USE OF MANAGEMENT INFORMATION SYSTEM IN AGRICULTURAL EXTENSION PROGRAMMES OF AHMADU BELLO UNIVERSITY, ZARIA, NIGERIA

By

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MSc/Educ/09619/2010-2011

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

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A MASTER DEGREE IN INFORMATION SCIENCE

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE,

FACULTY OF EDUCATION,

AHMADU BELLO UNIVERSITY, ZARIA.

NIGERIA

JUNE, 2014

Declaration

I declare that this Thesis has been carried out by me. It has never been presented anywhere, either wholly or partially, for the purpose of the award of a higher degree. All the quotations and sources of information are, however, duly acknowledged by means of references

…… ……..……

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Certification

This Thesis entitled: "Use of Management Information System in Agricultural Extension Programmes of Ahmadu Bello University, Zaria", by Adedokun, Aderonke Olubukola meets the regulations governing the award of the degree of Master of Information Science at Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

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Dedication

This research work is dedicated to my loving husband, Engr Adewale E. Adedokun (PhD).

Acknowledgements

Glory, honour and majesty be ascribed to the Lord God Almighty for granting me favour and seeing me through this work successfully. My appreciation to my Head of Department, Dr. M.I. Abdullahi, for his kind contributions. My sincere gratitude goes to Prof. I.I. Ekoja, who took his time to read and thoroughly scrutinize the work, despite the distance, tight teaching and administrative schedule. My profound appreciation goes to my second supervisor, Dr E.S. Gbaje, who became a big brother to me, took his time to tutor, guide, advice and encourage me through every stage of the work.

Special appreciation also to Prof Zakari Mohammed who I fondly call 'Grandpa', was so much of an encouragement all through my study. Worthy of commendation is Hajia R. Quadir and Mrs G. Nock who have proved to be true leaders in the course of my study. I wish to acknowledge all my Lecturers through whom I gained immense knowledge Dr. K. A. Momoh, Dr. K. A. Sanusi, Dr (Mrs) H. M. Daudu, Dr Baba S. Aduku, Dr Abu Yusufu, Late Dr A.A. Lemu, Mrs C.C. Adikwu, Mallam M.M. Hayatu, Mrs M. Mohammed Dr Babangida Umar and Dr Lawal Umar and all other staff member of the Department of Library and Information Science, Ahmadu Bello University, Zaria.

My gratitude to my Colleagues Aliyu Abdulkadir, Habib Mohammed, Matthias Kasa, Ali Martina, Ladi Badakin, Gladys Adegboye, Atteh Sadiat, Amina Lawal, Mrs Oshagbami, Hajia Hadiza Abdullahi for their time, encouragement and contributions. I am also very grateful to Prof. I. Adeyinka and Mr Bunmi Aregbe, for their time and contributions and all the management staff of NAPRI and NAERLS. Others include all staff of IAR and DAC libraries for their understanding, encouragement, support and patience throughout the study. Their contributions by way of ideas and suggestions have helped me a lot in carrying out this study.

I am grateful to my parents Prof & Mrs. J.O Olukosi, for giving me the best education they could afford and for their continual prayers. I am most grateful to my husband, Dr. (Engr) Wale, for his unending love, understanding, spiritual, financial and emotional support. 'You are a true pillar'. For my lovely kids: Dara, Joba and Seyi, you are truly Gods gifts and I love you. I duly thank my big brother, Adeyemi Scott for his support throughout this study. I truly appreciate the prayers, push and support of the mothers God has given me: D.M Olukosi, C.O Adedokun, M.A

Onaolapo and M.A Iranloye. I appreciate all my siblings, especially my big sister Sandra, friends, family, in-laws and the church of God for their prayers, encouragement and support.

Abstract

This study investigated the Use of Management Information System for Enhanced Activities in Agricultural Extension Programmes of Ahmadu Bello University, Zaria. To achieve the objectives of the study, the study formulated six research questions. A qualitative research methodology using the case study approach was adopted. An Interview guide, focus groups and observations were the instruments used to collect data. The target population of the study comprised of the Management and MIS staff of the Agricultural Extension programmes in National Agricultural Extension Research Liaison Services (NAERLS) and National Animal Production Research Institute (NAPRI). The responses from the sampled staff of the Agricultural Extension Programmes were collated, analyzed and interpreted descriptively, using tables. The finding showed that the Agricultural Extension Programmes in the Institutes surveyed, made use of one MIS facility or the other. The most available and used MIS facilities were the computer, scanner, printer, digital camera, generator and multimedia projector. All the facilities available and used by the MIS/IT staff had so little to do with decision making but more of statistics generation from various field researches. The sources of information for the MIS staff were more of external than internal sources. There was no information passed from the Agricultural Extension programs to MIS, which is a crucial internal source of information. The channels of information to managers were the E-mail, phones, prints and paper files. There existed no intranet, extranet, interactive website or a specific discussion forum for the Extension program heads. The types of report generated include the scheduled, summary and the on-demand reports. The contributions of MIS include: increased access to information, improved generation of information and dissemination, improved communication networking between colleagues and other Institutions and availability of consistent data. These contributions have very little relation with decision making. The challenges resulting in the partial use of the MIS and its facilities include power supply, lack/ shortage of specialist's personnel for development program for MIS, inadequate infrastructure and lack of full support by management staff. The study therefore concluded that the Use of MIS for enhancing activities in these Agricultural Research Institutions is partial and the facilities are not used for enhancing decision making, being the essence of an MIS. In view of this a number of recommendations were made, some of which are: Provision of a separate structure for MIS with expanded facilities and the MIS unit put in place should be to provide information strictly for all levels of management, for effective decision making. This will go a long way to help improve information flow, hence decision making.

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Abbreviations

ABU	Ahmadu Bello University.
DAC	Division for Agricultural Colleges.
FOA	Faculty of Agriculture.
NAERLS	National Agricultural Extension Research and Liaison Services.
ICT	Information and Communications Technology
IAR	Institute for Agricultural Research.
IAR&T	Agricultural Research and Training.
ISNAR	International Service for National Agricultural Research
LCRI	Lake Chad Research Institute
MIS	Management Information System
NAPRI	National Animal Production Research Institute.
NRCRI	National Root Crop Research Institute
NCRI	National Cereals Research Institute
NVRI	National Veterinary Research Institute
NSPRI	Port Harcourt
T&V	Training and Visit

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Every society and organization requires adequate information to survive in the 21st century. Information has a great impact on decision making, and hence its value is closely tied to the decisions that result from its use. Information does not have an absolute universal value. Its value is related to those who use it, when it is used, and in what situation it is used (Ramesh, 1990). Information is a basic and important resource needed to develop other resources in any thriving organization. Changing circumstances and environments have necessitated the need for access to information for effective decision making at various levels of management in the organization. Information can be considered as an abstract concept, usually in the form of reports. Essentially, information has become a critical resource which is vital to the wellbeing of individuals and organizations in the modern world.

The development and use of Management Information Systems (MIS) is a modern phenomenon concerned with the use of appropriate information that will lead to better decision making, hence better results. A manager's effectiveness is largely dependent on the existence and use of an effective assistance such as a management information system. Management information systems could be described as a system or process that provides the information necessary to manage an organization effectively. According to MIS complete (series 2); MIS outputs enables a manager to make strategic decisions and intelligent choices that shape an organization's future vision and mission. This output which is the information, has the potential to either stabilize or destabilize an organization. MIS provides several benefits to the agricultural

extension organization some of which are: the means of effective and efficient coordination between departments, quick and reliable referencing, access to relevant data and documents, use of less labour, improvement in organizational and departmental techniques, management of day-to-day activities (as stock control, crop and animal production, e.tc.) and day-to-day assistance in a department. Management Information System is basically concerned with processing data into information which is then communicated to the various departments, in an organization for appropriate decision-making.

Management information system is an ever evolving and a useful integrated user – machine for providing information, supporting operations, management, analysis and decision making, functions by utilizing computer hardware, software models and database. MIS and the information it generates, are generally considered essential components of prudent and reasonable business decisions (MIS handbook, 1995).

1.1.1 Concept of MIS

Management information system is a concept of three words: Management, information and system. MIS generates, synthesizes and processes information from computerized and certain manual systems. In other words, it is an acknowledged fact that the manual aspect/ process cannot be totally divulged from the automated system. It can be argued that the use of automation makes it possible to store immense quantities of information, to avoid many of the errors that find their way into manual records, and to make calculations and comparisons that would be practically impossible in a manual system.

These Information systems comprise of all the components that collect data, manipulates, and then provides information. It usually includes hardware, software, people, communication systems such as telephone lines, and the data itself.

McClure (1990) defined Management information systems as tools designed to improve management decisions. Sekhar (2007) opines that management information system is "a system that collects and processes data (information) and provides it to managers at all levels, who uses it for decision making, planning, program implementation and control". In other words, MIS is aimed at proffering the management with a solution to a problem.

According to Laudon & Laudon (2004), management information system is an integral part of organizations which represents an organizational and management solution, based on information technology, to a challenge posed by the environment. As noted by Lucy (2005), a management information system is a system using formalized procedures to provide management at all levels in all functions with appropriate information, based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible.

MIS is an information system that enhances management decision making. This is because it possesses decision making capability. The MIS, therefore, is a dynamic concept subject to change, time and again, continuously interacting with the internal and the external environment of the organization and thereby provides a corrective mechanism within the system that brings about the change needed by a typical MIS. A management information system essentially produces information that supports the management functions of an organization (Davis & Olson, 2005; Lucas, 2000; McLeod, 2005). In essence, management information system is the link required to connect all the organization's components together, hence providing better operation and survival in a competitive environment.

1.1.2 Concept of Agricultural Extension

The term Agricultural extension stemmed from the general concept of extension. Extension revolves around information creation and dissemination and it is designed to be a management system for empowering extension staff, turning desk-bound and poorly motivated field staff into effective extension agents. Agricultural extension has long been grounded in the diffusion model of agricultural development, in which technologies are passed from research scientists via extensionists to farmers (Rogers, 1995). This approach is exemplified by the training and visit (T&V) system. It was first implemented in Turkey in 1967 and later widely adopted by governments (Benor, 1987; Roberts, 1989).

