultural research institutes and determine the extent of use of the facilities for agricultural extension purposes and the factors that militate against the effective use of Internet for extension communication.

1.3 THE RESEARCH OBJECTIVES

The aim of the study was to examine the use of Internet for agricultural extension among farmers and the research institutes staff in North-Western Zone, Nigeria.

The specific objectives therefore, were to:

- (a) Determine status of Internet facilities in the research institutes in North-West zone.
- (b) Examine the level of utilization of Internet facilities for agricultural extension among the agricultural research institutes in the North-West.
- (c) Determine the extent of farmer's use of Internet to source for agricultural information and factors militating against their use in the North-West zone.
- (d) Identify the factors militating against effective use of Internet for agricultural extension in the research institutes.
- (e) Recommends ways to address the challenges of Internet use by the research institutes and farmers.

1.4 THE RESEARCH QUESTIONS

The questions addressed in this study therefore are:

1. Do the agricultural research institutes have functional Internet facilities for agricultural extension purposes in the North-West?

2. What is the level of Internet utilization for agricultural extension among the agricultural research institutes in the North-West zone?
3. What is the level of Internet usage by farmers to source for agricultural information in the North-West?
4. What are the constraints against effective use of Internet in the agricultural research institutes in the North-West zone?
5. What are the solutions to the factors identified against the use of Internet for agricultural extension in the North-West?

1.5 SIGNIFICANCE OF THE STUDY

The study was based on the need to find out the nature of Internet use in agricultural research institutes and to determine the most effective way of using the Internet for agricultural extension. Also the study identifies ways on how to enhance the use of Internet for feedback and disseminating research results (2way communication).

The study contributes to the available literature in areas of agricultural extension communication media in the north - western Nigerian. Also, it can serve as benchmark to other researchers in the same field to compare and assess the validity of conclusions reached.

The results, conclusions and recommendations of this study will be useful to the agricultural institutes when using the Internet for research and extension purposes to set up guides for agricultural professionals based on their needs for use of emerging information technologies. Similarly, the study will help fill the gap in knowledge discovered in the empirical studies on the use of Internet for agricultural extension in Nigeria. Findings provide feedback on areas of Internet usage which researchers can engage in for agricultural extension as well as suggested various Internet facilities to engage other stakeholders for agricultural extension. In addition, the results of this study will be beneficial to agricultural

research institutes, agricultural researchers, farmers and extension agents for agricultural extension using the internet.

1.6 SCOPE/ DELIMITATION OF THE STUDY

The study is limited to Internet use for agricultural extension in North-West zone of Nigeria. There are seventeen (17) agricultural research institutes in Nigeria, out of which four are located in the North – West precisely Kaduna State, but the study is limited to two agricultural research institutes in North – West Agro-ecological Zone of Nigeria vis: (i) Institute of Agricultural Research (IAR) (ii) National Animal Production Research Institute (NAPRI) Ahmadu Bello University, Zaria. The reason for selecting the two institutes is because they have been given the mandates to research on crops and livestock production respectively.

1.7 OPERATIONAL DEFINITION OF KEY TERMS

The following terms have been defined based on their usage in this study.

Internet use: refers to using the internet for accessing research results, communication interaction, and dissemination of research result via the internet.

Agricultural Research Institutes: are industry that developed and promotes the agricultural sectors through research, technology development and technology transfer.

Extension Communication: in the context of this study is a planned programme of services targeted for expanding, strengthening and empowering the capacity of farmers.

Researchers and Technical Staff: defined as people that are responsible for accomplishing the research institutes mandates through research and technology development.

Internet Facilities: refers to equipments, platforms, computers, website presence and internet connectivity.

Level of Utilization: determining the level of Internet usage and maintenance of the Internet facilities.

Large Scale farmers: farmers that are cultivating more than five hectares of land for commercial purposes.

Medium Scale farmers: farmers that cultivates between two hectares to five hectares of land for consumptions at home or commercial purposes.

Smallholder farmers: the majority of Nigerian farmers cultivating less-than two hectares.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

In this chapter, review of related literature to this study was done. The review highlighted topics includes:- ICT policy in Nigeria, Opportunities and Challenges of Internet use for agricultural extension, Empirical studies to identified gap in knowledge, and a theory that further explains the study are discussed. The purpose is to find out what other researchers have done in this field of study and the gap to be filled.

2.1 ICT policy on Agriculture in Nigeria

The federal ministry science and technology of Nigeria (1999) has developed Information Technology Policy and Communications Act. The act focuses on the development and use of ICT products and services in Nigeria. National Information Technology Development Agency (NITDA) and National Communications Commission (NCC) have been empowered to ensure compliance with these government policies. It should be noted that the private sector has led in the sales and distribution of Internet services.

Policy Statement: “The nation shall use IT to re-engineer agriculture for the purposes of maximizing food production, improving food self-sufficiency and security, increasing output for industrial raw material utilization, providing employment, economic growth and minimising environmental abuse and degradation”. The **objectives of the policy are to:** To optimise land use for food production; to provide employment for the citizenry; to minimize urban migration; develop and protect a sustainable agricultural environment.

Strategies for Policy Implementation

Government will revitalise agricultural extension services by empowering and equipping farm extension workers with IT skills to support farmers through the use of IT in

areas such as: Digital Mapping, Land Use, Soil types, Meteorology, Ecology, Oceanography particularly off-shore fisheries exploitation, Hydrology, Agricultural records.

The policy is to create an avenue for establishing an agricultural information system and to provide support for planning, production, storage and distribution of horticultural crops, livestock, and fisheries products among others. In essence, it creates an opportunity to agricultural research institutes to host their web site and upload research results for the benefit of all stakeholders. Furthermore, it will create Information Technology (IT) awareness for all types of farmers at all levels nationwide.

2.2 The Internet

According to Olutayo, (2010), Internet web communication technology (WCT) is one of the most significant technological developments of the late 20th century. Initially conceived in the seventies to act as a nuclear-attack-resistant method for exchange of scientific information, the Internet was deployed for linking research agencies and universities. A number of websites are dedicated to veterinary medicine research and education resources (Babalobi, 2006; Simões, 2010).

Chambers, (1998) then president of Cisco Systems (an Internet networking company) states about the Internet revolution thus: The Internet will change how people live, work, play and learn. The Industrial Revolution brought people together with machines in factories, and the Internet revolution will bring together people with knowledge and information in virtual communities. And it will have every bit as much impact on society as the Industrial Revolution. It will also promote globalization at an incredible pace.

At the information age, Internet is one of the most important tools for access to information. Nowadays Internet is used in various forms at academic centres, military,

research institutions, among others. The Internet is the largest computer network in the world that uses common standards to connect many variations of hardware and software (Seguin & Seguin, 1995). The Internet is essentially a network of independently administered federal, regional, educational and foreign networks for people across the world to access and use (Fleck, 1994; Marine, Kirkpatrick, Neau & Ward, 1993). The Internet allows for the sharing of resources between millions of participating organizations (Marine et al., 1993). The Internet includes sites for research at universities and research laboratories, government sites, military sites, commercial sites, hospitals, libraries, schools and individuals.

The Internet was started by the United States Defence Department as a communications network that is computer-based. The military established the system to provide a means of communication between the various types of computers stretched across the world (Marine et al., 1993). The Internet referred to as World Wide Web (WWW). The Internet contains large amounts of diverse information, stored in a number of different formats, on computers with many different operating systems (Pantum, 1995). The Internet allows various federal, regional and campus networks to communicate with each other through the computer, Fleck, (1994).

Wimmer and Dominick (1994) stated that "the Internet is a convenient way to refer to the loose association of thousands of computer networks all over the world" (p. 386). Fleck, (1994) also, assert that the Internet in developed countries like America is used as a resource for teaching, research, entertainment or information on any subject one may be interested in.

One Internet tool that has become very popular for agricultural researchers is electronic mail or e-mail. E-mail allows one to communicate through computer networks with a multitude of people world wide (Talbert, 1995). Talbert continued, "The main

advantage of e-mail is that you can send a message any time of day and the recipient can read it at his/her leisure. With e-mail there is no phone tag" (p. 14)

The earliest Internet service offered in Nigeria was electronic mail (e-mail) using dial-up. However with the advent of democracy in 1999, Internet service provision blossomed into an enterprising business sector and in the process gave Internet access to many more organizations and individuals (Babalobi; 2010).

Now in Nigeria Internet service provision is being offered through various means and methods to users. Some of the technology in use include broadband, DSL, radio, and VSAT. The VSAT option is the major one being implemented by many organizations because of ease of deployment and other advantages over the other methods.

2.3 Opportunities of Internet for Extension Communication

Nyirenda-jere, (2010), opined that the role of Internet is recognized in Millennium Development Goal No. 8 (MDG8), which emphasizes the benefits of new technologies, especially information and communications technologies in the fight against poverty. Global statistics indicate that 75% of the world's poor live rurally, and agriculture remains the largest single contributor to their livelihoods (IFAD, 2001; FAO, IFAD & WFP, 2002). Africa's leaders have recognized this and made strong commitments towards the agricultural agenda. Achieving food security requires new levels of innovation and Internet can play a crucial role by enabling and facilitating agricultural innovation systems; providing rapid and efficient means of sharing and accessing information across the entire agriculture value chain.

Among the uses of internet in agriculture include the use of Geographic Information System (GIS) technology in Somalia to help farmers locate their environments. (Drysdale, 2005), Crop Protection Compendium (CABI's), is increasingly being used to identify and manage crop diseases and pests in Africa, the use of hydro-acoustic technology to assess fish

stocks in Lake Victoria (Mkumbo, 2005 & Benamrane, 2005). Other applications of Internet in agriculture include data collection, data analysis, geo-spatial applications, decision-support and knowledge-based systems, embedded Internet in livestock and farm equipment and processes (Babalobi, 2010).

The benefits of Internet accrue not only from the technologies but also from their potential to facilitate extension communication and change leading to innovation (UNCTAD, 2008). It is widely acknowledged that transformations in the global economy are being fuelled by Internet-powered innovation. As such, it is imperative for Nigeria to continue to prioritise Internet on its development agenda both within agriculture and in other sectors. In addition other Internet social media pages that can contribute for agricultural extension are:

You tube

YouTube is one Internet tool that allows billions of people to actually watch and share originally-created videos. YouTube provides a forum for people to connect, inform, and inspire others across the globe and acts as a distribution platform for original content creators and advertisers large and small. Farm demonstration is one of the several agricultural extension methods known in Nigeria. It is an effective method of teaching a skills and most convincing method in showing the value of improved practices, especially in the early stages of extension training. Farm demonstrations on how to manage a poultry farm packaged in video can be uploaded on you tube web page. You tube is a sharing website on which users can upload download, view and share videos. Organisations such as the research institutes can offer some of their demonstrations material via their website for viewing and downloading.

Internet Radio (Streaming)

Internet radio is a medium for audio broadcasting that is similar in concept to traditional radio. The difference is that, as opposed to a standard AM or FM radio signal, Internet radio is transmitted directly to computers or similar devices via the Internet. No matter which category of internet radio you are using (standard simulcasting of regular FM/AM radio, music recommendation, or an internet exclusive radio network), they all take advantage of streaming technology. When an audio or video signal is streamed it is continually being received by a user in a signal over which they have no control. Streaming media is integral to a popular form of Internet radio where regular radio stations are simulcast over the Internet in real time as they are being broadcast over regular radio airwaves.

Through the Internet radio agricultural radio programme can be aired and heard free of charge across the globe without paying for air-time to any radio station. Furthermore, programme can be listening to anytime anywhere. Therefore agricultural research institutes can take the advantage to be packaging their radio programmes on new innovation/technology and aired via their web site.

Advantages of Internet Radio

Traditional radio station broadcasts are limited by two factors: 1. the power of the station's transmitter (typically 100 miles) programmes be receiving any where across the globe. 2. The available broadcast spectrum (you might get a couple of dozen radio stations locally).

Internet radio has no geographic limitations, so a broadcaster in Nigeria can be heard in England on the Internet. The potential for Internet radio is as vast as cyberspace itself. In comparison to traditional radio, Internet radio is not limited to audio. An Internet radio broadcast can be accompanied by photos or graphics, text and links, as well as interactivity,

such as message boards and chat rooms. This advancement allows a listener to do more than listen. An example, a listener who hears an advert for a farm implement can make an order through a link on the Internet radio broadcast Web site. This expanded media capability could also be used in other ways. For example, with Internet radio, you could conduct training and provide links to documents. You could also have interactivity with the trainer or educator and other information on the Internet radio broadcast site.

Blogging

The word "blog" is a "term used to describe web sites that maintain an ongoing chronicle of information." In other words, blogs are updated regularly with current material, relevant to the site's main topic. It can give opportunity to researchers or research institutes to post and update documents on new innovations, which can be accessible to other agricultural stakeholders ie farmers. Blogs can create opportunity for discussions between the blogger and readers.

Advantages of blogs are: Blogs offer a means of developing relationships with the blogger's audience, often referred to as the blog's "readership," "community" or "tribe." Bloggers interact with their communities through post comments and can even add a community forum to their blog, if desired. Many small business owners and corporation staff members have begun using blogs to maintain good customer relationships by providing answers to frequently asked questions and addressing issues as they arise. Most blogging platforms are open sources, meaning there is no cost to use them. Bloggers often purchase their own domain names and/or premium themes, but if desired, a new blogger can set up a blog for free.

E-wallet

A **digital wallet** (also known as an **e-wallet**) allows users to make electronic commerce transactions quickly and securely. A digital wallet functions much like a physical wallet. The digital wallet was first conceived as a method of storing various forms of electronic money (e-cash), but with little popularity of such e-cash services, the digital wallet has evolved into a service that provides internet users with a convenient way to store and use online shopping information. E-wallet provides farmers to online commerce and purchase of farm inputs such as fertilizer, seed or agro chemicals. Research institutes can provide e-wallet soft wares to farmers and other stakeholders to be able to transact its commodities direct to famers from any where in this country. Similarly, Nigerian farmers since 2012, begins to use e-wallet to purchased fertilizers, seeds and other farm inputs.

The term “digital wallet” is also increasingly being used to describe mobile phones; especially Smartphone’s that store an individual’s credentials and utilize wireless technologies such as near field communication (NFC) to carry out financial transactions. An individual’s bank account is usually linked to the digital wallet. They might also have their driver’s license, health card, loyalty card(s) and other ID documents stored on the phone. The credentials can be passed to a merchant’s terminal wirelessly via NFC. The system has already gained popularity in Japan, where digital wallets are known as wallet mobile, while in Nigeria adoption of the system began in 2012 cropping season with some element of success.

E-Library

E-Library is a gateway to quality academic resources, such as peer-reviewed articles and selected websites. It also lets you search a number of databases at once, combining and filtering the results so that you spend less time searching for relevant material to support research and study. It is a website that provides 24-hour online access to digitized

audio, video, and written material. It also refers to all the library resources that are available online through computers and databases. This can give research institutes opportunity to create data base for their publications, and researches including journals, audio and video contents for both listening and viewing.

The use of a digital library is enhanced by a broadband connection such as cable modem or DSL. Dial-up connections can be used to access plain-text documents and some documents containing images, but for complex files and those with animated video content, a downstream data speed of at least several hundred kilobits per second (Kbps) can make the user's experience less tedious, as well as more informative. Internet-based digital libraries can be updated on a daily basis. This is one of the greatest assets of this emerging technology. Note that the Electronic distribution of intellectual and artistic property has authors, agents, and publishers concerned about the possibility of copyright infringement.

The application of some of the Internet web pages for extension purposes will create an avenue for direct contact and interactions between and among the farmers and the research institutes. Therefore utilization of Internet by the agricultural research institutes will contribute towards achieving the agricultural transformation programme.

2.4 Challenges of Internet use for Agricultural Extension

CTA (2010) identified several challenges facing the uptake of Internet for agriculture extension in Africa. These challenges will be looked at generally but also in the context of farmers and agricultural researchers.

According to Nyirenda-jere (2010) highlighted that the challenges has to do with how ICTs are understood and perceived with emphasis on the Internet and associated technologies. With the current mobile boom in Africa, the context has shifted to cell phones,

computers and the Internet. This perception can result in other technologies such as radio and TV being sidelined or overlooked, a critical issue in Africa where half of rural households have a radio and 6% have TV, whereas only 2.6% have access to fixed telephones and 0.38% have access to the Internet. This reveals that without access and Internet connectivity between and among the agricultural stakeholders the use of Internet for extension might not be achievable, Nyirenda-jere (2010).

Second, challenges identified by CTA (2007), is that with regard to research, Africa suffers from inappropriate channels and infrastructure for sharing and exchanging agricultural knowledge generated from researches. According to the World Bank Development Report (World Bank 2007), sub-Saharan Africa has nearly 8 times as many agricultural research agencies as the USA, yet because these agencies are fragmented across the different countries, economies of scale are not realized. Internet has an important role to play by enabling the interconnection of these research agencies to facilitate collaborative research and information and knowledge sharing. This clearly reveals the need of research institutes in Nigeria to be provided with Internet facilities for the benefit of agricultural transformation.

The third challenge is that the use of Internet by scientists and researchers will require the services of information technology (IT) professionals to adopt and use the Internet channel to harness extension dissemination. Also, CTA report pointed out that the majority of farmers are based in rural areas where, as it has been, access to Internet and other infrastructure and services is limited. In addition to this, generally Internet literacy levels tend to be lower in rural areas. This will necessitate the integration of Internet into agricultural education systems and eventually specialized programmes relating to Internet in agriculture. The report recommends capacity building, including literacy programmes for farmers, is thus important not only to facilitate the uptake of Internet but also to improve the farmers' overall

productivity and quality of life. Internet can be used to provide distance-learning opportunities to farmers in a variety of ways, tailored to the individual needs of communities.

Finally, is where access to Internet is possible, the creation and availability of locally relevant content that has been developed or adapted to local conditions and the language of local communities remains a challenge. This requires capacity building on the use of Internet for extension to researchers, farmers and other agricultural stakeholders in Nigeria. Also the need to increase awareness of the benefits afforded by Internet and to provide content and information which farmers, scientists and other agricultural stakeholders can understand. (Nyirenda-jere; 2010).

Similarly, Arokoyo, (2011) identified major constraints to Internet use in agricultural extension in Nigeria are: low level to Internet readiness of the research institutes and extension organisations; poor Internet facilities; limited access to Internet; high level illiteracy of farmers and computer illiteracy among researchers and extension workers; and erratic power supply.

According to Asian Development Bank, (2004) other developing countries in Asia are also characterized by the following challenges: inadequate infrastructure to use Internet; far away locations of service centre to maintain and repair Internet devices and systems; small markets; others are inadequate financial resources, which make Internet less affordable and low levels of literacy and Internet literacy; and low awareness of opportunities and benefits that Internet can provide.

However, bridging the digital divide between urban and rural areas is one of the challenges facing governments and policy-makers today. According to Kushner and Chong, (2004), factors that contribute to and widen this divide include the following: **Economic**; ICT infrastructure remains prohibitively expensive for many communities and nation;

Geographic: difficult terrain, long distances, and inadequate infrastructure; **Technological:** lack of skills to participate in the economy that uses Internet extensively; **Cultural:** Inequalities of access and participation; **Political:** Long-term investment versus short-term political cycle, Kushner and Chong, (2004).

2.5 Empirical Studies on the Use of Internet for Agricultural Extension

Consolata and Evans (2010) conducted a study in Tanzania on availability and usage of Internet and e-resources by livestock researchers argue that Internet are very important because they enable the accessibility and use of e-resources such as books, researches and feedback, without computers and the internet, e-resources cannot be accessed and used even if the livestock researchers possess the basic computer skills. The study further reveals that the application of Internet, particularly computer technology for information handling is increasingly important in Tanzania. Kapange (2002) had reported that, Internet is crucial in facilitating communication and access to information for agricultural and rural development. Since agriculture is the national priority sector, it is one of the potentially beneficial areas for the application of Internet for economic transformation. Further more, a study by Tumsifu (2002) investigated the access and use of Internet in agricultural research institutes in Tanzania. The results reveals that, almost all the researchers from the selected institutes have access to Internet. Apart from scientists and researchers, the agriculture sector has a variety of players and stakeholders including farmers, commodity brokers, buyers, extension workers, policy makers and end-consumers. Each of the stakeholders have varying needs for, and uses of Internet, all within the common thread of knowledge and information brokerage and sharing,(Nyirenda-jere,2010).

The most prevalent use of Internet in agriculture is to provide farmers with information and advisory services. The Forum for Agricultural Research in Africa (FARA)

has compiled a comprehensive inventory of initiatives providing such services (FARA, 2009). From the results of the inventory, the basic information needs for farmers are market information prices, weather forecasts, transport facilities, information on storage facilities and information related to crop and livestock diseases and general advice related to agriculture. The use of Internet for extension can enhance communication within the entire value chain of farmers, buyers, transporters, traders and retailers and also encourages the bi-directional sharing of information as well as peer learning. In this way, the users not only have access to information but are given the opportunity to learn from each other on how to use the information.

Arokoyo (2011) states the potential applications of Internet in agricultural extension and rural development to include: enhance farmer's ability to collate demands; collaborative learning; exchange of time sensitive information e.g market prices, disease outbreaks, etc; make extension systems and structures more efficient; facilitating multi-stakeholder brainstorming; facilitating access to markets and credits; community learning; search select and compile information for individual clients; peer to peer sharing and exchange among extension.

Oduwale (2004) studied the utilization of Internet facilities and its impact on the research outputs of agricultural scientist at the University of Agriculture, Abeokuta, Nigeria. The results showed that (54 per cent) of the agricultural researchers at the university use the yahoo search engine and that they spend an average of one hour per day browsing the Internet. The study also revealed that respondents use the Internet to find research materials such as journals and conference proceedings, followed by sending and receiving of electronic mails (e-mail) but did not reveal the use of Internet for extension communication. In a related study, Fadiji (2011) found that the level of ICTs awareness by Village Extension Agents

(VEAs) was+ high on some ICT components such as Radio, GSM phones, Cinema and computers among others, but lacking Internet knowledge. The study further revealed numerous constraints in adopting Internet for agricultural extension to lack of Internet access in the rural areas; high cost of Internet facilities, and lack of electricity. Richardson, (2005), opined that extension organizations must be able to examine the appropriateness of various Internet usages and the accessibility of Internet in rural and remote areas, to reconcile costs and benefits, and to ensure that access to Internet is gender-sensitive and includes a diversity of cultures, languages, social strata, and age-groups.

However, Bonati and Gelb, (2005), explained that adopting Internet use has proved difficult for extension services in Africa. Adoption is rarely instantaneous; the technology has to be taught and learned, adapted to experience, and integrated into production. As is often the case with technological innovation, potential and expectations can outpace reality. The researchers, extension workers and farmers lack essential skills to use the Internet for extension communication. It is important to realize that the information that researchers and extension workers need includes not only technical knowledge but also knowledge and skills that increase the effectiveness of delivery. Improving access to these vital extension skills will lead to better designed, delivered, and supported technologies (Bell, 2004).

Internet when applied to agricultural extension in Nigeria will enhance the delivery and access to knowledge, improve the breadth and scope of the agriculture, increase learning rates, encourage critical thinking and offer unlimited means of achieving goals (Iloanusi and Osuagwu, 2009).

2.6 THEORETICAL FRAMEWORK

This study is in conformity with the technological determinism theory propounded by McLuhan (1962) which further buttresses by Everret Rogers (1986) through the diffusion

theory. The theory relate to this study by providing some potential on the uses of the Internet for agricultural extension. The perspective of the theory involves using modern technology such as the Internet to communicate new innovations to clients can create an appetite for change and modernisation. On this note, McLuhan's idea of the "Global Village" seems to be reality with the Internet. The theory was propounded by Marshall McLuhan (1962). McLuhan's central notion about the new media (internet) is that the medium is the message and can be applied to the internet or to particular forms of the World Wide Web (www) such as online news sites he categories the **assumptions and of the theory were:**

Ontological Assumptions: Humans do not have much free will at all. Whatever society as a whole is using to communicate, individuals too will use to communicate. Therefore agricultural research institutes can adapt to the medium they are using so that they can send and receive messages like everyone else, which is consequently development.

Epistemological Assumptions: State that there is one truth by observing what has happened over time. As the medium changes so does society's way of communicating. Researchers can use the medium for the purposes it was created for (phone for talking over lines or electronic mail for talking via internet). If the medium is impersonal (television) then the message too is impersonal.

Axiological Assumptions: This theory postulate, that everyone will act and feel the same no matter what the medium they are using provided that they are using the same medium. Values are not involved because evidence is seen strictly through observation. Furthermore once the internet is use for extension by all stakeholders it is likely to lead adoption of new innovations.

To further buttress the application of the theory to this study, **Everret Rogers** cited in Anaeto, Onabajo & Osifeso (2008) propounded a theory in 1986 called **the diffusion and technological determinism theory** he states the assumption of the theory that the perspective involves using communication to transfer technological innovations from development

agencies to their clients, can create an appetite for change through raising a climate for modernization among members of the public, he further point out that adoption and diffusion processes are conducted in social and cultural contexts, which can make them aspects of dependency or modernization. It is to distinguish among five phases in the diffusion process: awareness, interest, evaluation, trial and adoption. More so, the role of the internet is concentrated on the first stage of the process (awareness stage), whereas personal sources are most important in the adoption process. Technological determinism theory provides some potential for the analysis and understanding of the uses of Internet for agricultural development.

Rogers further explained the critical roles for technology in the employment of Internet for communication for development. The Internet technology serves a dual role in diffusion; it is a channel for messages, as well as messages of innovation. TDT sees technology as a value-free and politically neutral asset that can be used in every social and historical context. Within this perspective, at least four different points of view can be distinguished: An overly optimistic view shares the conviction that the development and application of technology can resolve all varied problems of mankind; that technology is the source of much that is evil in society; that technology is the proponent factor in development; and that technology is an inexorable, irresistible, and overwhelming force, which is a message in its own right.

Also, Chadler, (2000) viewed technological determinism as a technology-led theory of social change: technology is seen as 'the prime mover' in history. In economics, this is known as a 'technology-push' theory rather than a 'demand-pull' theory. According to technological determinists, particular technical developments, communications technologies or media, or broadly, technologies in general are the sole or prime antecedent causes of changes in society, and technology is seen as the fundamental condition underlying the

pattern of social organization. Technological determinism interprets technology in general and communications technologies in particular as the basis of society in the past, present and even the future. They say that technologies such as writing or print or television or the computer (Internet) 'changed society'. In its most extreme form, the entire form of society is seen as being determined by technology: new technologies transform society at every level, including institutions, social interaction and individuals. At the least a wide range of social and cultural phenomena are seen as shaped by technology. 'Human factors' and social arrangements are seen as secondary.

2.7 Conceptual Model

It is important to link the use of Internet for communication, information and knowledge exchange among agricultural stakeholders as depicted below by the researcher.

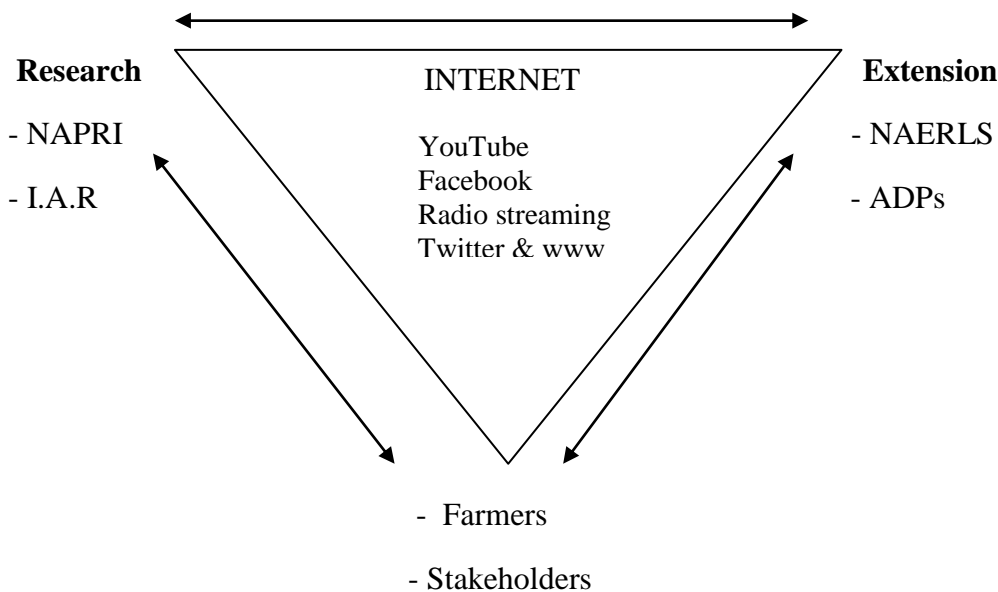


Figure 1: Extension Communication Chain

The diagram is information flow and exchange among the various agricultural stakeholders via the Internet. The internet as a medium for extension communication provides access to information, sharing and interaction among the various agricultural research institutes, farmers with other stakeholders (2 way communication).