Agricultural extension means different things to different people. To the farmers, it is a form of assistance to help improve their knowledge, efficiency, productivity, profitability and contribution to the good of their family, community and society. To the managers, planners and policy makers, it is a policy instrument to increase agricultural production, to achieve national food security and at the same time help alleviate rural poverty. To the practitioner, agricultural extension enhances and accelerates the spread of useful knowledge and technologies to rural people. These activities are expected to lead to increased and sustained productivity, increased income and well-being of farm people and to the promotion of national food security and economic growth.

It was pointed out by Denban (1992) that agricultural extension involves the conscious use of communication of information to help people form and make sound decisions. Madueke (1995) opines that agricultural extension is known as the application of scientific research and new knowledge to agricultural practices through farmer education.

Therefore, agricultural extension must provide an effective linkage between farmers, agricultural research and other sources of information. According to Phan (2012), agricultural extension involves deliberate use of communication of information to help people make a good decision concerning farming activities. This makes it possible for extension agents to stimulate learning among their farmers by improving the extent and quality of their knowledge and their decision making skills.

1.1.3 Agricultural Extension Programmes in Ahmadu Bello University.

The Ahmadu Bello University, Zaria has Agricultural Extension programmes in National Agricultural Extension and Research Liaison Services (NAERLS), National Animal Production and Research Institute (NAPRI) and Institute for Agricultural Research (IAR). These Agricultural extension programmes are put in place to ensure extensive agricultural research, capacity development for effective delivery services, increased agricultural productivity, sustainable agricultural growth and wealth creation in Nigeria at large (NAERLS, 2012). An agricultural extension organization is a formalized structure of programmes, roles or position targeted at achieving extension activities. These programmes represent the various crops, animals and fields of agriculture.

NAERLS, which is one of the foremost institute for agricultural extension research, executes and focuses its extension activities/research through the following programs: Crop and forestry, Livestock and Fisheries, Agricultural Engineering and Irrigation, Agricultural extension and economics, food technology and rural home economics and the Agricultural Media. However, to effectively discharge its functions of coordinating the overall planning and development of extension liaison activities throughout the country, NAERLS established six

zonal offices, one in each of the six agro – ecological/ geo- political zones of the country. To promote synergy and collaboration of all the six zonal offices, they are located in the zonal research institutes. These are: National Root Crop Research Institute,(NRCRI) Umudike; Institute of Agricultural Research and Training, (IAR&T) Ibadan; National Cereals Research Institute,(NCRI) Badeggi; Lake Chad Research Institute,(LCRI) Maiduguri, (NSPRI) Port Harcourt and Institute for Agricultural Research, Zaria (NAERLS, 2012).

IAR is mandated to undertake research activities on the genetic improvement of food crops. The institute is structured into 9 programmes in cooperation with the Federal Ministry of Agriculture and Natural Resources of each state and other agricultural research, in order to fulfill the mandate. The programmes include: Artemesia Research, Product Development, Cotton, Agricultural Mechanization, Legumes and Oil Seeds, Cereals Research, Farming Systems, Biotechnology and Irrigation Research Programmes.

NAPRI engages in extension research on a range of animals and their feeds. It seeks to improve on breeds and varieties to enhance productivity, hence increasing income. The institute focuses on: Small Ruminants, Beef, Poultry, Swine, Forage and Crop Residue, Animal Production, Livestock System and Animal Reproduction.

The collective mandates of these Institutes include mediating between the regional structures in cooperation with Ministries of Agriculture and Natural Resources, and agricultural stations within and outside the country. The establishment of these Institutes was also to facilitate the training of scientists, academics, agricultural officers while at the same time undertaking and implementing research programs under close supervision and collaboration with universities, Ministries of Agriculture and Natural Resources as well as private, national and

international agencies. These Institutes are recognized for its immense contribution to farmer education and the national objective of self-reliance and sufficiency in food and raw materials. Although funded separately, these Institutes function in very close association with each other.

1.2 Statement of the Problem

Agricultural Research Institutes conduct research in all fields of agriculture. Some of these researches have the capacity to revolutionize agriculture in Nigeria. The law establishing these Agricultural Research Institutes makes it obligatory for them to implement extension research programmes, collect, retrieve information and collaborate with Federal ministry of agriculture, agro-based research institutes, universities and other tertiary institutions offering agriculture, international & national agricultural research institutes and private and public agricultural units/departments in the country. In the same vein, they are expected to coordinate national trainings, conferences, workshops, coordinate production of television, radio, film, publish bulletins & books in agricultural extension within their mandate. The mandates of these institutes saddled them with multiple functions that lead to information flow with highly varied content, format and importance. However with the increase in agricultural research in the Agricultural Extension programmes of Ahmadu Bello University, Zaria it has become imperative for the Management Information System to collect and process the agricultural research outputs into information and communicate to all relevant levels of management for appropriate decision making, which will include ensuring a wide dissemination of these new agricultural research and knowledge.

Every Organizational management, irrespective of the mandate, requires relevant information in good time and information systems that are essential for both the managers and

the organizations to survive and prosper (Laudon & Laudon, 2004). The researcher observed that the administration in NAPRI & NAERLS has become deficient because of lack of full utilization of facilities & managerial tools needed to aid decision making, though some are available physically in the institutions. Also there is a clause as to whether the management sees the need for expanded facilities to empower the MIS to deliver the right information, in the right format, to all managers which in turn will get to stakeholders, agricultural extension agents and the end users promptly. For example, both the NAERLS and NAPRI have full internet connectivity, with lanned computers but lack facilities like the intranet and a dedicated system for effective comprehensive integration of all research outputs.

Studies have revealed that in most sophisticated organizations, both manual and computer- based systems are used; in fact, both are held to be complementary in information handling procedures (Sanders, 1983). Obi (2003), Fabunmi (2003) & Adebayo (2007) stressed the need for Management Information Systems in making effective decisions in institutions. Collaboration, information sharing and harmonization of research result without the use of MIS in these agricultural extension programs will definitely affect effective delivery of their mandates, knowing fully well that, effective deliveries of an Institutions products and services are supported by the MIS (Asadi et. al 2008). Hence, for effective decision that positively impact agricultural revolution in the country, these research institutes need to be organized and administered in a truly scientific manner utilizing modern management techniques and decision making tools. A new interactive and analytic approach to problem solving, team work, data integration, data sharing, dynamic linking and service provision is needed, to hasten and improve the activities in the agricultural extension programs in ABU, for maximum results.

1.3 Research questions

The study addressed the following research questions:

1. What Management Information System facilities are available and used for Agricultural extension programs in Ahmadu Bello University, Zaria?
2. What are the information sources for Management Information System of the Agricultural extension programs in Ahmadu Bello University, Zaria?
3. What are the channels used by the Management Information System in the provision of information to managers of Agricultural Extension Programs in Ahmadu Bello University, Zaria?
4. What type of report is generated by the Management Information System for agricultural extension programs in Ahmadu Bello University, Zaria?
5. How has the Management Information System contributed to the enhancement of the activities of the Agricultural Extension programs in Ahmadu Bello University, Zaria?
6. What are the problems encountered by the use of the Management information system in agricultural extension programs in Ahmadu Bello University, Zaria?

1.4. Research Objectives

The objectives of the study are;

1. To identify the Management information system facilities available and used in Agricultural extension programs of Ahmadu Bello University, Zaria.

2. To determine the sources of information for the Management information system of the Agricultural extension programs of Ahmadu Bello University, Zaria.

3. To determine the channels used in the provision of information to managers by the Management information system in Agricultural extension programs of Ahmadu Bello University, Zaria

4 To determine the type of report generated by the Management Information System in the agricultural extension programs of Ahmadu Bello University, Zaria.

5. To determine how the Management Information System has contributed to the enhancement of the activities in the Agricultural Extension Programs of Ahmadu Bello University, Zaria..

6. To identify the problems encountered by the use of the Management Information system in the agricultural extension programs of Ahmadu Bello University, Zaria.

1.5 Significance of the Study

The essence of MIS is to improve decision making by utilizing integrated man – machines. However, this will only be possible if the stakeholders fully appreciate the importance and role of MIS and the problems that abound to exist in the organization for as long as it is not utilized.

It has been observed by the researcher that there is currently no research work addressing issues on MIS with particular focus on agricultural extension in ABU Zaria. The outcome of this study resulted into recommendations to address the problems identified at the end of the study.

In addition the findings reflect the types of Management information system facilities appropriate for enhancing the information flow between and across the agricultural extension programmes in ABU Zaria and all stakeholders, bringing about a general awareness of how the use of the MIS is beneficial in the Agricultural extension programmes of Ahmadu Bello University.

This study will bridge the gap in timely informational and technology innovations among the providers: NAERLS, IAR, NAPRI & Federal Ministry of Agriculture, other agricultural institutions and the end users. Similarly, the study is of significant value to researchers and scholars in the Library and Information Science field, ABU Zaria, Nigeria and the world at large.

1.6 Scope of the study

The study focused only on the Management Information System used in the agricultural extension programmes of ABU Zaria. The study also focused on management staff and information managers of the various agricultural extension programmes in NAERLS and NAPRI. IAR was excluded because it doesn't have a MIS unit or a similitude of it. Furthermore, the study focused on the type of information produced in form of reports.

1.7 Operational Definitions of Terms

The following terms are defined operationally thus:

Use: The value or state of the system being used for a purpose.

Information: Data that have been shaped into a form that is meaningful and useful to human beings.

Management Information System: Formalized procedures to provide management at all levels in all functions with appropriate information, based on data from both internal and external sources, to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible.

Information Systems: A set of interrelated components that collect (or retrieve), process, store and distribute information to support decision making and control in an organization

Agricultural Extension: Application of scientific research and new knowledge to agricultural practices through farmer education.

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CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviewed relevant literature to the study under the following headings:

1. Management Information System Infrastructure for Agricultural Extension.
2. Sources of Information for Agricultural Extension.
3. Information provision by Management Information System for managers.
4. Types of Reports generated by Management Information System.
5. Role of Management Information System in the Enhancement of Agricultural Extension.
6. Challenges in the use of Management Information System for Agricultural extension.
7. Summary of Review.