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter presents the research design, population sample and sampling techniques and instrumentation. Other subthemes include validity of the instruments, reliability of the instruments, procedure for data collection and procedure for data analysis.

3.2 THE STUDY AREA

This study was conducted in the North-West ecological Zone, of Nigeria. The zone includes: Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto and Zamfara states. The choice of the zone was because farming is the main occupation of the people in the North-West zone and it is characterised by mixed cropping and livestock production for meat. It has a very few large and medium scale farmers that are engaged into mechanised farming with majority smallholder farmers. This is fairly representative of the nation major food supplier (North), APS, (2011).

The two research institutes selected were Institute for Agricultural Research (IAR) & National Animal Production Research Institutes (NAPRI) base in Ahmadu Bello University which is located in Zaria, Kaduna State; on the other hand North-West is the major food crops and livestock supplier in Nigeria. Beside that the selected two research institutes have the mandates in the area of research on crops improvement and livestock production in Nigeria. There are four agricultural research institutes that could be found in the North-West zone and all are cited in Kaduna state, being the former headquarters of the defunct Northern region.

The North-West agro-ecological zone has Southern Guinea Savannah, Northern Guinea Savannah and Sudan Savannah ecologies. According to NAERLS Agricultural Performance Survey (APS) report of (2011) the zone has farmer's population of 4,343,561 million. It has an estimated cultivated land of about 640,716 km².

The research setting adopted for this study is a Survey Research Method (Descriptive survey) using quantitative and qualitative research. Questionnaire was administered in the Research Institutes and structured interview to large, medium scale & smallholder farmers. Tull and Dell (1993), defined survey research as systematic gathering of information from respondents for the purpose of understanding and predicting some aspects of the behaviour of the population of interest.

Ijaya (2000), cited in Razaq and Ajayi (2000) viewed survey research as a study which involves an investigation on entire population of people or items by collecting data from samples drawn from population and assuming that the sample are true representatives of the entire population.

Survey research is adopted for this study because it can be effectively used to investigate problems in a realistic setting (Wimmer, et al 1983: 103). Furthermore, it is a common research design used by the social sciences, its cost is reasonable and can be controlled and large amounts of data can be collected with relative ease. Survey method also lends itself to easily answering this studies research questions.

3.3 THE STUDY POPULATION

The population of this study are Institute for Agricultural Research (IAR), National Animal Production Research Institute (NAPRI) researchers and technical staff of the two selected research institute and Farmers in the North West zone Nigeria ie researchers, technical staff and farmers, aged between 20yrs – 60yrs.

The researchers and technical staff of the research institutes are the people responsible for accomplishing the institute's mandate. According to the institute's staff list, NAPRI has a total number of 36 researchers and 100 technical staff, while IAR has a total of 73 researchers and 111 technical staff respectively. Mean while North-West has a total of 4,343,561million farmers majority whom are small scale farmers.

3.4 SAMPLING TECHNIQUE

The study uses a purposive sampling technique. The purposive sampling technique according to Razaq and Ajayi (2000) is a procedure in which a researcher purposely selects certain groups as samples because of their relevance to the investigation under consideration.

The criterion used to select the sample for this study was to randomly pick 20 respondents from each of the 5 programmes units of the institute's i.e: **NAPRI** (i) Poultry research programme (ii) Small ruminant research programme (iii) Beef cattle research programme (iv) Dairy research programme (v) Livestock research programme. While in **IAR** (i) Agricultural Mechanization programme (ii) Irrigation research programme (iii) Food science and technology programme (iv) Farming systems research programme (v) Agricultural extension services. This sampling

technique was chosen for this study in order to have equal representation from each department/programme units. Also 100 farmers from among the large, medium and small scale farmers from Kaduna, Kano, Katsina, Jigawa and Zamfara states were interviewed ie 20 farmers, 5 farmers selected from four local government areas in each state.

SAMPLE SIZE

Sampling plays an important role in research. In selecting the sample size, the researcher takes up to 50% of the study population in the research institute. Gay, (1980) cited in Olayiwola (2007), opined that for descriptive research a minimum sample of 10% of the population would be considered enough. However, without a sound sampling plan and suitable sample size, the data will be collected from neither the proper respondents nor the appropriate number of them. Therefore, in this study 200 respondents (50%) from the research institutes ie NAPRI 30 researchers and 70 technical staff while IAR 50 researchers and 50 technical staff, note that IAR has more number of researchers and technical staff. Also total of 100 farmers drawn from 5 states (ie Kaduna, Kano, Katsina, Jigawa and Zamfara states) were interviewed.

3.5 THE STUDY VARIABLES

The Independent and Dependent variables were identify and explained. Independent variable is the cause of the changes in the values of the dependent variable on one hand. On the other hand the dependent variable is the expected outcome of the independent variable. (Ujo, 2004:47)

The independent variables for this study are “Ownership of Internet” in this context is having or owning the Internet facility in the research institutes. “Access” is

having availability and connectivity of the Internet facility in the research institutes. “Knowledge of the Internet facility” having familiarity or understanding of the various Internet usage for extension services. While “Frequency of Internet use” how often the Internet is being use for information sourcing or sharing.

The dependent variables for this study is the “Internet use” Internet can be use as a research survey tool, emailing, social media, downloading, information retrieval and dissemination of research result. “Endorsement of innovation” extent of time the end users gain from the use of internet. All this values are presumed to depend on the independent variables.

3.6 METHODS OF DATA COLLECTION

Both primary and secondary sources of data collection were used for the study. The primary data are obtained from field survey method using structured questionnaire and interview while the secondary data are obtained from relevant literature such as scholarly journals, Books, Internet, scientific and technical reports. The researcher personally conducted the farmer’s interview as well as administered the structured questionnaires to the researchers and technical staff of NAPRI and IAR, Ahmadu Bello University, Zaria, one-on-one which enable the researcher to be sure of collecting the data and information timely.

The justification for adopting questionnaire and interview for this study as an instrument for gathering information is predicated that questionnaires are design to elicit information from the sample drawn. It was noted by Sarantakos (1993: 177) that “it is prepared and executed in a systematic way it is controlled by the researcher to avoid bias and distortion and is related to a specific research question and a specific purpose” While interview provides information for assessing situations as well as

obtains data on the feelings, perceptions or attitudinal dispositions of a certain group of people towards a particular problem.

3.7 INSTRUMENTS FOR DATA COLLECTION

The instrument used for data collection was farmer's checklist and structured questionnaire design in order to guide the researcher. The structured questionnaire is divided into six sections. The first section contained information on the biological data of the respondents. The second section is based on the level of internet awareness. The third section is based on what the institutes used the Internet for. The fourth section deals with the benefit the institutes derive from Internet use. The fifth section looks at the level of Internet utilization by the institutes, and the sixth section find outs the factors militating against the use of Internet for agricultural extension in the north – west Nigeria are the research question, eliciting information from the respondents. The questionnaire contains 27 close ended questions. Farmers check list is also used to generate farmers view on the use of internet for extension.

3.8 VALIDITY AND RELIABILITY

The structured questionnaire was validated by a pilot study. The pilot study was carried out and 20 respondents chosen from National Agricultural Extension and Research Liaison Services (NAERLS) A.B.U Zaria, ie (10 researchers and 10 technical staff).

During the pilot test, some of the respondents complained of too many open-ended questions in the questionnaire. Also, out of the 20 respondents selected during the test, most indicate positive views on the advantages of Internet to research institutes and did not reveal factors militating against the use of Internet, this is

because questions that seek to reveal the factors are open-ended and were skipped by the respondents, this lead to removing of all the open-ended questions in the questionnaire.

3.9 METHODS OF DATA PRESENTATION

In order to make accurate and thorough analysis of data collected, data was analyzed based on structured research questions. Information collected was computed and presented in tabular form using simple summary statistics and charts.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 INTRODUCTION

This chapter presents the field data, the interpretation of the data and analysis as well as the discussion of the findings. The data presentation and interpretations were based on the computer statistical software program i.e Microsoft excels Table, bar and pie charts present the results of the analysis of the data gathered after the field survey.

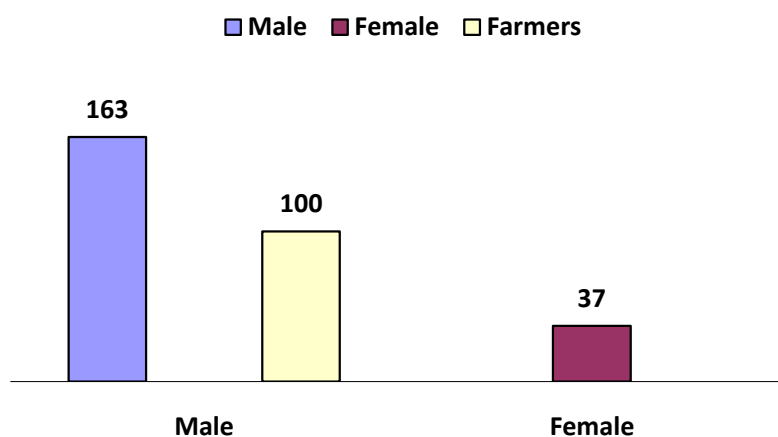


Figure 2: Gender of Respondents

The above figure indicates that males dominated the sample of respondents with 163 researchers & technical staff, while females had 37 with 100 male farmers. This is because less than one third ($1/3$) of the researchers and technical staff are women in the research institutes.

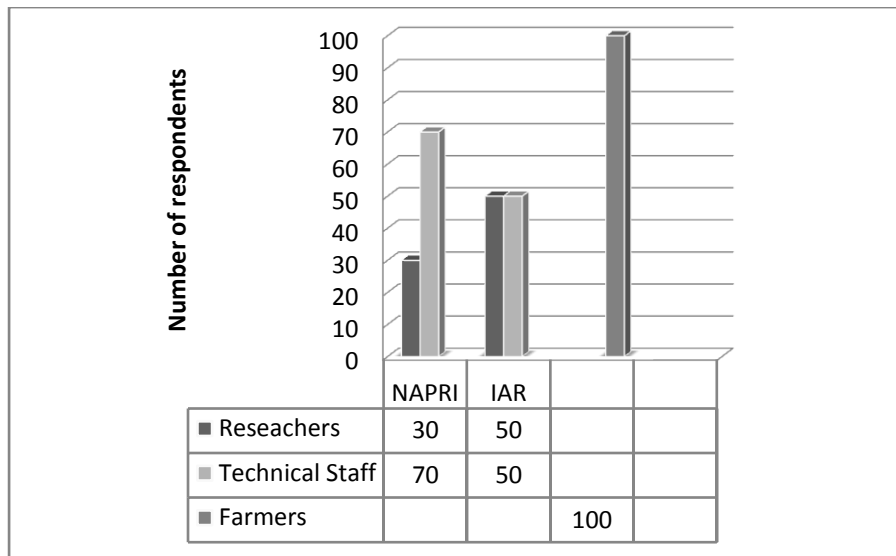


Figure 3: Respondents Status

Figure 3 show that majority of respondents were technical staff, according to the institutes staff list NAPRI have a total of 36 researchers with 100 technical staff. Meanwhile IAR has a total of 73 researchers with 111 technical staff.

Table 1: Age Group of Respondents.

Age group	frequency	Percentage (%)
20-30	50	25
31-40	80	40
41-50	44	22
51-60	26	13
Total	200	100

The result of the analysis in table 1 shows that majority of the respondents were youths between the ages of 31 – 40. The youths the world over constitute the majority of internet users as early adopters, while the older generation are laggards (Rogers 1995).

It is significant to note that those under 20 – 45 years might be research assistants whose only interest to large extent might be research ie downloading materials instead of two - way communication (downloading and uploading).

Table 2: Respondents Years of Working Experience

Experience	frequency	Percentage (%)
1-5	60	30
6-10	48	24
11-15	36	18
16-20	28	14
26-30	11	5.5
30-35	2	1
Total	200	100

From the above table, it could be seen that 1 – 20 years working experiences constitute the largest percentage of respondents. This fact shows that most of the respondents are very much active in their carrier. It is also, significant to note that those above 25 – 35 years are fewer reason because most of them are either engaged with administrative work or else.

Table 3: Educational Level of Respondents.

Level	frequency	Percentage (%)
Certificates	50	25
1 st Degree	63	31.5
2 nd Degree	32	16
PhD	29	14.5
Professor	26	13
Total	200	100

Table 3 shows that most of the respondents from the research institutes have either completed their first and second degree, while some up to PhD level. This means the respondents are likely to have internet skills.

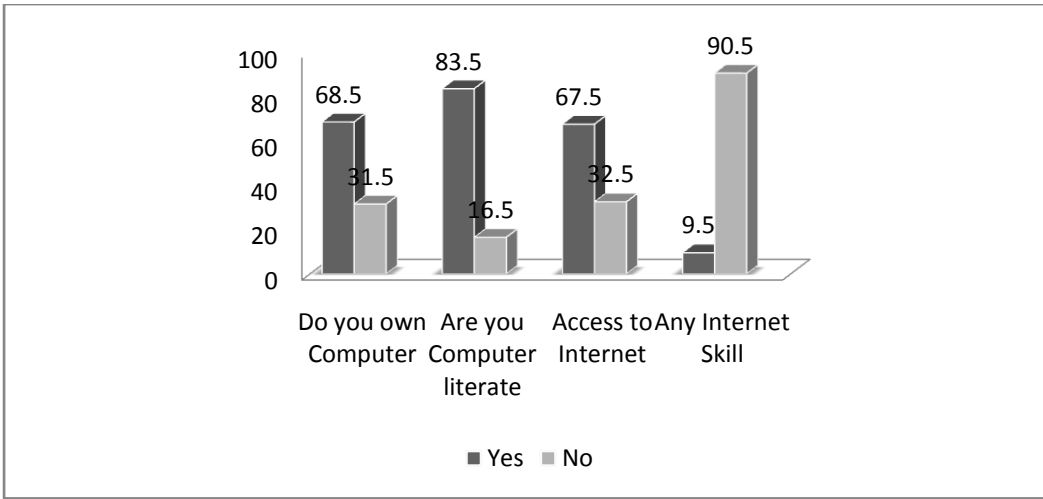


Figure 4: Level of Internet Skill

From the above figure, majority of respondents confirmed that they are computer literate and knows how to use the internet. About 70% of them own a computer but lacking internet skill. This then confirmed that majority of respondents cannot use the internet to interact with other stakeholders hence 90% of them lack internet skills.