2.2 MIS Facilities for Agricultural Extension

Management Information System (MIS) in agricultural extension Organizations is a process of generating and providing information to its clients. MIS is a computer-based system that provides managers with the tools for organizing, evaluating and efficiently running their departments (Gupta, et.al, 2010). It is according to Sambo (1992), a system that uses formalized procedures to provide management at all levels and in all functions with appropriate information, based on data from both internal and external sources. In order to provide past, present and prediction of information, a MIS can include software that helps in decision making, data resources such as databases, the hardware resources of a system, people management and project management applications, and any computerized processes that will enable the departments within the complex to run efficiently.

As enumerated in the MIS Handbook (2007), Information Technology (IT) infrastructure or facilities components include computer hardware and software, networking and telecommunications technology, data management technology, and people services. This was also asserted by Post and Anderson (1997) that a management information system (MIS) or computer information system (CIS) consists of five related components: hardware, software, people, procedure and collection of data. Specifically, computers and other networking equipment have been emphasized as prerequisites for an effective MIS operation. Robertson, Swann & Newwel (1996) investigated the role of networks in the diffusion of technological innovation. The study revealed that networking equipment are important in ensuring adequate spread of new technologies to end-users. Hazzan (1999) aptly summarized the importance of this information equipment that without computers, their peripherals and other communications equipment, organizations could not access information offered through world-wide web.

These studies have shown that adequate availability of MIS equipment is inescapable for effective MIS operations. Also, effective use of this equipment is important in order to generate information for management use. The IT infrastructure provides the foundation, or platform, on which the firm can build its specific information systems.

2.2.1 MIS Structure

For optimum service, an adequate housing provision for the equipment's will be required. MIS buildings are custom built worldwide" (Akintunde, 2006), it is built with space for information and communications (ICT) facilities. It should be an ICT customized structure. In other words, the building should be built specifically and condusively for the purpose of housing these equipment's. Consideration for the following should be made: Lines for electrical and network cables, servers and switches must be observed, electronic mail services, teaching

laboratories and laboratories for data collection, synthesis, research and learning, space for seminars, video conferencing among the functional Outstation Laboratories across the various States of the Country. Space and furniture should be able to accommodate multiple electronic resources such as television, radio, close-circuit television (CCTV), mobile telephony, iPod, cameras, computer and other accessories. The furniture should suit the workers and patrons. The walls of the building should be provided with network outlets and sockets for plugging in of computer power cables.

2.2.2 Human Services

In MIS, an information system is composed of two major portions: ecosystem and endosystem. According to Korfage & Delutis (2006), an ecosystem includes the people who are involved with the system, availability of information and the equipment and technology available for the system. The endosystem consists of those factors that the designer can specify and control, like equipment, algorithms and procedures used.

There is a great need of people in the use of MIS to operate and organize all management information system resources. These people resources can be categorized into: (i) End users, who happen to be the client of a Management information system i.e. the People who use an information system or need the information. In this category is the managerial staff of the various departments and the directors within the complex. (ii) The Information system specialists: Are those who develop and operate the system, some of which are: systems analysts, system operators and software developers.

2.2.3 Hardware

Agricultural extension organizations require a wide variety of computing equipment, software, and communications capabilities to operate and solve basic managerial problems. The

physical equipment used in computing is called hardware (Rashid, 2011). Sachdeva, (2000) also asserted that all physical components of a computer system compose the computer hardware .Computer hardware consists of all kinds of physical device/ technology used for input, processing, data storage, and output activities in an information system, which basically do not differ from one organization to another. Mainframes, mid-range computers, Personal computers, workstations, and supercomputers are the major hardware used today in various organizations. Magnetic disks, optical discs, scanner, printer, and magnetic tapes are also the main components of computer hardware. The principal input devices are computer mice, keyboard, touch screens, magnetic ink and digital scanners. Satellite televisions, radios, multimedia projectors, digital media such as floppy disc, CD-ROMs and DVDs, digital cameras and camcorders, CD and DVD players also have a significant potential for use in agricultural extension.

2.2.4 Software

These resources help to operate the system and possess all sets of information processing. Computer software consists of all detailed, preprogrammed instructions that control and coordinate the computer hardware components in an information system. Software provides the interface between users and the information system (Kumar, 2004). These include both systems software and application software. System software manages the resources and activities of the computer i.e. it comprises of the operating system, utility programs and special purpose programs. Application software applies the computer to a specific task for an end user such as generating staff list for extension programs within the complex. For users of MIS it is much more important to understand the software than the hardware. Software maintenance can take 50 to 70 percent of all personnel activity in the MIS function. When the organization moves to

implement an advanced information system the hardware and software environment becomes more complex.

2.2.5 Data Management Technology

This can be referred to as a wide range of techniques and database systems used for managing information use and allocating access both within the organization and between entities.Data management software organizes, manages, and processes data concerned with inventory, clients/ farmers etc. Data is unorganized and a raw material in an information system. Data can be taken in any form like numerical, alphabetical or any other form, but the collection of data should be proper and meaningful. When data is stored, organized and presented in a meaningful form then it can be used as information.

DBMS is software that permits an organization to centralize data, manage them efficiently, and provide access to the stored data by application programs (Laudon & Laudon, 2010). It acts as an interface between application programs and the physical data files and also makes the physical database available for different logical views required by users. Different types of database management system exist. Majority of the deployed databases use relational database management systems.

The relational database management system represent data as two- dimensional tables called relations (also known as files). Microsoft Access is a relational DBMS for desktop systems, whereas DB2, Oracle Database, and Microsoft SQL Server are relational DBMS for large mainframes and midrange computers. MySQL is a popular open- source DBMS, and Oracle Database Lite is a DBMS for small handheld computing devices. For data inventories organized on non-relational database management systems or some legacy systems existing,

access solutions can be individually designed on XML basis (extended Markup Language), which became one of the reference solutions in the enterprise data integration. (Basu & Chanchani, 2006). Any of the aforementioned can be used in the Agriculture / Vet complex.

In accordance with the preferred database type: desktop databases deployed mainly on stand-alone workstations or local networks, such as Microsoft Access (Prague et al., 2003) or server databases such as Microsoft SQL Server (Syverson, 2002) or Oracle (Velicanu et al., 2002). Object-oriented DBMS stores the data and procedures that act on those data as objects that can be automatically retrieved and shared (Laudon & Laudon, 2010) . These are becoming popular because they have the ability to manage multimedia components or java and integrate pieces of information from a variety of sources. They are relatively slow for processing of large numbers of transactions when compared with relational DBMS.

2.2.6 Networking System

Network is a system of interconnected computers, telephone, or other communications devices and data. According to Hutchinson & Sawyer (2000), it is the tying together of so many communication and computer hardware devices in so many ways e.g. Printers, clients / server, Close circuit TV camera (CCTV) and Fax machine. This was also asserted by Laudon & Laudon (2010), that it links various pieces of hardware/physical devices and software and transfers data from one physical location to another. Zheng & Ruan (2003) is of the view that, for automated information technology (IT) system to perform properly in MIS, Storage-area networks (SAN) is recommended for such project because SAN is a dedicated, high-performance network used to move data between server and storage resources. It also avoids any traffic conflict between

clients and server. A network links two or more computers to share data or resources, such as a printer.

The world's largest and most widely used network is the internet. The internet is a global 'network of networks' that uses universal standards to connect millions of different networks with more than 1.4 billion users in over 230 countries around the world.This network could be internal and external internet-like networks called intranet and extranet with a security program (firewall). Firewall blocks unauthorized traffic from entering the intranet and can also prevent unauthorized employees from accessing the files (Cisco Hand book 2009)

2.2.7 Telecommunications Technology

Data base management system (DBMS) and telecommunications are the two major building blocks that facilitate the development and use of MIS. DBMS makes data integration possible, while telecommunications brings information as close as possible to the end users. The idea behind telecommunications is that it is able to transmit data electronically, despite geographical distance existing between the computer site and the users' location. This is supported by (kotler & Kotler, 2012) who states that transmission, processing and control of information are the key building blocks of any organization.

A good MIS should be able to electronically communicate data from within and outside any organization, this can be achieved with the computer systems connected to the internet using VSAT, Telephones, Modems, hubs, Reuters fiber optic cables and network cables. This will provide data, voice, and video connectivity for the managerial staff, other staff of the agricultural extension programs and other agricultural institutions within Nigeria.

2.2.8 Computer Networks and Client/Server Computing

There is the need for computers to be linked together. The use of multiple computers linked by a communications network for processing is called distributed processing. Centralized processing, in which all processing is accomplished by one large central computer, is much less common. One widely used form of distributed processing is client/server computing. Client/server computing splits processing between "clients" and serves". The client is the user point of entry for the required function and is normally a desktop or laptop computer. The user generally interacts directly only with the client portion of the application. The server provides the client with services. For instance, at the first level a Web server will serve a Web page to a client in response to a request for service. Web server software is responsible for locating and managing stored Web pages. If the client requests access to a corporate system (a product list /information, for instance), the request is passed along to an application server.

2.3 Sources of Information for MIS for Agricultural Extension Programs.

Agricultural extension department is the most important public service institution with the widest range of responsibilities for agricultural and rural development (Akinbode, 1996).Extension is a service which is entrusted with the responsibility of diffusion of correct and productive information to the farmers. Their aim is to help the farmers in enhancing their productivity and to assist in better farm management so that both the individual and nation can benefit as a whole. Till now, extension programs are dedicated to expanding and enhancing the agricultural sector, has been involved in guiding the farmers, and has acted as a bridge between them and research institutions (Kimaro,). This is done through seminars, personal meetings between the farmers and extension workers, calling and sending messages through mobile phones and distribution of brochures. Information must be timely, organised, useful and in a

simple form if it is to ease decision making. It should also be easily manipulated to satisfy the changing and ad hoc requirements of management for information. In order for these programs to have timely information made available for their use, MIS has to produce this information from various sources and make it available in the right format.

Most of the information sources have information related to agriculture like market information, weather forecasting data, university research, personal research work, Agricultural extension agents, feedback from farmers, program contributions, legislation, economic referential data bases, agricultural news, non-governmental and community based organizations, input supply locations and prices, and the like. Information may come from different sources, but are basically divided into external and internal sources.