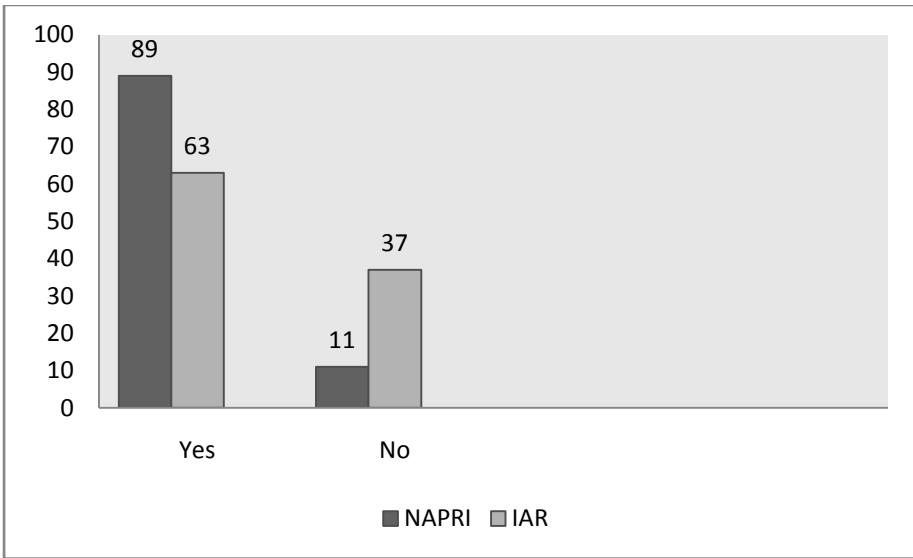


Figure 5: Whether the Institutes have functional Internet facilities

In figure 5 above, majority of respondent's agreed that the institutes have internet facilities. Since majority of respondents confirmed that the institutes have internet facilities,

this then proved that the institute might be capable of using the internet for agricultural extension.

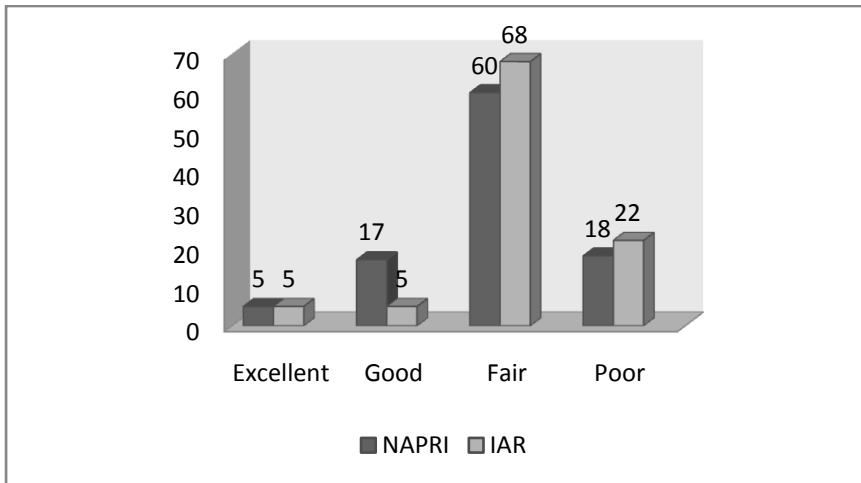


Figure 6: Rating the Institute’s Internet facilities

Figure 6 reveals that the institute’s internet services are not good enough in serving the organisation, considering the majority of respondents rated the internet facilities as only fair. It is worthy to note that without good internet services or facilities the set objectives (communication, 2 way channel, uploading and downloading) of the internet services would not be achieved.

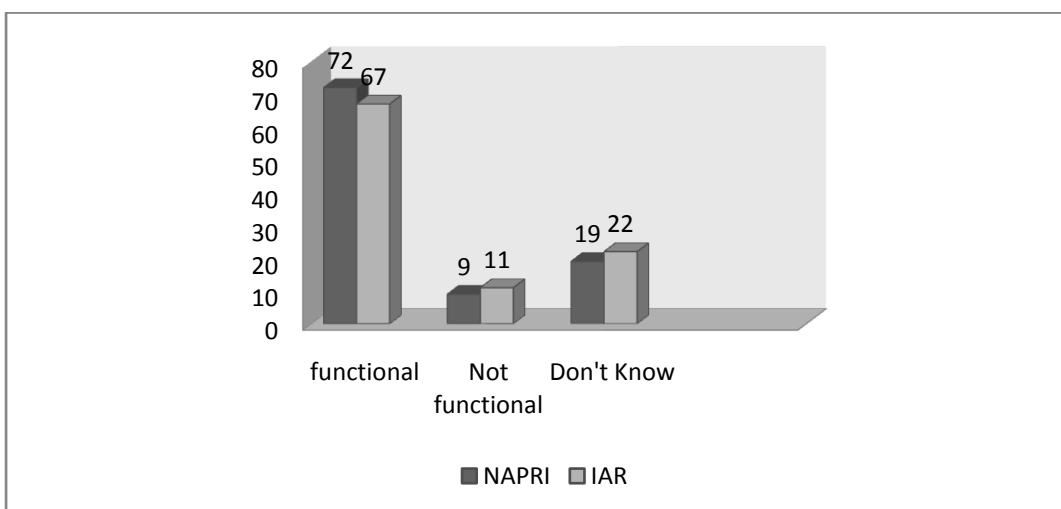


Figure 7: Assessing the Institute’s Web Site

Figure 7 shows that both institutes (NAPRI & IAR) owns a Web Site which gives opportunity for other stakeholders all over the world to view their activities and to contact them via same page as confirm by majority of respondents. And only a small proportion indicates not functional, and don't know whether the institutes have web site or not.

This small percentage might be among those that are not computer literate as well as lacking internet skill as revealed in figure 4 above, 20 % and 15 % of respondents are not computer literate and therefore lack internet skills respectively.

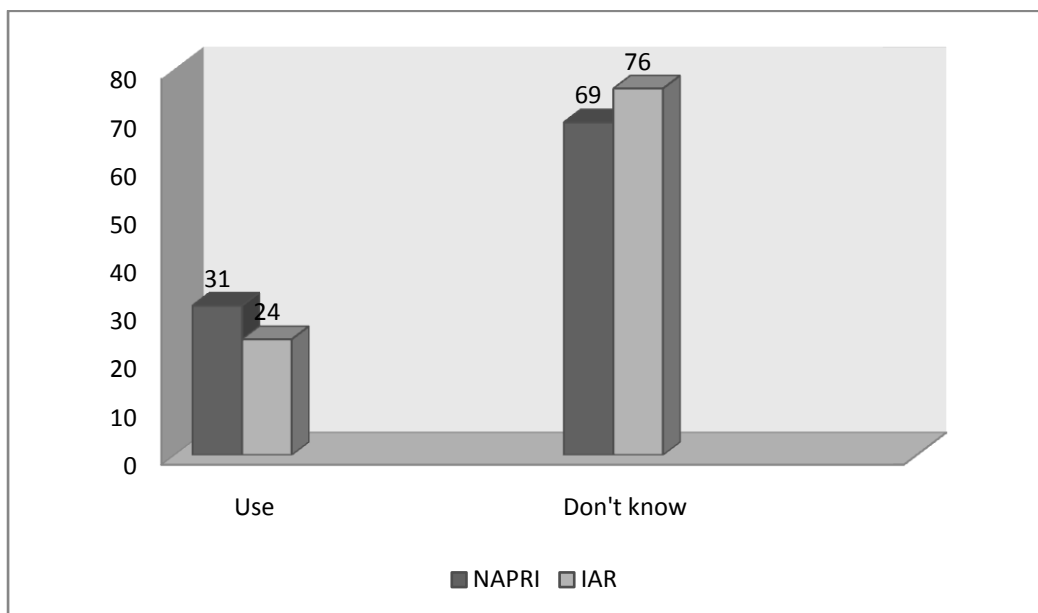


Figure 8: Institute's used of their Web Site for Agricultural Extension

From figure 8, the study discovered that most respondents attest to either the institutes don't use or not sure if their web site is being use for agricultural extension dissemination. However, about 31 % of the respondents still confirmed that the institutes use their web site for agricultural dissemination. But it should also be noted that figure 6 above reveals that the institute's internet facilities are not good enough. This might likely be the cause of the institute's not being able to fully use their web site for agricultural extension.

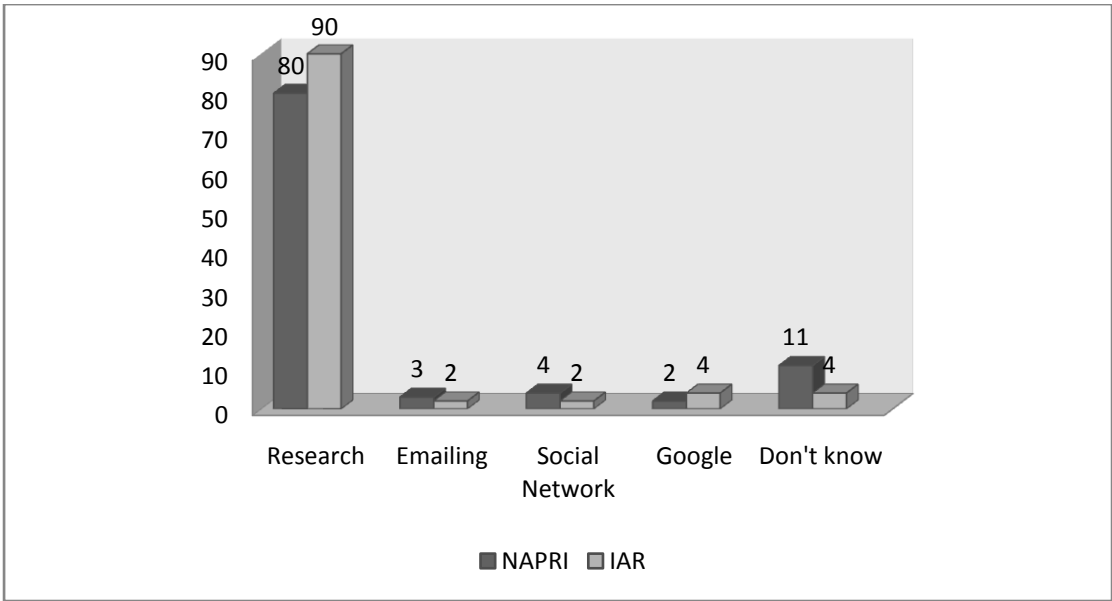


Figure 9: Internet services to Research Institute's

From figure 9, one can say that the Internet contributes more to the institutes (NAPRI & IAR) in researches. This might mean that the Internet is relevant to the research institutes activities ie “research”.

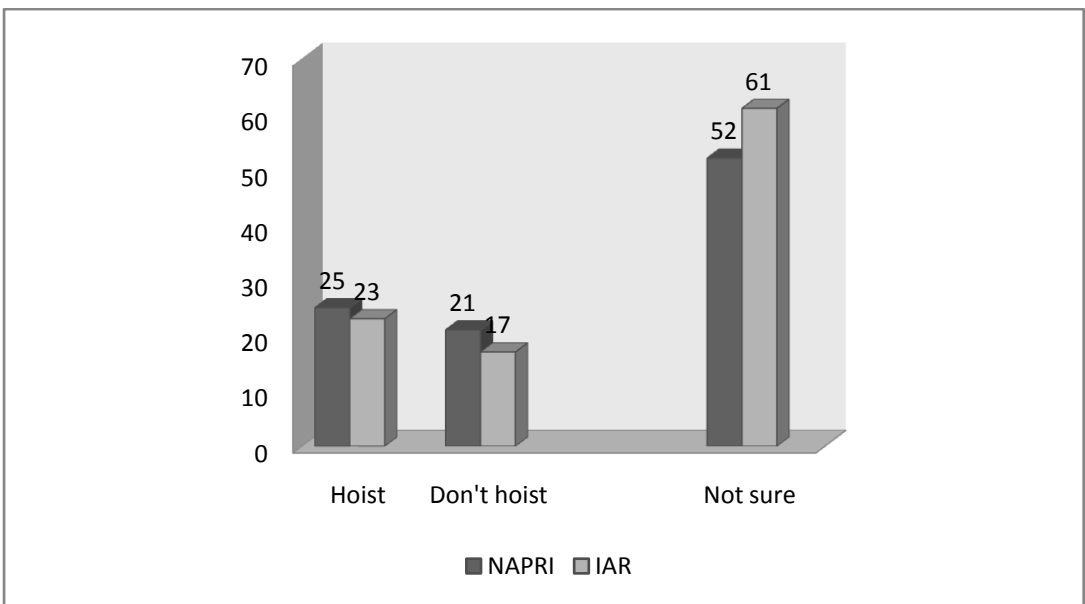


Figure 10: Institute's hoisting completed research projects on their Web Site

Figure 10 reveals a respondent ignorance view as to hoist researches done on the institute's website. Only 25% and 23% of respondents from NAPRI and IAR confirmed their

institute hoist completed researches done while the majority percentage confirmed either don't hoist, and or not sure if their institute does that.

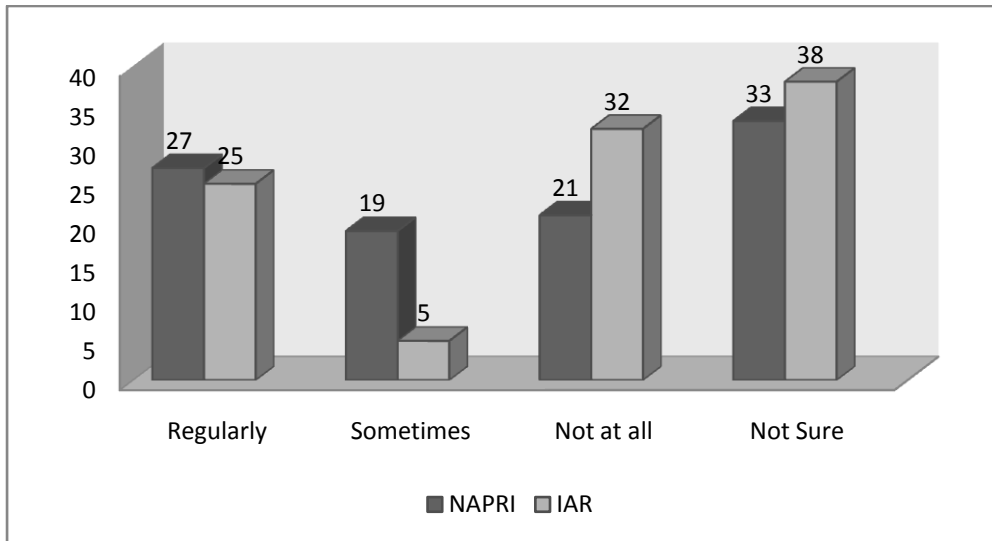


Figure 11: Rate at which the Institute's update their Web Site

From the above figure, it shows that majority of the respondents are not certain if the institute's update their web site with latest findings. It is worthy to note that figure 10 above reveals not a satisfactory result on hosting researches by the institutes in their web site.

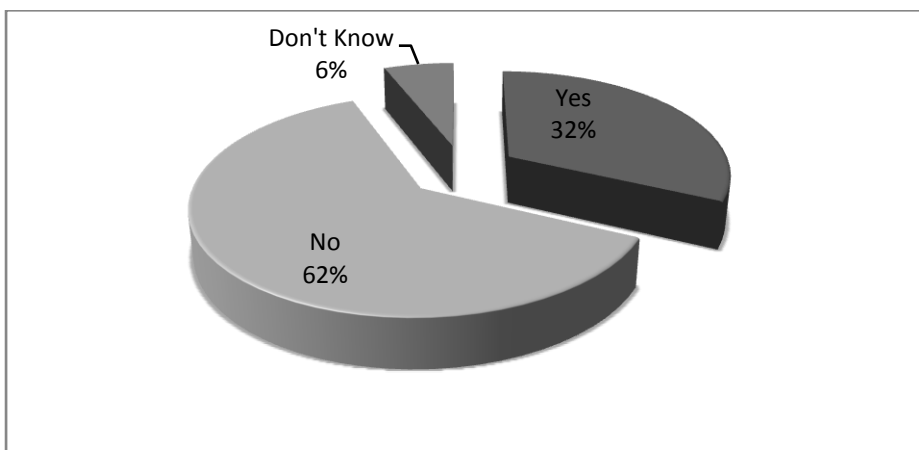


Figure 12: Respondents owning blog on the Internet

When asked if they own a blog on the internet, majority of respondents 62% answered in the negative (No), only few 32% answered on the affirmative (Yes) while 6% respondents

don't even know about blog. This reveals that the researchers and the technical staff are ignorance of using blog to disseminate research results/findings which also means that there is low level of Internet utilization in the Institutes. This calls for training in the area of other usage of the internet for extension.

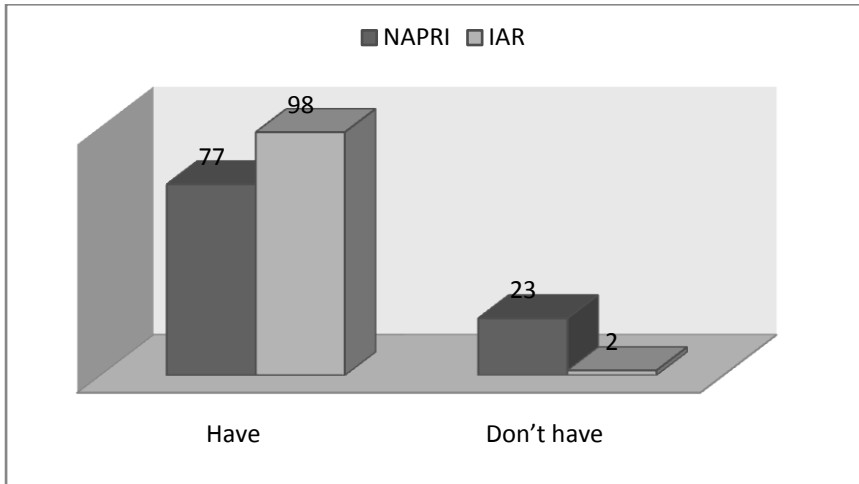


Figure 13: Respondents having an Email account.

In figure 13, respondents were asked if they have personal email account, majority confirmed having personal email account, while only 25% answered negative, one reason may be due to lacking internet skills.

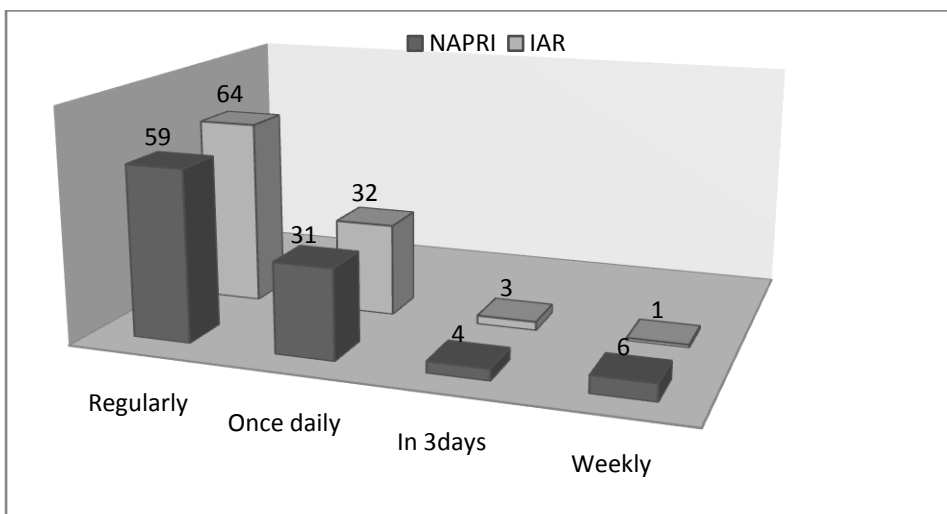


Figure 14: Rate of checking Email account by the respondents

Figure 14, shows the rate the respondents check their mails on the internet, it reveals that majority check regularly, while very few check in 3days as well as weekly.

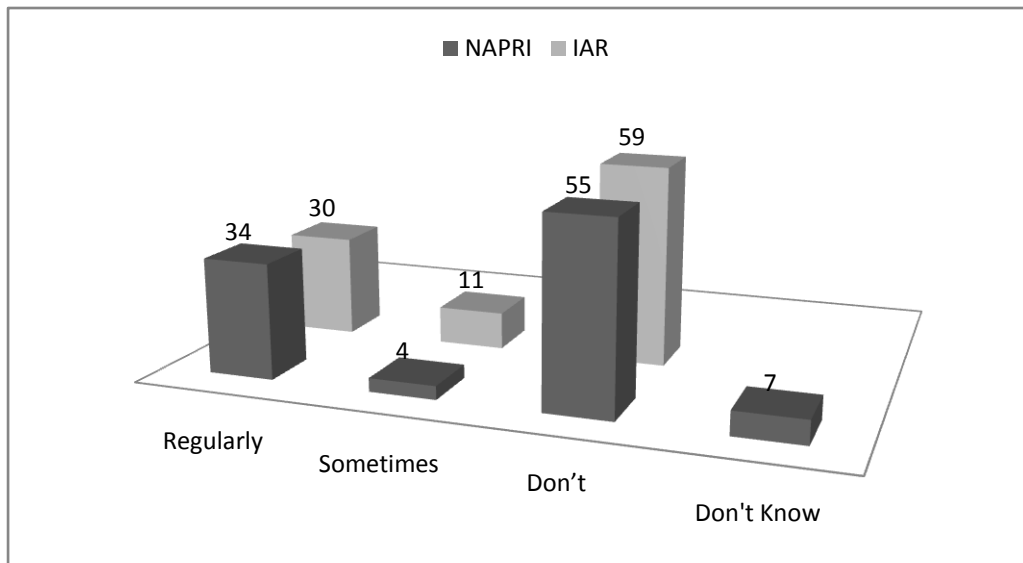


Figure 15: Respondents Interaction with farmers and other Research Institutes via the Internet

From figure 15, reveals that 55% – 59% of respondents in both institutes confirm not interacting with farmers or other research institute's via the internet. 30% – 34% respondents agreed to have been interacting with other agricultural stakeholders via the internet. This is likely confirming that most respondents use the internet for personal use.

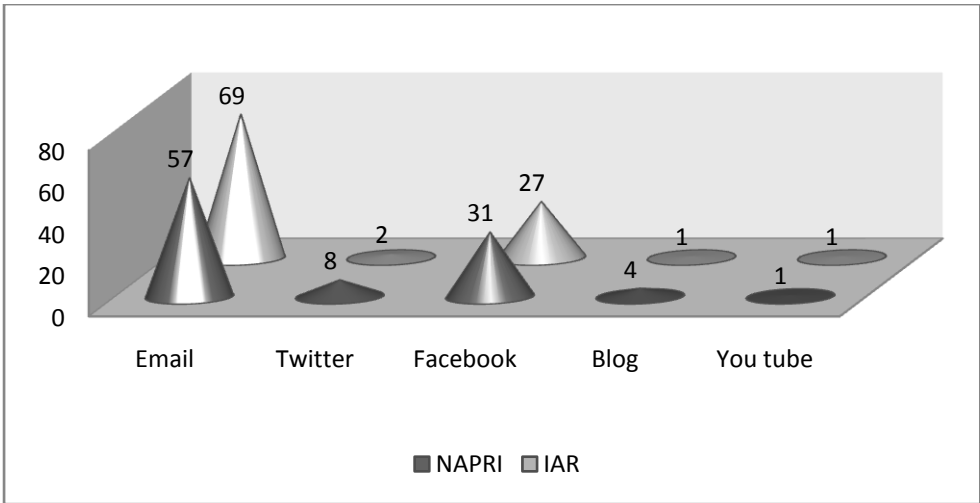


Figure 16: Knowledge of various Internet resources use for Interactions

From figure 16, when respondents were asked about the knowledge of these Internet resources, the majority confirmed “Email” for sending and receiving messages, while the least known was Twitter, Blog and You tube.

This means that the majority of respondents need to acquire more Internet knowledge in the sense that Twitter, Blog and You tube can be used to send immediate news of emergency or outbreaks. More so, You tube can be used to demonstrate new farming techniques.

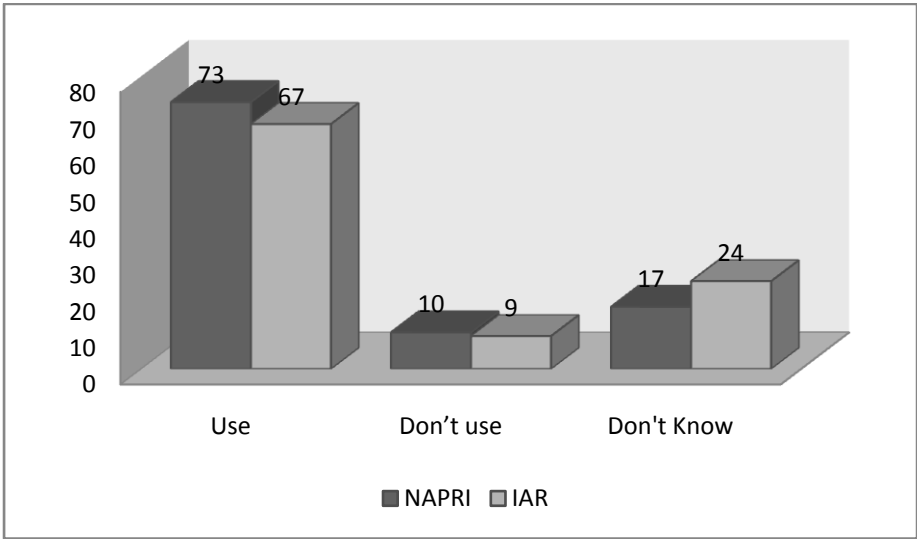


Figure 17: Institute's use of Internet tool for Agricultural Extension

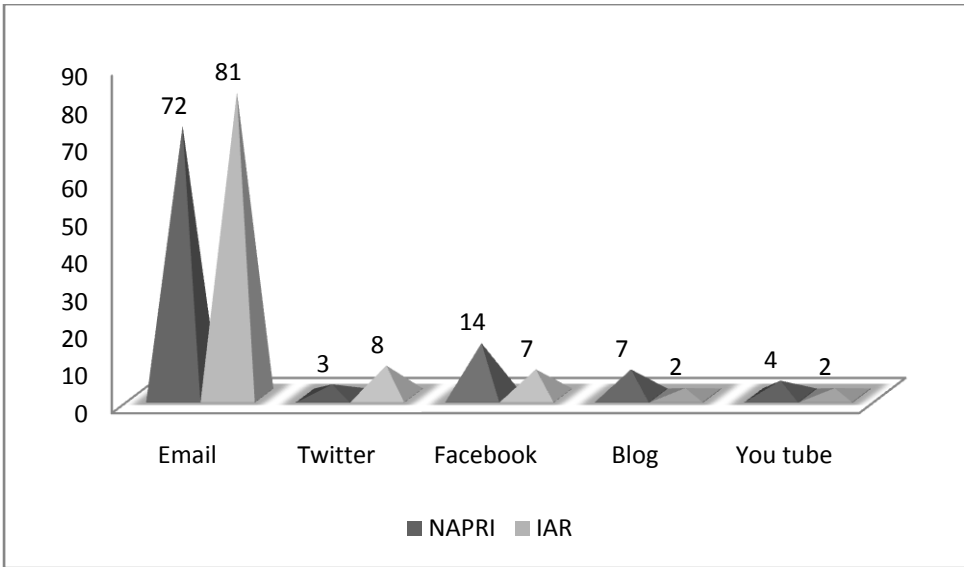


Figure 18: Type of Internet resources the Institute’s use commonly

In other to determine the type of Internet resources their Institutes used, figure 17 and 18 reveals that majority of the respondents confirmed “Email” was the commonly Internet resource used by the institute’s. This is likely that the institutes use the Internet for sending and receiving official messages.