2.3.1 External Sources

As the term implies, these are sources of information derived from outside the organization concerned. As stated by Swash (1997), external information sources are often regarded as valuable on a daily basis, and is difficult to manage. This is mainly because analysis and interpretation is necessary to determine the value (relevance and usability) of these information sources. It could be in a formal or an informal source. Some examples of formal are: Agricultural published reports, government statistics, political debates, technical documents and legal documents, e.g. every establishment needs to keep records so that they can collect taxes on behalf of the government. There is a need to obtain regular information about the taxation system (e.g. PAYE, VAT, Corporation Tax) and what action is needed to be taken. Similarly, a business needs to be aware of key legal areas (e.g. environmental legislation; health & safety regulation; employment law). There is a whole publishing industry devoted to selling this kind of formation

to businesses.

Informal sources, such as research Institute publications, conferences and its proceedings, meetings, workshops, training and capacity building services, media and ICT services and all forms of social contacts. Most of the external informal information that an agricultural organization needs can be obtained from marketing research/ trade literature.

2.3.2 Internal Sources

These are sources of information derived from within the organization. Internal sources of information are highly valued and much easier to manage. The focus of its management is on the life cycle of these sources. Internal sources, such as personal observations from immediate environment and neighbours, and personal research work. Generally, science is about observing the immediate environment. It also can be classified into formal and informal sources.

Accounting records are a prime source of internal information (Riley, 2012). They detail the transactions of the organization in the past - which may be used as the basis for planning for the future (e.g. preparing a financial budget or forecast).The accounting records are primarily used to record what happens to the financial resources of an organization. For example, how cash is obtained and spent; what assets are acquired; what profits or losses are made on the activities of the business. However, accounting records can provide much more than financial information. For example, details of new specie of crop or animal breed developed and delivered to end users can provide useful information about whether quality standards are being met. Data analyzed from client sales invoices provides a profile of what and to whom products are being sold. A lot of internal information is connected to accounting systems - but is not directly part of them. for example:

- Records of the people employed by the organization (personal details; what they get paid; skills and experience; training records)
- Data on the costs associated with all organization's processes.
- Data from the production department (e.g. number of machines; capacity; repair record)
- Data from activities in direct contact with the clients and stakeholders.

A lot of internal information is also provided informally. For example, regular meetings of staff and management will result in the communication of relevant information. Other colleagues are also an important source of information about new technologies. Studies on technology adoption in fields other than agriculture show that individuals learn from others within their social network.

2.4 Channels of Information Provision by MIS for Managers.

Effective MIS should ensure the appropriate presentation formats and time frames required by operations and senior management is met. MIS can be developed and maintained by either manual or automated systems or a combination of both. The MIS gathers data and ensures it is duly processed. This data processing consists of identifying each item of data and systematically placing it within a scheme that categorizes data items on the basis of some common characteristic or feature. For example, field training reports will be categorized separately from improved crop technologies, even though it falls under general research and extension. Data not organized into a meaningful pattern and timely provided can serve almost no useful purpose to those who must use them to make decisions.

A computer can help in processing the data effectively. As far back as nineteen years, Rao (1985) suggested the use of computers in agricultural extension in India. He proposed that computer programmes be focused on the different managerial levels. As noted by Asadi, et. al, (2008) that effective deliveries of the institution's products and services are supported by the MIS. With increased globalization, organizations, firms and establishments have teams around the globe in different time zones, working on the same problem, so the need for continuous interaction, communication and information flow round the clock has greatly increased. This involves a much larger group of managers in different zones all over the country.

This is the typical scenario of the Agricultural extension programs in Nigeria with zonal offices in the ecological zones of the Federation. There are some information that need to be shared as soon as possible and decisions taken for appropriate action. Provision of information by MIS can be done by documenting and then retrieving and also through a number of channels, some of which will enhance communication and collaboration which is an essential part of both information systems and agricultural extension.

This documentation involves storing items of information in an orderly manner, through the use of storage media. Storage media are materials such as ordinary office paper, office paper files, metallic file cabinets, magnetic tapes, magnetic disks, microfilms, film strips, and a few other devices. Once the information is recorded on these storage media, the system can generate, on demand, information required for making decisions, solving problems, or performing analyses and computations. Gladner (2007) asserts that hard disk and magnetic tapes are the most reliable storage media. A properly designed storage and retrieval system matches the related variables efficiently and accurately. In some cases, it even suggests alternative courses of action for management to take. This is best done by the use of a database.

2.4.1 Database

The term database is any central controlled collection of organized data that might serve the extension programs within the complex. Data is stored in an organized and structured way to facilitate sharing and improve availability to those who need it (McLeod, 2005). A database on a given subject is a collection of data on that subject, which observes three criteria: comprehensiveness (completeness), non-redundancy, and appropriate structure. Comprehensiveness means that all the data about the subject are actually present in the database. Non-redundancy means that each individual piece of data exists only once in the database. Appropriate structure means that the data are stored in such a way as to minimize the cost of expected processing and storage (Awad & Gotterer, 2002).

The database improves efficiency of processing by providing all required data in a single file rather than separate files. This also improves efficiency of information retrieval. Data as affirmed by Keen & Morton, (2008) are usually generated at the field level through transaction-processing systems, but once the data are captured, any echelon along the organizational hierarchy may use them, provided that information requirements have been well defined, appropriate programmes have been implemented, and a means has been arranged for the sharing of the data. This implies that the same data can be used by different sets of programmes, otherwise known as applications.

The idea of a large corporate database that can be flexibly shared by several applications or model bases has been realized by means of software packages specially devised to perform such tasks. These packages, called database management systems (DBMSs), are available in the market under different trade names such as ORACLE, SYBASE, INGRES, FOXBASE, and DBASE.

2.4.2 Information Communication Technology (ICT)

There is an increased recognition of the vital role that information can play in development and of the potential for the use of new information and communication technologies (ICTs). The rapid spread of information and communication technologies (ICT) in developing countries over the past decade offers a unique opportunity to transfer knowledge via private and public information systems (Aker, 2010).

ICTs have become an important way of handling the complex and rapidly changing information, needed for effective and sufficient management. Moreover, Extension has the mission of distributing tremendous quantities of useful information in dozens of subject matter areas to stake holders and extension workers in every part of the country. Thus, extension ought to adopt an information system that will account for transferring quantities of relevant and timely information between the information sources (mainly research) and each extension office/centers. Where applicable, ICT's provide easily accessible information on warning systems or relief activities. And, most importantly, they generate networking among people and reduce cost of transactions/finding information (Bertolini 2004).

Though recent ICT developments in developing countries including Nigeria, such as the expansion in the use of cell phones, have opened up the possibility for speedier transmission of information. Extension Information Systems (EIS) have been an established part of Extension for many decades, around the world (Richard, 2007). These established systems have traditionally relied on face-to-face contact, printed materials, radio, workshops, and other media. ICTs are a support to such systems, with an electronic network in an organized way to enhance and not to create a new research/extension system or even alter the existing system, but to support its linkages and enhance its work.

Information produced by a Management information system in extension programs can take a variety of forms, including paper reports, visual displays, documents, messages, graphics, posters, video and audio. A MIS can use all these kinds of data/information, but with the right application of tools – software and network configurations. ICTs have many features to support most kinds of communication, which simulate the established processes or sometimes enhance the performance of those processes. Each of the ICT tools has its special features that fit a certain use or specific users. It is also possible to make combinations of suitable tools according to the kind of communication needed.

2.4.3 Internet Services

The internet is based on client/server technology. A client computer connecting to the internet has access to a variety of services. These services include the discussed under listed.

The World Wide Web

The Web is the most popular internet service. It's a system with universally accepted standards for storing, retrieving, formatting, and displaying information using a client/ server architecture. Web pages are formatted using hypertext with embedded links that connect documents to one another and that also link pages to other objects, such as sound, video or animation files. A typical web site is a collection of web pages linked to a home page.

Internet-Based Collaboration Environments

Teams of employees who work together from many different locations around the world need tools to support workgroup collaboration. Chatting enables two or more people who are simultaneously connected to the internet to hold live, interactive conversations. These tools provide storage space for team documents, a space separate from corporate e-mail for team

communications, group calendars, and an audio-visual environment where members can meet face to face in a live video conference. The use of chat software (e- conference) provided by the MIS for the extension managers will reduce travel rates in meeting researchers, and other agricultural organizations.

The use of list servers or Internet forums (threaded discussions/video conferencing) to discuss specialized topics for a longer time instead of conducting a round table that may or may not include the best experts who might only be available for a limited time. Products such as IBM's Lotus and Internet conferencing systems such as WebEx, Microsoft office live meeting, and Adobe Acrobat Connect are especially helpful.

E- mail and Instant Messaging (IM)

E- mail enable messages to be exchanged from computer to computer, with capabilities for routing messages to multiple recipients, forwarding messages, and attaching text documents or multimedia files to messages. As stressed by Alabi (2001) & Richard (2007), that these are being embraced by corporations and organizations as a major collaboration and communication tool supporting interaction and managerial jobs. The use of e-mail to submit reports (including photos) about an infection that has occurred in the area within a few minutes instead of taking several days to produce and deliver a written report.

Instant messaging is a type of chat service that enables participants to create their own private chat channels. The instant messaging system alerts the user whenever someone on his or her private list is online so that the user can initiate a chat session with other individuals. IM systems include Yahoo! Messenger and AOL Instant Messenger.

Newsgroups are worldwide discussion groups posted on internet electronic bulletin boards on which people share information and ideas on a defined topic. Anyone can post messages on these

bulletin boards for others to read.

Social Networking

Social networking sites such as Myspace, Facebook, LinkedIn. com provides networking services to business professionals. They feature tools to help people share ideas and interact. Some have features that enable users to set up profiles, blog, tag documents, and use online forums to communicate with other co- workers about their ideas and interest. These sites provide access to a wide variety of information to agricultural organizations in new formats such as alerts e.g. results from crop and farm models, maps etc. Individuals and agricultural institutes will also generate and contribute data and information through datasets related to production and answers to queries, blogs etc. Social networking tools have become corporate tools for sharing and collaborating among interaction- based jobs in the firm.