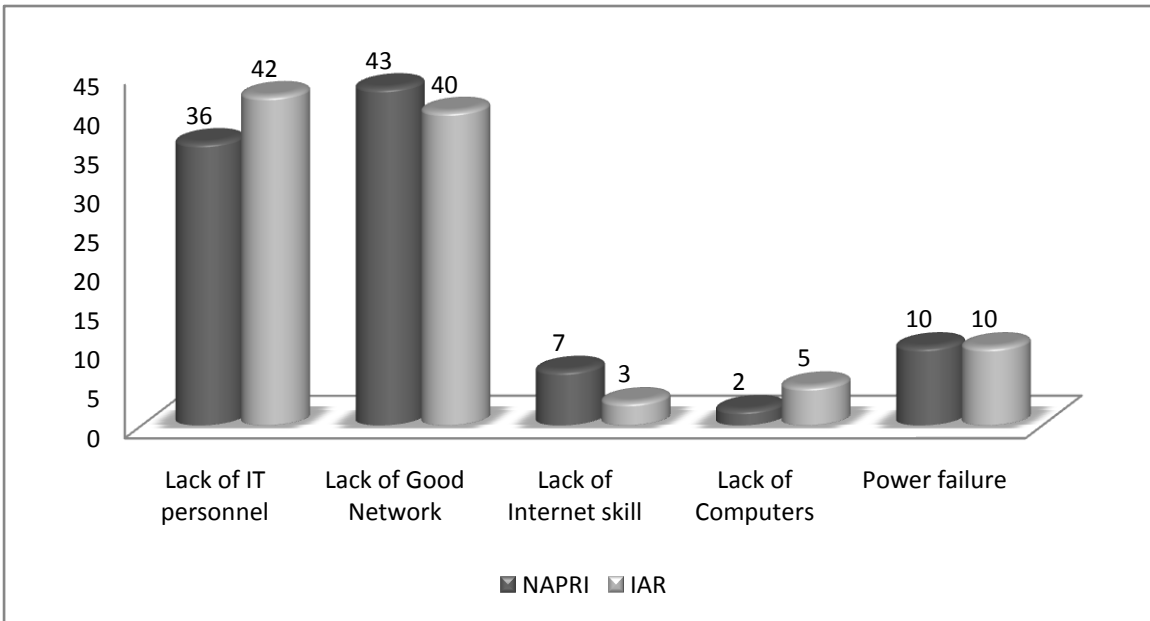


Figure 19: Challenges of Internet use in the Research Institute’s

Figure 19 reveals that majority of respondents confirmed that there are constraints in the use of Internet for agricultural extension in the agricultural research institutes ranges from

lack of: (a). Lack IT personnel, (b). Good network, (c). Internet skill, (d). Computers, as well as Electricity failure. Another problem is the farmers lacking Internet connectivity and computer skills for using the Internet as interactive medium to search and ask questions.

Without connectivity, skills, computers and power generations Internet usage for agricultural extension may not be possible in the northern Nigeria.

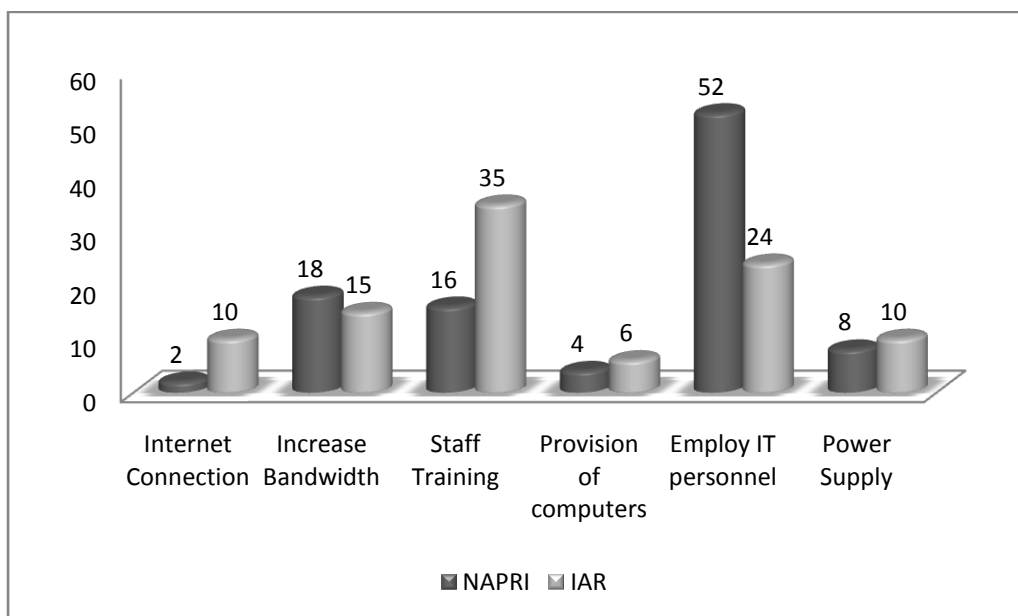


Figure 20: Ways Internet utilization can be enhanced by the Research Institute’s

From figure 20, respondents generally believed that if all structure will be provided such as: Internet connectivity to all stakeholders, increase bandwidth, staff training to improve their skills, provisions of computers, employ IT personnel as well as regular electricity supply, it will enhanced and sustained the use of Internet for agricultural extension in Nigeria.

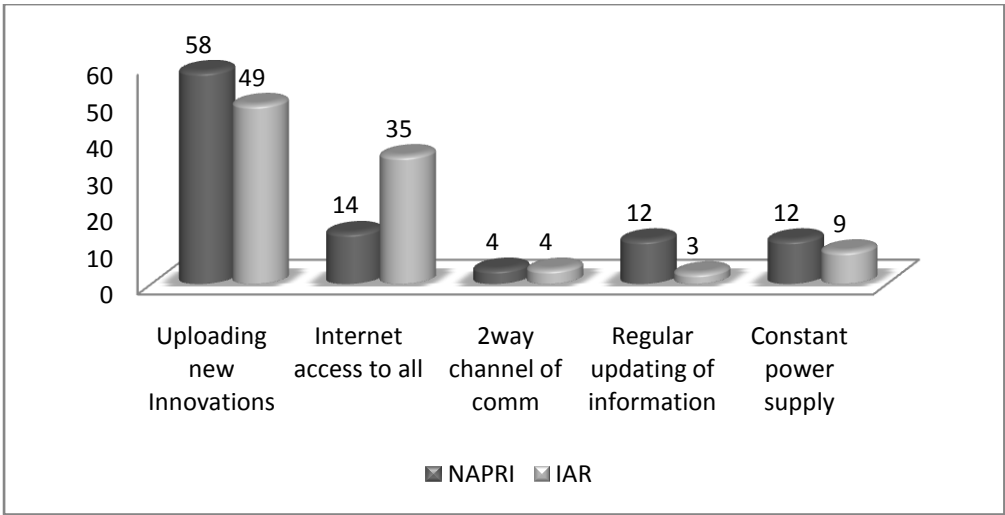


Figure 21: Best practices for Internet use in Agricultural Extension

Respondents from the research institutes suggest how the Internet could be use for agricultural extension and development in Nigeria. Figure 21 proffer solutions for the best Internet practices in agricultural extension which are: (i) Uploading new agricultural innovations (ii) Internet access to all stakeholders (iii) Internet for two-way communication (uploading and sharing) (iv) Regular updating of information as well as (v) Constant electricity supply.

Level of farmer’s participation in Internet use to source for Information

In other to answer the research question three (3) a checklist was use to generate the findings below:

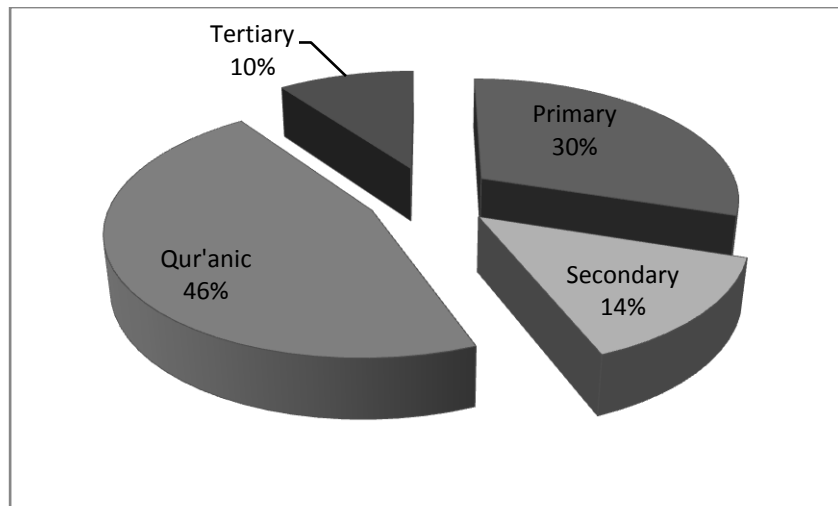


Figure 22: Farmers educational level

Figure 22 revealed that majority of the respondents (farmers) in the north-west are semi-literate ie either have Qur’anic, primary, secondary and or tertiary education, this portrays that the farmers if trained can use the Internet to source for information.

Table 4: Farmers level of Internet awareness

Awareness	Frequency	Percentage (%)
High	19	19
Average	39	39
Low	40	40
Not at all	2	2
Total	100	100

From the above table it shows that majority of the respondents are averagely aware of the Internet. This means the farmers might have had about the Internet opportunities.

Table 5: Assessing Farmers Internet Skill

Skill	Frequency	Percentage (%)
High	4	4
Average	12	12
Low	32	32
Not at all	52	52
Total	100	100

Table 5 above revealed that majority (52%) of the farmers in the north-west zone are lacking Internet skill to source for information.

Table 6: Farmers Access to Internet

Access	Frequency	Percentage (%)
Access	5	5
Sometimes	10	10
Not at all	52	52
Don't know	33	33
Total	100	100

In table 6 it reveals that 52% of the farmers are lacking access to the Internet, even though their mobile GSM (hand set) as well as cyber café's that could found around them can provide access to browse for information on the internet, This means that farmers need to be enlightened on other ways of accessing Internet.

Table 7: Ever use the Internet to source Information

Use	Frequency	Percentage (%)
Used	5	5
Once	13	13
Not at all	57	57
Don't know	25	25
Total	100	100

Findings in table 7, shows that only 5% of the farmers once used the Internet to source for any kind of information on the net. This further validates the findings in table 6, that farmers are really lacking internet skill.

Table 8: Internet as alternative source of agricultural information

Alternative	Frequency	Percentage (%)
Agreed	5	5
Disagree	23	23
Neutral	42	42
Don't know	30	30
Total	100	100

The above table confirm that majority of respondents not believing the Internet can serve as alternative source of agricultural information. This further confirms the farmer ignorance about the Internet as information store house. This means farmers need to be sensitised on the need of using the Internet for 2way communication channel.

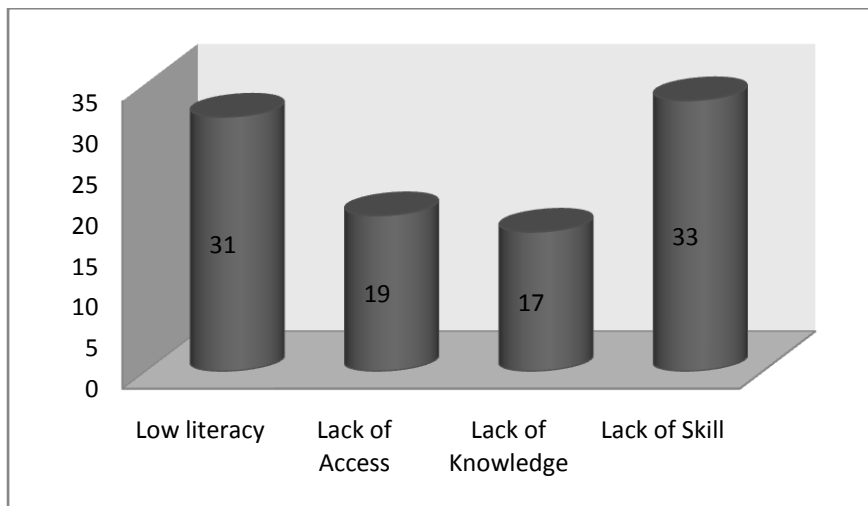


Figure 23: Farmers constraints in using the Internet

Figure 23, identifies the farmers constraints on the use of Internet range from; low literacy, lack of internet access, lack of knowledge and skills to use the Internet.

4.2 Results and Discussion

This section discusses the findings of the research questions.

RQ1. Do the Agricultural Research Institutes have functional Internet facilities for Agricultural Extension purposes in the North-West?

Concerning use of Internet for extension in the Institute, the study reveals that majority of respondents (90%) in Figure (4) are computer literate with Internet skills. To answer the research question, Figure (5) 60-90% of respondents confirmed that the institutes have functional Internet facilities including Web page as revealed in Figures 7 (NAPRI: www.napri-ng.org IAR: www.iar-samaru.org). However, it was reveal by majority of respondents 70% in Figure (8) confirmed that the institutes do not use the Internet for agricultural extension which might be attributed to poor network services and lack of IT personnel as revealed in Figures (6) and (19)

From the data it can be said that the agricultural research institutes in the north-west zone have available internet facilities to engage the stakeholders through the use of internet by interacting (question and answer), but does not use it for agricultural extension purposes.

RQ2. What is the level of utilization of Internet for Agricultural Extension among the Agricultural Research Institutes with farmers in the North-West zone?

In response to the question it can be observed that 80 – 90% respondents in Figure (9) suggest that the Internet contributes to agricultural research institutes mostly in “researches”. Similarly, Figure (10) further suggest that the agricultural research institutes do not hoist completed research projects in their web site, due to lack of Information Technology (IT) personnel as indicated in Figure (19).

More over, 62% in Figure (12) revealed that the researchers and technical staff of the institutes are not fully utilizing other Internet resources by creating blogs for uploading research report or their journal publications; however 98% of respondents in Figure (13) confirmed owning an email account. Considering the research question, Oduwale (2004) noted that agricultural research institutes in the south-western Nigeria uses the internet for searching materials (research) followed by electronic mails (email). This clearly shows that the agricultural research institutes are yet to explore the other benefits of the internet.

Figure 15 shows that 59% of respondents indicate negative response confirming not interacting with farmers or other research institutes via the Internet, Figure 16 confirmed that those with affirmative response their level of interaction with other stakeholders was minimal. This reveals that most respondents are ignorant of other internet opportunities for extension communication.

Further more, Figure (17) shows that 70% of respondents are more conversant with emails, but ignorance of other social network pages such as Twitter, and You tube. More so, 80% of respondents in Figure 18 confirmed that “researches” as the commonly Internet resources used by agricultural research institutes.

It can be seen that there is low level of internet utilization due to factors such as lack of IT personnel, knowledge and internet skills in the agricultural research institutes as reveal in Figure 19.

RQ3. What is the level of Internet usage by farmers in the North-West Zone?

In response to the research question it can be observed that 46% of the respondents in figure 24 have attained primary, secondary and or tertiary education to be able to use

the Internet. Further more table confirmed that (39%) respondents are aware of the Internet. Although table 5 and 6 show that majority (52%) of the respondents are lacking Internet access and skill to use the Internet for extension communication purposes. More so, in table 7 only (5%) of the respondents once use the Internet to browse for information. Also table 8 revealed respondents (65%) oppose the Internet as alternative source of agricultural information.

Based on the data it can be seen that few farmers (4%) known about the internet and yet, lacking knowledge and skill to use the internet to source for information, but if properly guided they may be able to use the internet for interaction with other stakeholders. This findings concurs with Haruna, Baba & Abdullahi (2012) that majority of farmers have never use the Internet to source for agricultural information. To further buttress that Kapange (2002) stressed that Internet is crucial in facilitating communication and access to information for agricultural and rural development.

RQ4. What are the constraints against the effective use of Internet in the North-West zone?

Constraints: majority of the respondents (75%) confirmed that factors militating against the effective use of Internet for agricultural extension among the agricultural stakeholders in the North – West zone include; lack of access to the Internet connectivity to farmers as well as low level of Internet skills, low literacy level, lack IT personnel in the research institutes, lack of computers to farmers and poor electricity supply. Arokoyo, (2011) states that constraints to Internet use for extension communication in Nigeria is characterised by inadequate infrastructure to use Internet such as unstable power supply; low literacy levels farmers, researchers and extension workers; and lack of Internet facilities.

RQ5 What are the Solutions to the Factors Identified against the use of Internet for Agricultural Extension in the North-West Zone?

Solutions: Findings reveals that respondents suggest ways for effective Internet usage in the agricultural research institutes for agricultural extension in the North – West zone Nigeria to includes; provision of Internet connectivity to all stakeholders, increase band with, staff/stakeholders training on Internet usage, provisions of computers to all stakeholders, employment of IT personnel as well as regular subscriptions with regular power supply.

Further the data gathered suggest that the best Internet utilization in the agricultural research institutes for agricultural extension in North –West zone, is to be; frequently uploading new agricultural findings, research result on the Internet, provision of Internet access to all researchers and technical staff, capacity building on internet uses, making the Internet two-way channel of communication (uploading and downloading) information with constant power supply to the Institutes. However, one can observe that the institutes' Staff does not know the major advantage of internet for interaction like the use of internet social network.

Following the emergence of the Internet there is possibility for all agricultural stakeholders to communicate instantly with one another with opportunities for feedback regardless of time and distance. The theoretical framework of the study provides some explanation about the correlation between the theory and the research findings. Anaeto *et al* (2008) opine technological determinism theory with a perspective involving using modern communication technology ie (Internet) to transfer technological innovations from development agencies to their clients will create an appetite for change and modernisation among members of the public.

Responses in figures 18, 20 and 21 conform to the theory that the Internet can serve as a means of sharing information, and connecting between people, and a link in the chain of the development process itself. Access to Internet will give farmers the chance to improve their incomes and increase food security.

The Internet today is a peoples' network. Anyone with basic computer knowledge and a phone line can connect to it, communicate through it, host information on it, and look through it. Unlike many other media, such as television and radio, only user of the medium can be an information producer and knowledge sharer. No one can ascertain how many people are using the Internet today, but estimates range from 50 to 100 million people, and it is growing fast.

CHAPTER FIVE

5.0 Summary, Conclusion and Recommendations

5.1 Introduction

This study assessed Internet use for agricultural extension among two agricultural research institutes and farmers in the north-west agro-ecological zone in Nigeria. The advent of the Internet became possible for agricultural research institutes to communicate and interact with farmers and other agricultural stakeholders instantaneously with feedback opportunities regardless of time and or distance.

5.2 Summary

In Chapter One, background to the study, statement of the problem, research questions, objectives, significance and scope were provided. The objectives of these research were: to assess the extent of Internet usage among the agricultural research Institutes and farmers for extension purposes in the north-west zone; find out the nature of Internet contribution to the research institutes for agricultural extension in the north-west zone; examine the level of utilization of Internet facilities among the agricultural research institutes and farmers; and assess the factors militating against the effective use of Internet by agricultural research institutes and farmers.

While in Chapter Two a thorough examination of relevant literature and the corresponding theoretical framework was carried out. The review discusses ICT policy on agriculture, the policy states that the nation (Nigeria) shall use IT to re-engineer agriculture for the purposes of maximizing food production, improving food self-sufficiency and security, increasing output for industrial raw material utilization, providing employment, economic growth and minimising environmental abuse and degradation.

The Internet is essentially a network of independently administered federal, regional, educational and foreign networks for people across the world to access and use. The Internet allows for the sharing of resources between millions of participating organisations. The Internet includes sites for research at universities and research laboratories, government sites, military sites, commercial sites, hospitals, libraries, schools and individuals. With IT technologies emerging rapidly, it is important for agricultural researchers/educators to include these new technologies in their curriculum.

Studies have shown that the Internet World Wide Web (www) is changing to allow new trends in communication, information and knowledge exchange to flourish. Sproull (1989) suggested the use of electronic mail to distribute and collect research surveys as an alternative to traditional means of survey distribution. Under certain conditions, Sproull found that this new tool for data collection could be faster, more cost effective and easier to respond to than either paper and pencil or oral interviews.

Kapange (2002) had reported that, Internet is crucial in facilitating communication and access to information for agricultural and rural development. Further study by Tumsifu (2002) investigated the access and use of Internet in agricultural research institutes in Tanzania, the result indicated that, almost all the researchers from the selected institutes had TEEAL (The Essential Electronic Agricultural Library).

Nyirenda-jere (2010) concludes that apart from scientists and researchers, the agricultural sector has a variety of players and stakeholders including farmers, commodity brokers, buyers, extension workers, policy makers and end-consumers. Each of these stakeholders has varying needs for, and uses of Internet ie Internet all within the common thread of knowledge and information brokerage and sharing.

Chapter Three primarily dealt with the methodology employed in the study, research design, population, sampling technique, instrument for data collection and method of data analysis. Thus, survey research method using structured questionnaire was adopted.

A total of 100 farmers and 200 researchers and technical staff were sampled using purposive sampling.

Chapter four presents the data, analysis and discussion with a view to answering the research questions. The findings were: the research institutes use the Internet mainly for “email” and “research” and not directed to agricultural extension; the staff of the institutes are ignorant with other internet resources ie (Twitter and You tube); the institutes did not take much of the internet advantages; also, lack of internet connectivity to farmers and internet skills are the factors militating against the use of internet for agricultural extension. The study further found solutions for internet utilization among the research institutes and farmers to include: provision of internet connectivity to farmers; provision of Information Technology (IT) personnel; and staff training to acquire internet skill are found to be solutions to the factors militating against the use of internet for agricultural extension by the research institutes.

5.3 Conclusion

This research principally assesses Internet use for agricultural extension communication among the agricultural research institutes and farmers in North-West Nigeria, rate of internet facilities, the nature of usage, how it contributes to their activities and identifies problems in its use.

Based on the above findings, the study discovered that the Internet can offer opportunities for strengthening research – extension systems in Nigeria, going by majority of

respondents confirming having Internet skills and access to it within their working environment.

Even though, it was found that the agricultural research institutes own internet facilities, they are yet to utilize the advantages and benefits that the Internet can offer for agricultural extension purposes as confirmed. More so, the research institutes and their staff use the Internet for one-way communication channel, “Research (downloading) and Emailing” instead of two-way channel (interacting, uploading, emailing and downloading) as indicated by respondents. In other words, agricultural research institutes and its staff use the Internet mainly for “researches and emailing” purposes. Mean while, some farmers are aware of the internet but do not use it to source for information due to lack of internet knowledge and skill.

It was discovered that the Internet can play a role in improving the quality of life of all the agricultural stakeholders’ as explain by the theoretical frame work in the study. The promise of the internet is yet to be realized owing to lack of connectivity on the side of farmers and poor Internet service in the research institutes as revealed in the study. In conclusion, it is necessary to provide basic infrastructure to all agricultural stakeholders to enable Internet to spread, which would enable them to be part of a comprehensive socio-economic development strategy for the country’s agricultural development and food security. In order to fully realise the benefits of Internet, there are three broad prerequisites that must be provided: access, capacity (skills) and applications (services). Access refers to both the hardware and the underlying infrastructure. The capacity or skills to use Internet are the second requirement. Lastly, there must be applications and services that are relevant, localised and affordable.

The World Summit on Information Society (WSIS) has set a target for greater penetration of Internet by 2015; half of the world's population will have access to the Internet. If achieved average rural population will be connected and therefore internet will help in strengthening extension communication in Nigeria.

5.4 Recommendations

In view of the fact that the Internet usage for agricultural extension purposes in North-West Nigeria is minimal or not existing, its utilization for extension communication to some extent can breach the gap of farmer - extension agent ratio. Based on the findings it is recommended that:

- (i) Based on the findings, respondents in the research institute having Internet access and skill it is recommended that government to provide Internet access and skills to other stakeholders ie extension agents and farmers, to encourage 2-way communication (downloading, uploading, interaction (question and answer) to enhance agricultural extension in Nigeria.
- (ii) Agricultural research institutes should collaborate with farmers in providing Internet connectivity, through farmer's cooperative society or adopted village concept. Adopted village concept refers to selected villages in the various agro-ecological zones of the country to; enhance food security and market competitiveness; empower resource-poor farmers; enhance job and self employment opportunities for youths and women; augment sustainable natural resource management effort of the communities.
- (iii) As further revealed, researchers/technical staff, and farmers lack knowledge of other Internet uses it is also recommended that Agricultural researchers/ technical staff of the agricultural research institutes with farmers needs to be trained on uses of the Internet for agricultural extension.

- (iv) Since the study reveals that the majority of farmers have low Internet skill, it is recommended that the need to design awareness building campaigns to stress the importance of using the Internet for agricultural extension in Nigeria.
- (v) Finally, as solution to the identified constraints in the study it is also recommended that the government to provide electricity to the rural areas through solar energy or power generating set.

5.5 Suggestions for Further Studies

Researchers have proved the value of using Internet for economic development. However, there is no adequate research to reveal the use of Internet for agricultural extension in Nigeria. Therefore the following further studies are recommended:

- Future researchers should expand the population to cover all the agricultural research institutes in Nigeria, in other to investigate the use of internet for agricultural extension in other zones to broaden knowledge and to check the validity or otherwise of findings.
- Also, further studies to investigate states' Agricultural Development Projects (ADPs) in the area of internet usage for extension are needed.
- Other researchers should conduct studies to evaluate the extent of implementation of Nigerian ICT policy in relation to agriculture and rural development.

5.6 Contribution to Knowledge

The study found that Internet used in the Agricultural Research Institutes in the North-West is for researches and emailing but not for two way communication (sharing-uploading and downloading). It also discovered that Agricultural Research Institutes are not using other Internet web pages for agricultural extension purposes. These findings have not been, before now, found by any study in the North-West Nigeria which also validates Oduwale (2010) findings in South-West Nigeria.