2.4.4 Web 2.0

This refers to these second generation interactive internet based services. As enumerated by Laudon & Laudon, (2010), the technologies that distinguish web 2.0 include cloud computing, software mashups, wikis, blogs and RSS.

- Wikis is a type of Web site that makes it easy for users to contribute and edit text content and graphics without any knowledge of Web page development or programming techniques. The Wikipedia is the most well- known wiki in the world. Wikis are ideal tools for storing and sharing organizations or company's knowledge and ideas.
- RSS (Rich Site Summary) is a technology using aggregator software to pull content from websites and feed it automatically to subscriber's computers.
- A blog is a popular term for weblog, designating an informal yet structured Web site where individuals can publish stories, opinions, and links to other web sites of interest.

- Cloud computing is a Web based application that is stored on remote servers and accessed via the 'cloud' of the internet using a standard Web browser.
- Mashups are composite software applications that depend on high- speed networks, universal communication standards, and open-source code.

2.4.4 Cell Phones and Smartphones

These are the new mobile platforms that have emerged for coordinating and running organizations, including cell phones and smartphones such as iphones and Blackberrys. Over the past decade, mobile phone coverage has spread rapidly in Africa (Aker, 2010). It was also deduced from literature that over 12 million BlackBerry subscribers use messaging, phone, and wireless internet connections. Of the 300 million cell phone subscribers in the United States, one- third are business subscribers (Telecommunication Industry Association, 2008). In Nigeria, according to Mavtrevor (2013), the smartphone culture is fast growing; probably the fastest growing in Africa, in a country with over 70 million phone users, the percentage of smartphone users is seriously improving. He further stated that the versatility and functionality of the Android smartphones, particularly the Samsung products, are quite impressive. Cell phones are today a basic part of firm's telecommunications infrastructure, especially for managers who need to do a lot of talking and messaging through SMS and MMS. The data generated by these digital phones may be stored in large corporate systems for later review and use in legal proceedings. It could also be used as a new networked model flow, using a wide variety of media, individually and as a combination (video on cell phone, radio through Internet).

2.5 Types of Reports generated by MIS

Many organizations have separate MIS departments which are involved in maintaining records, performing transactions, report generations and consolidation of the important

information which will be supplied to the various levels of the management. MIS has three basic levels: Operational (i.e. lower level management make decisions affecting day to day operations), Middle management (Middle-level management plan working capital, schedule production, formulate budgets, make short-term forecasts, and make tactical decisions that usually involve time periods of up to two years) and Top management (Top-level management provide direction for the Organization by planning for the next five years and make strategic decisions that involve a great deal of uncertainty)where the information is passed from bottom to top.

According to the International Service for National Agricultural Research (ISNAR, 2004) agricultural research managers are faced with new challenges and demands. They are being asked to make their research more relevant to farmers and consumers, to take on new research priorities, and to be more accountable for their use of resources, that is human, financial, and physical. They must have good information at their fingertips that they can use when making decisions and setting priorities. They must also be able to provide reports showing how scarce resources have been allocated, what research programs they are involved in, and what impact their research outputs have had on producers and consumers. This was also asserted by Harsh (2000) & Extension ARBLN (2012) that both production and financial reports are important to the efficient management of today's extension and farm business. When such information is accurately maintained and categorized, it can be used to produce useful decision-making information.

Generally, information is presented in reports, statistical summaries, and analyses, in the form of text, figures, charts, tables, and graphs. Managers will need information on cash flow projections, staffing, transport, research-extension linkages, staff training activities, and

successes and failures in solving technical problems e.t.c. Feedback is needed from field staff and farmers on farmer problems and on which recommended practices are helpful. Managers need to know something about the amounts, kinds, and combinations of media support (i.e., print, radio, television) that have been used for various efforts. They need to know if external factors have limited the success of particular efforts such as supply of new farm inputs, new breeds of animals, new species of crops, cropping operations, information on fields and sub-fields, fertilizers and pesticides applied, varieties planted and yields achieved, alternative management practices employed in the production of the crop (e.g., comparison of varieties, seeding rates, pest control measures, tillage systems, etc.) and to identify field problems (e.g., soil compaction, drainage problems, etc.). PH, precious crops grown, soil structure, planting date, nutrients applied, variety grown, pesticides used, rainfall, etc.)

Presentation of information should be in a form and format suitable to the needs of extension managers. The presentation of information should be precise, clear, and appealing. Busy managers and decision makers want quick access to needed information for making decisions. Reports should be limited to what the decision maker needs to know.

There are particular reports that are produced using an MIS but vary according to the functional area and individual needs. However, as stated by Lucey (2004) & MIS Complete (series 2), there are certain general types of reports encountered and these include:

2.5.1 Periodic or Scheduled Reports

These are produced for managers on a regular basis in a pre- specified format. Typical examples include weekly, monthly and annual analysis report and financial statements.

2.5.2 Exception Reports

The production of these reports is triggered only in exceptional cases when a specific set of conditions occur. An exception refers to data that are outside of normal ranges. Exception reports aggregate these unusual conditions and present them separately. A timely reporting of exception conditions makes it easier for a manager to isolate cases that require immediate attention. The manager does not have to go through other reports looking for these exception conditions, thereby saving time. For example, an MIS exception report could notify the head of cereals programme when his extension staff is running low of a particular supply of seeds, before the estimated period. Also in situations where the budget has been overshot, the MIS report brings exception to the attention of the manager for prompt action to solve the problem.

2.5.3 On-Demand Report

These are produced whenever required by a manager. On-demand reports provide specific information as and when needed. The content of these reports depend on the circumstances and the requesting manager's requirements. These reports can be in a custom format or in one of the regular summary or trend formats. For example, the head of poultry program in NAPRI, wants to know how their Shika brown specie is doing and whether its products are bringing the expected income for the rural poor in specific geographic areas.

2.5.4 Push reports

These are reports that are sent to managers containing information that is likely to be of value but which may be unknown to the manager. For example, in situations where selective

broadcast reports are sent over their corporate intranet, in this manner, the report is pushed to manager's networked personal computer or smartphone.

2.5.6 Summary Reports

Summary reports aggregate data by accounting periods, geographic regions, business units or product categories. The reports consolidate information in a format that makes it easy for managers to review and analyze. For example, an inventory summary report could include the number of items in stock, recent purchases and total inventory value. Similarly, a research summary report could provide information on monthly, quarterly or yearly research outputs of the extension organization and group the information by program category and geographic regions. MIS applications, including even basic spreadsheet applications, usually allow users to specify different report formats.

2.6 Role of MIS in the management of agricultural extension services

National agricultural extension systems, especially in developing countries, tend to be very large. Extension managers at various levels need relevant information in order to make effective decisions. In the absence of such information, they act only on the basis of their intuition and past experience. Data that have been processed, stored, and presented properly will aid them in analyzing situations and to make effective decisions.

Management information is the information required by managers as they make their decisions, such as the number of extension personnel employed by category, their training requirements, career development plans, job descriptions, budgets, forecasts, benchmark surveys, reports on socioeconomic conditions of people served, and existing facilities (Ramesh & Singh, 1987). As stated by (Ramesh & Singh, 1987), the main purpose of management information

systems is to provide management information to decision makers at various levels in the organization. Specifically, in an agricultural extension organization, MIS is needed:

- To plan the most effective allocation of resources, for example, the allocation of extension personnel under a Training & Visit extension system, the need for communications and training equipment and facilities, mobility, the amounts of required operational resources.
- To choose between alternative courses of action, whether to conduct a study on the impact of the Training & Visit system with the resources on hand or hire an expert to investigate
- To control day-to-day operations, for example, comparing the actual results achieved and those planned under the Training & Visit system.
- To serve as a link between planning and control, and all other necessary departments, thereby enhancing effectiveness. Badragheh,(2010) stated that in most agricultural extension organizations, extension managers have varieties of task to manage, thereby MIS will be useful in, taking care of the needs of the managers in the organization, will assist in different departments like marketing, production, sales, inventory, maintenance etc.
- In situations where Information is available in abundance from various sources (agricultural policy, agricultural researches, farmers, etc). MIS will aid in integrating the information generated by various departments of the extension organizations.
- To also help in establishing mechanism to eliminate redundancies in data. MIS as a system can be broken down into sub system; each sub system may be programmed. This results in easy access of data, accuracy of data and information. It helps in

maintaining the consistency of data. Agricultural extension deals with a lot of information from a whole lot of sources, and the services rendered can be improved by having access to consistent data at all times (because it is stored in a single file), especially when needed remotely.

- To help change the dynamics of running the organizations efficiently (Chaffey 2003). Decentralization is one of the biggest benefits to agricultural extension services in Nigeria. It will allow monitoring of operations at low levels and free up resources for program managers to devote time to strategic activities. Coordination of specialized projects and activities will be much better and decision makers in the organization will be aware of issues and problems in all departments.
- Another benefit of MIS to agricultural extension is that it will minimize information overload, which can be quite common with agricultural research institutes that has functional Outstation and zonal offices across the country.

2. 7 Challenges in the use of MIS for Agricultural extension.

It is necessary that we consider the few problems of MIS, as there is no perfect system. Managements in all forms of organizations are faced with an accelerating rate of change and an ever more complex environment. Agricultural extension organizations have a close link with the use of an MIS. This is due to the fact that the organization obtains information from agricultural research, from agricultural policy decisions and from social and psychological research (Vandenban, 1992). This information is used by the management of the extension organization to instruct the extension agents what should be passed across to farmers, with the expectation that such messages will bring about changes in farm management.

One of the characteristics of an MIS is to possess a structured information flow, just as this should be the case as from the MIS to the management, to the staff and all stake holders then to the end users. In essence, the processing of data into information and communicating the resulting information to the user is the key function of MIS (Fabunmi, 2003). It should, therefore, be noted that MIS exist in organizations in order to help them achieve objectives, to plan and control their processes and operations, to help deal with uncertainty, and to help in adapting to change or, indeed, initiating change. In the absence of all the above, problems are bound to arise in the use of MIS. It is worthy of note that most managers are promoters of these difficulties either through ignorance or demonstration of apathy. Some of the problems are:

- Top management unbelief and lack of in depth understanding of the importance of using MIS in the achievement of goals of the agricultural extension department.
- Dissatisfaction of users of MIS in the agricultural extension department.
- Inadequate attention is paid to new achievement in information technology for the development of MIS in the agricultural extension department.
- Shortage of specialist personnel for the development of MIS particularly meant for the agricultural extension department.
- Negligence in reviewing MIS programs with all managers of extension department, thereby no achievement to harmony and support for performing program.
- Automated MIS have had relatively little success in providing management with the information it needs. With particular reference to agricultural extension services, it was observed by Badragheh (2010) that there existed a MIS in agricultural extension services, that lacked internal communication network management and programming of

extension departments and or organizations. This Lack of internal communication therefore hinders fast and free flow of information across and within necessary links.

- MIS users are most times void of adequate educational knowledge, likewise the management having little or no idea of data and database management in relation to extension work.
- Agricultural extension requires the use of MIS for enhanced decision making, which without its use, retards the process of decision making (Davis, 2008). In other words, the MIS facility being available doesn't guarantee its use by the managers.
- Lack of management involvement with the design of the MIS, poor appreciation by information specialists of management's true information requirements.
- Deducing from literature, most MIS are not designed and operated with due regard to organizational and behavioral principles as well as technical factors (Akewukereke et al, 2010). The management are not being adequately informed and involved to make effective contribution to system design, and in the same vein, information specialists (including systems analysts, accountants and operations researchers) are kept in the dark about managerial functions and thereby, resulting to, ineffective development of an MIS. Therefore, management do not always know what information they need and information professionals often do not know enough about management in order to produce relevant information for the managers they serve.

2.8 Summary of the Review

The review of the domain of Management Information System and its use, emphasizes that Management Information System is a relatively new area of research especially in Agricultural research Institutes in Nigeria. However, the review revealed that although the MIS is used in the

Agricultural Research Extension Institutes, none of them has been able to fully embrace the use of MIS. This research has reviewed series of literature on the use of MIS and other concepts that have functional and direct relationship with MIS.

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CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

In this chapter, the method that was used to conduct the study were discussed under the following sub-headings;

3.1 Research method adopted

3.2 Population of the study

3.3 Sample and sampling procedure

3.4 Instruments for data collection

3.5 Validity of instruments

3.6 Procedure for data collection

3.7 Procedure for data analysis.

3.1 Research Method Adopted for the Study

The study adopted the qualitative methodology approach. Qualitative research is defined as "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss & Corbin, 1990). According to Creswell (2003), qualitative research takes place in the natural setting. He states that the qualitative researcher often goes to the site of the participants to conduct the research. This enables the researcher to be more detailed about the individual or place and be highly involved in the actual experiences of the participants.

According to Denzin and Lincoln (1994), qualitative methodologies include "interviewing; observing; artifacts, documents, and records; visual methods; personal experience

methods; data management methods; computer-assisted analysis; and textual analysis". All of these methods may be useful in gaining an insight into the MIS facilities that are available in the Institutes but not revealed by quantitative methods. The case study methodology which allows the researcher explores in depth the use of these MIS facilities was adopted.

In case study methodology, the legitimacy of the study does not spring from numbers, either of the organizations to be studied or people will provide response to the data collection instruments to be used. Osuala (2005) asserts that case study involves the observation of individual unit eg a family group, a school or a delinquent group, but the data collection is very extensive in order to produce understanding of the entity being studied.

3.2 Population of the study

The population of the study consists of the staff of the National Agricultural Extension Research& Liaison Services, and National Animal Production Research Institute. The target population of the study population size, which is 24 in number, cuts across the senior management, heads of research programs, and staff of the MIS/IT Unit.

Table 3.2.1 Target Population of the staff of Agricultural Extension Programmes of ABU Zaria

S/No	Institution	Category	Sample size
1	NAERLS	Deputy Director (Research) Heads of research programs MIS/ IT Staff	1 9 2
2	NAPRI	Deputy Director (Research) Heads of research programs MIS/ IT Staff	1 9 2
	Total		**24**

Source: Secretariats of NAERLS & NAPRI

3.3 Sample and Sampling Technique

The Sampling method that was used is the judgmental or purposive sampling. Thomas (2007) in Sage Dictionary, refers to purposive sampling as a form of non-probability sampling in which decisions concerning the individuals to be included in the sample are taken by the researcher, based upon a variety of criteria which may include specialist knowledge of the research issue, or capacity and willingness to participate in the research. Some types of research design necessitate researchers taking a decision about the individual participants who would be most likely to contribute appropriate data, both in terms of relevance and depth.

The research programs involved with extension and the information systems units are selected for the purpose of this study. This is supported by Patton (1990) who posits that subjects are selected because of some certain characteristics. The sample, otherwise called the subset of the population for this study is made up of the Deputy Directors -Research (Top managers), heads of research programs (middle managers), and a homogenous sampling of 2 MIS/IT staff each. (Operational managers)

The sample size better informed the researcher of the current focus of the investigation (Krathwohl, 1988). The justification for choosing the three institutions is that they run research programs that are focused on extension services. The exclusion of users of the selected institutions was because they have little or no role to play in management information of these research programs. The purpose for judgmental / purposive sampling is that it allows the researcher choose the sample based on who is thought would be appropriate for the study. This is used primarily when there are a limited number of people that have expertise in the area being researched.

3.4 Research Instruments

The instruments used to collect data for this study were direct observations, focus groups and interview guides. One of the research instruments used to collect the needed data were interview guides, which were in two sets. One of which was designed for the MIS staff while the second was designed for the management staff. These guides covered all the research questions which sought to find out the use of MIS for in Agricultural Extension Programmes of ABU, Zaria. The interview involved the researcher personally interviewing staff of the MIS unit, heads of programs and management staff, based on a semi-structured set of questions that have been prepared before the interview. This enabled the researcher to explain or elaborate on any question that was not well understood by the respondents.

3.4.1 Interviews

A focus group interview similar to a survey was used to collect information. Bryman & Bell (2007) opines that when conducting a multiple-case study research, there was a need for some structure in order to ensure cross-case comparability. The interview was used to find out if these institutes have a MIS in place, the MIS facilities used, channels of information provision, types of reports generated and the challenges experienced in the use of the MIS. The interview was used to further clarify and probe any additional and relevant information. It is also to offer deeper explanation on the questions contained in the interview guide in order to achieve desired results.

3.4.2 Observation

Observations were used to obtain primary and better information about the available infrastructure used for communicating their information by the MIS. Observation involves the use of the eyes rather than the ear and the voice. Direct observation of facilities available for MIS, such as computer hardware and software available were conducted to provide additional information that was needed for the research. This served as a good support and authentication to the information gathered during the interview.

3.4.3 Focus groups

Focus groups were originally called "focused interviews" or "group depth interviews". The technique was developed after World War II to evaluate audience response to radio programs (Stewart & Shamdasani, 1990). A focus group is a group of interacting individuals having some common interest or characteristics, brought together by a moderator, who uses the group and its interaction as a way to gain information about a specific or focused issue.

The researcher systematically questioned the heads of programmes as a focus group. The interview adopted a semi-structured questioning technique in order to elicit information on the use of MIS and the roles in enhancing their activities. The focus group interview was used to build on data collected from individual interviews by verifying and elaborating on information supplied by the informants individually.

3.5 Procedure for Data Collection

Before the personal visit to each of the Institutes site selected for this study, a letter of introduction was collected from the Department, Introducing the researcher as an MSc student

conducting research on the use of MIS for enhanced activities in the Agricultural extension programmes of Ahmadu Belo University, Zaria. The letter was passed to the Institute Secretary of each of the study areas to give approval for the researcher to collect data. The researcher also sought for appointments with the Assistant Directors and heads of programmes. After the focus group interview, the researcher was allowed to observe some of the MIS facilities available at both the National Agricultural Extension Research Liaison services and National Animal Production Research Institute.

Each participant in the focus group was given a copy of the questionnaire and each question was jointly discussed and the right response was agreed and indicated on the questionnaire.

3.6 Validity

In order to establish the validity of the instrument, copies were made available to the research supervisors, staff, research experts in the field of information science and colleagues in the Department of Library and Information Science, Faculty of Education, Ahmadu Bello University, Zaria. They critically examined the instrument with regard to its fitness for the purpose of this research. The opinion, criticisms and recommendations of these experts was incorporated into the construction of the final copy of the instrument.

3.7 Pilot Study

A pilot study was conducted at the outset of the research for the purpose of testing the method of data collection and also to pre-test the questionnaire and Interview schedule. This was done at the National Veterinary Research Institute (NVRI), Vom, Plateau state. It was hoped that any difficulties inherent in the administration of these instruments would be revealed during the conduct of the pilot study leading to the acceptance of the research method, revision of the

instruments, or adoption of another research method. The procedure for the pilot study entailed administering questionnaires to a focus group and physically inspecting the facilities available in the Institute.

The completed questionnaires from the focus group were carefully examined to determine if any changes or additions were necessary and if any difficulties were encountered. The NVRI had some facilities like the computer system, printer, scanner, projector and the satellite. The Institute is yet to fully embrace the use of MIS for decision making.

Although no formal statistical test was conducted owing to the small size nature of the sample, some difficulties were noted in the questionnaires. Because of the basis of the pre-test, it was discovered that the use of simple construction of grammatical expression will be more appropriate.

3.8 Procedure for Data Analysis

The data that was collected from the research instruments was organized for descriptive analysis and transcribed into different types, depending on the source of information. The data was then tabulated, analyzed and discussed descriptively.

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CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of the data generated using tables and figures. Findings were discussed based on the responses collected during the focus group interviews.

4.2 Response Rate

Out of the 24 sampled staff members in the MIS/IT unit, heads of research programs and one top management staff from each of the two Institutions, (23:95.83%) participated in the semi-structured interview. After several visits, the researcher found out that one of the respondents in NAPRI was undergoing a course as at the time of data collection for this study. Table 4.1 shows the response rate.

TABLE 4.1: RESPONSE RATE

S/NO	Institutes	Category of Staff	Sample size	Response rate
1	NAERLS	Asst. Director Heads of Progs MIS/IT staff	1 9 2	1 9 2
2	NAPRI	Asst. Director Heads of Progs MIS/IT staff	1 9 2	1 9 1
Total			24	23

This high response rate was achieved because of the population being small. The researcher had to formally seek for permission from the Institute Secretary at the various Institutes and also had to establish good rapport with the respondents.