REFERENCE

- Adekunle A.A. (2007). Technology-mediated open and distance education (tech-mode) for agricultural education and improved livelihoods: A Nigerian case study. Vancouver, Canada: commonwealth of learning. Retrieved 22/03/2012 from http://wikieducator.org/Tech-Mode_in_Nigeria
- Adeyanju A.M, Haruna. A, & Abubakar, A. (2011) *Information and agricultural development in Nigeria: analysis of NAQAS NAERLS*. Communication for social change and development (ed): Uyo. African communication council of education. PP. 31-45
- Anaeto S. G, Onabjo O. S & Osifeso J. B (2008). *Models and theories of communication*. Bowie, Maryland: African renaissance books inc.
- Arokoyo, T. (2011). *ICTs application in Agricultural Extension Service delivery*. Agricultural Extension in Nigeria (ed). Ilorin: Agricultural extension society of Nigeria. Pp. 325-331
- Asian Development Bank (2004). *ICT application in Agricultural Extension Service*. (ed). Thailand: ADB publishers,
- Babalobi O. O (2010). The challenge of changing trends in the development and use of information and internet web communication technologies for veterinary medicine education in Nigeria. Retrieved 04/08/2011 from <http://knowledge.cta.int/en/Dossiers/S-T-Issues-in-Perspective/ICT-for-transforming-research-for-agricultural-and-rural-development/Articles>.
- Benamrane, D. (2005). RURANET: providing access to information in Niger. ICT Update Newsletter Issue 25. Retrieved 23/12/2011 from <http://www.cta.int>.
- Bell, M. (2004). Improving the impact of research: using e-learning to improve agricultural extension. Asian Development Report, Report of the Regional Workshop, Bali, Indonesia.
- Bheenick, K. and Brizmohunr, G. (2003). The scope of information and communication technology application in agriculture extension in Mauritius. Retrieved on 20/4/2012 from www.Uom.ac.mu/faculty/foa/ais/amas98/htm%2099/12%20Bheenicks7p3.tm.
- Bonati, G. and Gelb, E. (2005). Evaluating internet for extension in agriculture. In Gelb, E and Offer, A. (ed.) *ICT in agriculture: perspectives of technological innovation*. European Federation for Information Technologies in Agriculture, Food and the Environment.
- Chadler D. (2000). Technological or media determinism. Retrieved 08/08/2011 from <http://www.aber.ac.uk/media/Documents/tecdet/tdet02.html>

- CTA (2003). ICTs – transforming agricultural extension an e-discussion, 20th August – 29th September 2003.
- Drysdale, J. (2005). Addressing territorial disputes Somaliland ICT Update Newsletter Issue 29. Retrieved on 04/06/2011 from <http://www.cta.int>
- December J. & Randall, N. (1994). *The world wide web unleashed*. Indianapolis: Sams publishing. pp23.
- Fadiji, T. O. (2011). Factors influencing usage of information and communication technologies among village extension agents in three states in Nigeria: Phd pre-defence seminar (unpublished). Department of agric economics and rural sociology: Zaria. Ahmadu Bello University.
- FAO (1998). The potentials of micro-computers in support of Agricultural Extension, education and training Rome: FAO.
- FAO, IFAD & WFP. (2002). Reducing poverty and hunger: the critical role of financing for food, agriculture and rural development. Paper prepared by FAO, IFAD & WFP for the International Conference on Financing for Development, Monterrey, Mexico, 18-22 March 2002. Retrieved on 04/06/2011 from <http://www.cta.int>
- FARA. (2009). Inventory of Innovative Farmer Advisory Services using ICTs. Forum for Agricultural Research in Africa. Accra, Ghana. Retrieved 04/06/2011. From <http://www.cta.int>
- Felix O. & Ojikutu L. (2010). Benefit of SMS. Retrieved 02/06/2011, from <http://www.multidox.net/blog/3/messages141.html>
- Fleck, K. (1994). The world's largest computer network: the Internet. USA: The Agricultural Education Magazine, pp.9-10.
- Fletcher, W. & Deeds, J. (1994). Computer anxiety and other factors preventing computer use among U.S. secondary agricultural educators. USA: *The Journal of Agricultural Education*. 35 (2). 16-21
- Flor, A. and Hazelman, M. (2004). *Regional prospects and initiatives for bridging the rural digital divide*. AFITA/ WCC joint Congress on IT in Agriculture, pp.2-4.
- Gate B. (2000). Shaping the internet. Retrieved on 02/08/2010 from www.microsoft.com/presspass/excel/.../shaping the internet.msp.
- Hahn, H. (1994). *The Internet Complete Reference*. Berkeley, CA: Osborne McGraw-Hill. pp. 17.
- Haruna, A. Baba D. & Abdullahi J. (2012). Assessment of internet usage for information by samaru farmers in kaduna state, nigeria. *The 46th annual conference proceedings of agricultural society of Nigeria (ASN)*: kano. Faculty of agriculture. Pp.1060-1064

- Hesse, B.W., Sproull, L.S., Kiesler, S.B., & Walsh, J.P. (1993). Rams to science: computer networks in oceanography. UK: Communications of the ACM. 36 (8), 90-101.
- IFAD. (2001). Rural Poverty Report 2001 - The Challenge of Ending Rural Poverty. Rome, Italy: International Fund for Agricultural Development.
- ITU. (2009). Information Society Statistical Profiles 2009 – Africa, ITU Telecommunications Development Bureau Geneva Switzerland: International Telecommunication Union.
- Kovacs, D.K., Robinson, K.L., & Dixon, J. (1995). Scholarly e-conferences on the academic networks: how library and information science professionals use them. *Journal of the American Society for Information Science*. 46 (4), 244-253.
- Kushner, J. and Chong, P. (2004). Conducive environments for promoting community e-centers. Asian Development Bank Regional Workshop, Bali, Indonesia.
- Lambert, S. & Howe, W. (1993). Internet Basics: Your on-line access to the global electronic superhighway. New York: Random House.
- Manobi. (2007). *Manobi Extends its Social Development Aims to Health Sector*. Manobi Press
- Marine, A., Kirkpatrick, S., Neou, v., & Ward, C. (1993). *Internet: Getting Started*. Englewood Cliffs, NJ: PTR Prentice Hall.
- Mcluhan, M. (1962). *The Gutenberg Galaxy: The making of Typographic Man*. Toronto: University of Toronto Press. Retrieved on 08/08/2011 from <http://www.uky.edu/~drlane/capstone/mass/determinism.htm>
- Meera, S.N; Jhamtani, A; and Rao, DUM (2004). Information and Communication Technology in Agricultural Development: A comparative analysis of three projects from India. Agricultural Research and Extension Network paper No. 135 pp 20. In Salau E.S and Saingbe N.D (2008) patnsukjournal.com
- Ministry of science and technology (1999). Nigerian national policy for information technology.
- Mkumbo, O. (2005). Monitoring fish stocks in Lake Victoria, ICT Update Newsletter Issue 29. National Communications Commission. Retrieved on 11/07/2011 from www.ncc.gov.ng
- National Agricultural Extension and Research Liaison Services (2011). Agricultural performance survey. Zaria: NAERLS press.
- Ndagi, J. (1978). *The essentials of research methodology for the Nigerian educator*. Zaria: ABU press.
- Nyirenda-jere T. (2010). Unlocking the promise of ICTs for transforming agriculture in Africa. Retrieved 04/08/2011 from <http://knowledge.cta.int/en/Dossiers/S-T-Issues-in-Perspective/ICT-for-transforming-research-for-agricultural-and-rural-development/Articles>

- Oduwale A. A (2004). Impact of internet use on agricultural research outputs in Nigerian universities of agriculture. Library Hi Tech news vol.21, no.6: Emerald group publishing limited. Retrieved 09/08/2011 from <http://www.emeraldinsight.com/journals.htm?articleid=861484&>
- Olayiwola, A. O (2007) *Procedures in educational research*. Kaduna: HANIJAM publishers. pp83
- Olutayo O. B (2010). The challenge of changing trends in the development and use of information and internet web communication technologies for veterinary medicine education in Nigeria. Retrieved 04/08/2011 from <http://knowledge.cta.int/en/dossiers/s-t/issues-in-perspective/ict-for-transforming-research-for-agricultural-and-rural-development/articles>
- Pantum, D. (1995). Use of the Internet by U. S. radio stations. Master's Thesis, Lubbock, Texas: Texas Tech University.
- Razaq B. & Ajayi O.O.S. (2000). *Research Method and Statistical Analyses*. Ilorin: Haytee press. pp.110.
- Salau E.S and Saingbe N.D (2008). Access and utilization of information and communication technologies (ICT)s among agricultural researchers and extension workers in selected institutions in Nasarawa state of Nigeria. Retrieved on 08/08/2011 from www.patnsukjournal.com/currentissue.
- Sarantakos S. (1993). *Social research*. Australia: Macmillan education press ltd. pp 56.
- Schmitz. J.G. (2003). *Agricultural extension on the Web*. University of Illinois, pp.1-13.
- Seguin, A. & Seguin, C. (1995). Window to the World: Are You and Your Students Ready To Explore the Internet ? *Vocational Education Journal*. 70 (2), 30-33.
- Simioes, D. (2010). How can agricultural extension best harness ICTs to improve rural livelihood in developing countries. In Gelb, E and Offer, A. (ed.) *ICT in agriculture: perspectives of technological innovation*. European Federation for Information Technologies in Agriculture, Food and the Environment.
- Sproull, L. S. (1986). Using electronic mail for data collection in organizational research. *Academy of Management Journal*. 29 (1). 156-169.
- Swortzel, K.A., & McCaslin, N.L (1991). Getting information from webs and gophers:who would have thought of that ? *The Agricultural Education Magazine*. p.12.
- Talbert, B. (1995). What do you do if you are a Model Ton the information superhighway and you want to be a corvette. *The Agricultural Education Magazine*, PP. 13-15. Retrieved 04/08/2011 from <http://esr.lib.ttu.edu/bitstream/handle/2346/pdf>
- Tull D. & Dell H. (1993). *Marketing research, measurement and method* (6th edition). India: Prentice hall. Pp.44

- Tumsifu, E. (2002). "Access and use of Information and Communication Technology (ICT) in selected Agricultural Research Institutes". Case of Ministry of Agriculture and Food Security in Tanzania. M Sc Dissertation (unpublished): University of Dar es Salaam.
- Umar, M M (2005) *Extension communication: Perspective on Mass Communication issues*. In Malam, M. N and Bashir, M. A (Ed). Kano: gidan dabino publishers. PP. 117-130
- UNCTAD. (2008). The Information economy report 2007-2008 – Science and Technology for Development: the new paradigm of ICT. Geneva, Switzerland: United Nations Conference on Trade and Development.
- UNESCO. (2009). Mobile device in e-learning. Third International Conference on E-Learning for Knowledge-Based Society,. Bangkok, Thailand 35, pp.1-5.
- Ujo, A. (2004). Understanding social research. A non-quantitative approach. Kaduna: Anyaotu enterprises and publishers limited.
- Vanguard (2011). Using GSM winning election. Retrieved 02/06/2011, from <http://www.Community.vanguardngr.com/forum/topics/winning-the-next-election>
- Van den Ban, A. W. and H.S. Hawkins (1998). *Agricultural Extension*. Second edition. Oxford: Blackwell Science Publication; Oxford, pp267-268.
- Wimmer, R.D., & Dominick, J.R. (1994). *Mass Media Research: An Introduction* (4th ed.). Belmont, CA: Wadsworth.

Appendix A

Department of Mass Communication,
Faculty of Social Sciences,
Ahmadu Bello University Zaria.

Dear Sir/Madam,

QUESTIONNAIRE INTERNET USE FOR EXTENSION COMMUNICATION AMONG AGRICULTURAL RESEARCH INSTITUTES AND FARMERS IN THE NORTH – WEST NIGERIA

This questionnaire is for research purpose designed to assess the use of Internet for Agricultural Extension in Nigeria: A study of two selected Agricultural Research Institute in the North – West Zone. All the information supplied will be treated confidentially.

Please tick the appropriate spaces as provided in each of the items below. Tick the appropriate boxes where applicable.

Thanks

Yours faithfully

Abdul-Aziz Haruna

Appendix B
Questionnaire

SECTION A

BIO-DATA

A. Sex: M ()

F ()

B. Status: Researcher/Academics ()

Technical staff ()

C. Age : 30-40yrs ()

41-50yrs ()

51 & above ()

D. Working Experience: 1-5yrs ()

6-10 yrs ()

11-16yrs ()

16 & above ()

E. Highest Qualification: Diploma ()

HND ()

PGD ()

Bsc ()

M.Sc ()

Phd ()

Others specify-----

SECTION B

Level of Awareness

Yes

No

	Yes	No
Do you own a computer?		
Are you computer literate?		
Do you have access to Internet?		
Do you have Internet Skills?		

SECTION C

NATURE OF INTERNET USE IN THE AGRICULTURAL RESEARCH INSTITUTES.

1. Does the Institute have functional Internet facilities?
Yes ()
No ()
Don't know ()
2. How would you rate the facilities?
Good ()
Fair ()
Bad ()
3. How about functional web site?
Yes ()
No ()
Don't know ()
4. If yes, does the institute use it for agricultural extension dissemination?
Yes ()
No ()
Don't know ()
5. If No, What do they use the web site for? **(Tick as many)**
Research ()
Social Networking ()
Emailing ()
Don't know ()

SECTION D

BENEFIT OF INTERNET IN THE AGRICULTURAL RESEARCH INSTITUTES FOR EXTENSION COMMUNICATION PURPOSE

Note: please write your institute Web Site address_____

6. What has been the contribution of Internet to your institution? **(Tick as many)**
Research ()
Emailing ()
Social Networking ()
Browsing ()
Don't know ()
Others (specify)_____
7. Does your institute host completed research projects on their Web site?
Yes ()
No ()
Don't know ()
8. If yes, how often is it updated?

- Regularly ()
 Sometimes ()
 Not at all ()
9. If no, why?
 Lack of IT personnel ()
 Lack of quality material ()
 Don't know ()
 Any other (specify) _____
10. As a Researcher or Technical staff do you own your blog or any page on the Internet?
 Yes ()
 No ()
 Don't Know ()
11. If yes, how often do you post publications?
 Regularly ()
 Sometimes ()
 Not at all ()
12. Do you have an email address?
 Yes ()
 No ()
 Don't know ()
13. How often do you check your Email
 Regularly ()
 Sometimes ()
 Not at all ()
 Not sure ()

SECTION E

LEVEL OF INTERNET UTILIZATION (Please tick where applicable)

14. Do you interact with agricultural stakeholders via the internet ie farmers & other research institutes?
 Yes ()
 No ()
 Don't know ()
 Sometimes ()
15. If yes, how frequent?
 Daily ()
 Sometimes ()
 Rarely ()
 Not at all ()
16. Which among the followings are you knowledgeable about?

- a. Email ()
- b. Twitter ()
- c. Face book ()
- d. You tube ()
- e. Blogging ()

17. Does your Institute use any of the above mention items for agricultural development & extension?

Yes ()

No ()

Don't know ()

18. If yes, which among them?

Email ()

Twitter ()

Face book ()

You tube ()

Blogging ()

SECTION F

FACTORS MILITATING AGAINST THE USE OF INTERNET IN THE RESEARCH INSTITUTES.

19. Are there any factors militating against the use of Internet in the research Institutes?

Yes ()

No ()

Don't know ()

20. If yes, mention them? **(Tick as many)**

Lack of Internet connectivity ()

Lack of good network ()

Lack of Internet skills ()

Lack of Computers ()

Power failure ()

Any other (specify)_____

21. How do you think Internet utilization by the research institutes could be enhanced?

(Tick as many)

Provide Internet connectivity ()

Increase bandwidth ()

Staff training on Internet usage ()

Provides computers/laptops to staff ()

Prompt payment of subscriptions ()

Constant power supply ()

22. How best do you think Internet could be use for agricultural extension & development in Nigeria? **(Tick as many)**

Uploading new agricultural findings/result ()

Provides Internet access to all stakeholders ()

Using the Internet as 2way channel of communication ()

Regular updating of agricultural information ()

Advocacy to all Agric stakeholders on the need of Internet for information sharing ()