Table 4.1.1 Summary of response rate by institution in Percentage

Name of Institution	Response Rate in %
NAERLS	50.0
NAPRI	45.83

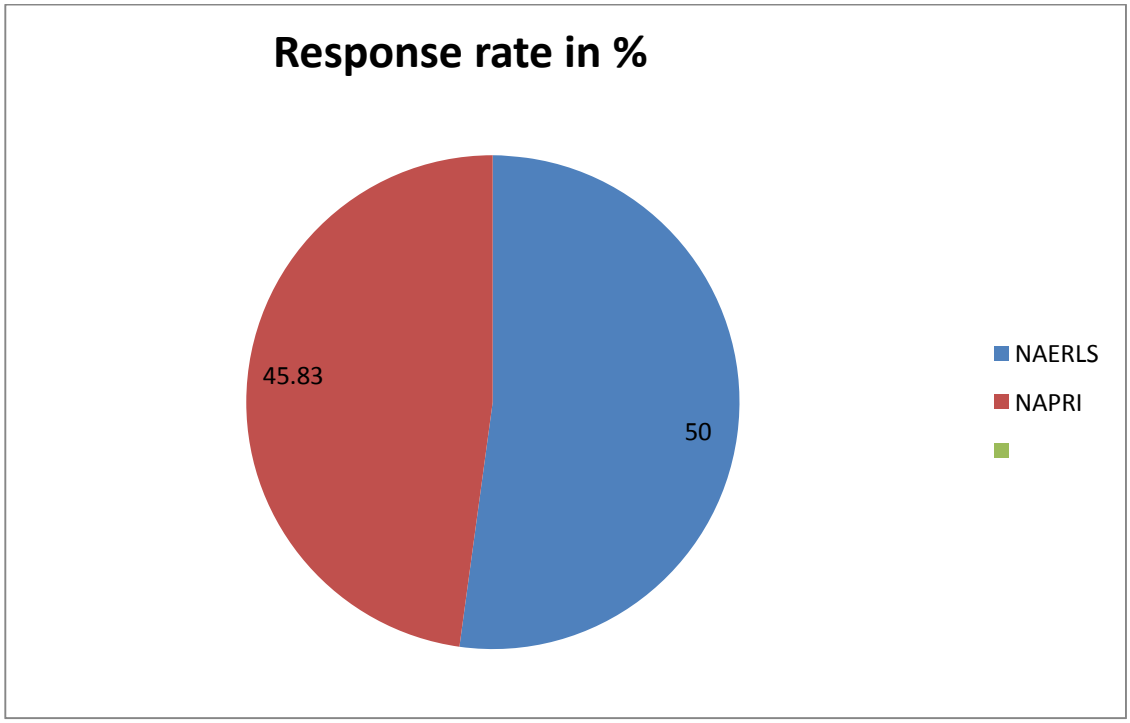


Figure 4.2: Summary of response rate in percentage

4.2 Data Analysis

This section analyzed the data collected with regards to the research questions raised in the study which are analyzed and discussed below.

4.2.1 Descriptive Analysis

This involved a descriptive analysis of the focus group interview. The answers to the research questions for the study are evident in this analysis. The findings under descriptive analysis are as follows:

4.2.2 MIS facilities available for Agricultural Extension programmes

To identify the MIS facilities available in the agricultural extension programmes, the respondents were asked questions on a list of facilities, while the researcher ticked the answers appropriately. Table 4.2 shows the various facilities available.

Table 4. 2 MIS facilities available for Agricultural Extension programs in ABU Zaria

S/N	**facilities**	**NAERLS**	**NAPRI**
1	Computers	✓	✓
2	Server	✓	✓
3	Communication satellite	✓	✓
4	Telex	x	X
5	Telephone	x	✓
6	Fax	x	X
7	Files	x	✓
8	Scanner	✓	✓
9	Printer	✓	✓
10	Internet Service (www)	✓	✓
11	LAN	✓	✓
12	Intranet	x	X
13	Digital cameras	✓	✓
14	Multimedia(power point projector	✓	✓
15	Inverter	✓	✓
16	Generator	✓	✓
17	Customized MIS structure/ building	x	X
18	Interactive Website	x	X
19	Integrated database	x	X
	Others (specify)		

✓ **= Available** **x = Not Available**

The finding revealed that the Institutes under study have one facility or the other; NAERLS and NAPRI have more than half the number of facilities identified. However, computers, scanner, printer, digital cameras, generator, multimedia projector and internet service are found to be the most available facilities. The researcher noted that none of the selected Institutes had telex, fax, intranet, interactive website, integrated database or a customized building for its MIS. This is in contrast to Akintunde (2006), Lucy (2005) and Elliot's (2010) research findings which assert that these facilities are needed for optimum and current services, integration of information, collaboration and effective interaction. This was strongly indicated by ISNAR (2004) that for sustainable development of the agricultural sector, there is the need for integration of all available information into a

comprehensive up-to-date and easily accessible information system to aid informed decision making. The two Institutes have a web page where information is uploaded from time to time by the MIS staff. This information is usually gotten from the research bulletins of the Institutes. This clearly shows that these institutions' do not make use of the major facilities that will serve as a linkage between them and the stakeholders to facilitate trans-border data flow. All these facilities like the, intranet, interactive website, and an integrated database will work hand in hand to ensure that up to date information is made available remotely to relevant stakeholders.

Table 4.2.1 Purpose for MIS facilities used in the Agricultural Extension Programmes in ABU, Zaria

S/No	Purpose	NAERLS	NAPRI
1	Report generation	✓	✓
2	Research work	✓	✓
3	Training purpose	✓	✓
4	Statistics generation	✓	✓
5	Situation Analysis	✓	X
6	Record keeping	x	✓
7	Regular Program document review	x	X
8	Surveys	✓	X
9	Budget Analysis	x	X

✓ = Available x = Not Available

The researcher gathered that the MIS facilities were to be used for purposes such as regular record keeping, research and report generation. The researcher tried to identify the purpose for which these facilities are used in order to achieve their mandates. Table 4.2.3 shows that the main purpose for which these facilities were put to use, was for statistics generation, report generation, research work and training. Although it was established during the interview that reports generated, were not a collation by MIS from all the programs, but the different programs

generate reports individually and passed on to the Deputy Director. The Deputy Director now has to go through all the reports from different Extension programs before he can arrive at a valid conclusion. This does not corroborate with Lucy's (2005) work which states that it is the MIS that possesses the ability to communicate information in an appropriate format (in form of reports) to all levels of management. This implies that, the primary output (reports) which is meant to be produced by an MIS is not being achieved in these Institutions under study. The researcher also noted that none of the Research Institutes used these facilities for the purpose of regular program document review and budget analysis. It was revealed during the interview and also noted by the researcher that the selected Institutes each has a data processing unit, while the NAERLS has a Web/ICT unit to her credit. The Institutes all process data from field work, into meaningful results but not for decision making purposes affecting the Institute. The data processing units are involved in biometrics, statistical analysis, design of research instrument and data banking (data storage). This was also evident form table 4.2.1 that statistical analysis is the basics of the data processing unit. This is solely because extension work has so much do with data collection from the various fields of agriculture. Furthermore, there is no integrated database and the software's available- AVG, SaaS, SPSS are not affordable, so the pirated ones are mostly purchased. NAPRI has been connected to the internet (from Israel) as far back as 2006, before ABU hotspot came on board, but it became too expensive for the Institute to continue with the subscription payment (costing about N600, 000 per quarter), while NAERLS had also been connected to the internet (from Abuja and Kenya) long before ABU Hotspot, and still maintains it as a fallback in cases when there is failure from the hotspot.

Staff and Staffing of MIS/IT Unit

The MIS facilities include people services as essential factor to its functionality. This was enumerated in the MIS handbook (2007) that people services are as important as other MIS facilities. The NAERLS has between 5-10 and NAPRI has between 1-5. NAPRI respondents indicated that the number of staff they currently assigned to the IT unit was insufficient but competent. NAERLS respondents indicated that the IT staff was very competent and sufficient in number. The staff of these units have their areas of specialization as indicated in table 4.2.3

Table 4.2.3 Areas of Specialization of MIS/IT Staff

Area of Specialization	NAERLS	NAPRI	Total
Computer Science	✓	✓	2
Electrical Engineering	x	X	0
Computer Engineering	x	X	0
Agriculture + Computer Science	x	✓	1
Agricultural Engineering + Computer Science	✓	X	1

✓ = Available x = Not Available

The NAERLS IT unit has specialists in Computer science, and also in Agricultural Engineering with a combination of Computer Science while that of NAPRI has in computers science and also in Agriculture with a combination of Computer Science. None of the Institutes has a staff with a specialization in computer engineering; this definitely needs a reconsideration of employing a staff with a good qualification in computer engineering to effectively handle the MIS unit. It was discovered during the interview that the heads of the web/IT unit had their major degrees in Agriculture/ Agricultural engineering and thereafter had to go for some certifications in computer and its related fields. This has an advantage over computer engineering when it comes to understanding the fundamentals of Agricultural management.

Training for MIS

The key element for MIS activities and in the operation of its facilities, lies in the people who have the technical know-how to maintain the equipment and facilitate the decision making process by the provision of timely reports. It was revealed during the interview that NAERLS staff were granted opportunities to undergo trainings related to MIS / Information management. The head of the IT unit in NAPRI indicated having undergone training in network security in addition to his PhD certificate. These opportunities equipped them better, but indicated that they still needed more training because technology advances by the day.

4.3 Information Sources for MIS

Information may come from different sources, but are basically divided into external and internal sources. As the term implies, external sources of information are derived from outside the organization concerned while internal sources are derived from within the organization and from personal researches. The sources of information for the MIS are stated in Table 4.3

Table 4.3 Information sources for MIS

S/N	Sources of information	NAERLS	NAPRI
1.	Workshop/Seminar/Conference	✓	✓
2	Extension agents	✓	x
3	Contact Farmers	✓	x
4	Colleagues	x	x
5	Personal experience	x	✓
6	Observations from neighborhood	x	x
7	Radio	✓	✓
8	Television	✓	✓
9	Existing literature	✓	✓
10	Other research institutes/ university	✓	x
11	Agricultural news	x	x
12	Internet	✓	✓
13	Other Agric. Extension Institutions	x	x
14	Policy makers/ policy decisions	✓	x
15	Marketers of Agricultural inputs	✓	x
17	Research findings	✓	✓
18	Non-governmental Organizations	✓	x
19	Government Statistics	x	x
20	Account records	x	x
21	Reports from Regular meetings	x	x
22	Social contacts	x	x
23	External Agricultural reports/ newsletters	✓	x
24	Legal documents	x	x
25	Data from Institute's extension programs	x	x

✓ = Available x = Not Available

The responses show that the most useful sources of information are the research findings (from individual researchers) and the internet. This implies that the staff of these Institutes are involved in a lot of research, whether for personal research or in regards to the mandate at hand. However, it was noted during the interview that the MIS staff don't have access to data from the various extension research programmes within the various Institutes under study, which is an internal source of information meant to be the most important to be processed into meaningful reports for the management. This is in contrast to an FAO document (1999) which stated that internal sources of information are highly valued and much easier to manage. The researcher also

noticed that the other important sources of information include workshops, contact farmers, radio, television, existing literature, NGOs, policy makers, newsletters, Agricultural marketer's and other research Institutes.

In response to a follow up question, it was discovered that these sources of information were relevant on regular basis but difficult to manage, analyze and interpret. This implies that these sources of information used, will be difficult to manage and process. This is in line with Swash's (1997) work which stated that external information sources are often regarded as valuable on a daily basis, but difficult to manage. This is mainly because analysis and interpretation is necessary to determine the value (relevance and usability) of these information sources. The implication of this is that if the bulk of the information is sourced externally, it will always be difficult for the MIS to process and thereby leading to a delay in report delivery and devalued information.

4.4 Channels of Information Provision

For information to be usable by a manager, it must be transmitted by a means or a channel. These channels ensure that information is sent to the managers for useful decision making and priority setting. Some of these channels include telephone, emails and prints. Table 4.4 shows the breakdown of the response.

Table 4.4 Channels of Information Provision

	NAERLS					NAPRI				
Channels of information provision	**AU**	**FU**	**RU**	**NU**	**NC**	**AU**	**FU**	**RU**	**NU**	**NC**
E- mails	✓	x	x	x	x	✓	x	x	X	x
Chat	x	✓	x	x	x	✓	x	x	X	x
Instant messaging	x	x	✓	x	x	x	x	✓	X	x
Video/ Tele conferencing	x	x	✓	x	x	x	x	✓	X	x
Mobile Phones(via bluetooth/ bulk sms)	✓	x	x	x	x	✓	x	x	X	x
Office Paper	✓	x	x	x	x	✓	x	x	X	x
Office files	✓	x	x	x	x	✓	x	x	X	x
Printed reports	✓	x	x	x	x	✓	x	x	X	x
Database files	x	x	x	x	x		x	✓	X	x
Social media eg facebook, twitter	x	x	x	x	x	x	x	✓	X	x
Wikis	x	x	x	x	x	x	x	✓	X	x
RSS feeds	x	x	x	x	x	x	x	✓	X	x
Web 2.0	x		x	x	x	x	x	✓	X	x
Cell phones/ smart phones	x	x	✓	x	x	✓	x	x	X	x
Networked Computers	x	x	✓	x	x	x	x	✓	X	x
Others specify	x	x	x	x	x	x	x	x	X	x
	x	x	x	x	x	x	x	x	X	x

✓ = Available x = Not Available Key AU=Always used, FU=frequently used, RU= Rarely used, NU=Never used, NC= No comment

From table 4.4, it is observed that NAERLS and NAPRI frequently make use of E – mails, phones, prints and paper files. This corroborates what was stressed by Alabi (2001) & Richard (2007), that the use of E-mails are being embraced by corporations and organizations as a major collaboration and communication tool supporting interaction and managerial jobs. The typical output of a formal information system is a printed report or tabulation. These have their uses, but there is research evidence that managers, especially at senior levels, obtain most of their

information aurally (Lucy, 2005). This was clarified during the interview that most of the managers preferred to be given a quick call, sms or sent an email rather than waiting for piles of printed report. Other channels like the wiki, web 2.0, RSS feeds, Instant messaging, chats and social media were indicated to be rarely used. The implication of this is that on-line collaboration, threaded discussions and interactive team work cannot be achieved regularly. This is in contrast to Laudon & Laudon (2010) who stated that particularly Chats/discussion forums, enables two or more people who are simultaneously connected to the internet to hold live, interactive conversations. These tools provide storage space for team documents, a space separate from corporate e-mail for team communications, group calendars, and an audio-visual environment where members can meet face to face in a live video conference. Another very important channel is through networked computers by the reason of intranet put in place. None of the Institutes make use of it. There is some private information that will be needed to go to a particular manager's computer. This cannot be achieved without the use of the intranet.

4.5 Types of reports

MIS is an information system that generates accurate, timely and organized information for managers so as to make timely decisions, solve problems, supervise activities and track progress. This peculiar function of generating regular reports gave it a basis for some scholars to refer to it as a management reporting system (MRS). The types of reports produced through an MIS are commonly by-products of extensive and detailed databases (www.basicofcomputer.com). Table 4.5 shows the types of reports generated in these Institutions under study.

4.5 Types of reports

S/No	Types of Report	NAERLS	NAPRI
1	On- demand	✓	✓
2	Scheduled	✓	✓
3	Summary	X	x
4	Exception	X	x
5	Push	✓	x

✓ = Available x = Not Available

Table 4.5 shows that the types of reports produced in these three Institutions is the on-demand, summary and scheduled. This implies that reports are only sent in when it is either demanded for by the managers, or till when the periodic/scheduled time of report submission comes by. This means except for NAERLS MIS staff that prepares push reports whenever the occasion demands it, the other Institution waits for the reports to be submitted at the stipulated time i.e quarterly and annually. It was gathered during the interview that the MIS staff do not prepare reports for the heads of programmes, but only for the Directors as occasion demands it. The secretaries prepare the reports and channel it to the heads of programmes either through paper files, electronically (e-mail) or copied on a CD- ROM. It was observed by the researcher that none of the respondents indicated preparing an exception report. This is in contrast to O'Brien (2004) who stated that exception reports bring exceptions to the manager's/planner's attention in an easily identifiable form. This helps save time from searching through a detailed report. The time saved thereby enhances an increase in their level of focus on situations that require immediate decisions or actions. This implies that the managers receive reports that will require so much of their time so as to go through all the details, tables, graphs because it is not filtered out like that of the exception report. The different types of reports all have their various functioning

capacities but a manager is always so busy and basically requires what could be looked at a glance and understood almost immediately.

4.6 MIS Contribution to enhancement of Activities in the Agricultural Extension Programs

The introduction and use of MIS is expected to have the potential to facilitate and promote research, planning, monitoring, evaluation and accountability. The activities of these Institutes include executing and focusing extension activities/ research through the available programmes and ensuring that they supervise and collaborate effectively with Federal Ministry of Agriculture and all National Agricultural Research Institutes in Nigeria. The role the MIS has played in the Institutions under study is presented in Table 4.6.

Table 4.6 Roles of MIS in Enhancing Activities in the Agricultural Extension programs in ABU, Zaria

S/NO		NAERLS	NAPRI
1	Enhancement in choosing between allocation of resources	**x**	**x**
2	Improved choosing alternate course of action	**x**	**x**
3	Improved the day- day control and planning of operations	**x**	**x**
4	Increased your access to information(online or otherwise)	✓	✓
5	Integration of information made possible across various extension programs.	**x**	**x**
6	Generation of information and dissemination has improved	✓	✓
7	Improved communication networking between colleagues and other institutions	✓	✓
8	Minimized information overload	**x**	**x**
9	Free flow of Information within and across Institutes	**x**	**x**
10	Speed and accuracy of performance is enhanced	✓	✓
11	Provision of timely information has been achieved	**x**	**x**
12	Decision making is made easy	**x**	**x**
13	Availability of consistent data	✓	✓

✓ = Available x = Not Available

The respondents indicated that their response was from two points of view. i) That some of the facilities were used by themselves when occasion demands.eg computer systems, internet facilities and printers ii) And also used by the IT staff to serve them as managers. The very

significant contributions were indicated to include the following: Increased access to information, improved generation of information and dissemination, improved communication networking between colleagues and other Institutions and availability of consistent data. It was discovered in the course of the research that it was very difficult for the respondents to choose other alternatives indicated as contributions of the MIS in the questionnaire. This is because the MIS facilities such as the RSS feeds, extranet and the integrated database were either not available or not used by the MIS staff to pull relevant information together and forwarded to assist the managers for decision making. This does not corroborate with the work of Mejabi (2010) which asserts that MIS should be put in place to enable relevant data and information to be pulled from various units within an institution and then presented to management to take informed decisions when the need arises.

4.7 Challenges in the Use of MIS

The success of any MIS is dependent on its full implementation. A number of challenges were faced by the Information technology staff in the course of trying to implement and in the use of its facilities as reported in Table 4.7.

Table4. 7: Challenges in the Use of MIS

	Challenges in the Use of MIS	NAERLS	NAPRI
1	The Principles of the organization don't tally with the MIS.	**x**	**x**
2	Top Management not involved with the design of the MIS.	✓	**x**
3	Inadequate IT or database knowledge by management in relation to extension work.	✓	✓
4	IT Specialists not adequately informed about managerial functions.	✓	✓
5	Poor Internal communication network between the management and other sections directly handling information.	✓	✓
6	Inadequate database knowledge in relation to extension work.	✓	**x**
7	Inadequate Infrastructure.	✓	✓
8	Lack/ Shortage of specialist's personnel for development program for MIS.	✓	✓
9	Lack of adequate understanding of the role and possible contributions of an automated MIS.	**x**	✓
10	No guarantee of the use of an automated MIS.	**x**	✓
11	Inadequate resource allocation for maintaining communication networks.	✓	✓
12	Use of complex software.	**x**	**X**
13	Lack of trainings/ organizational learning's on the use of MIS.	**x**	✓
14	Poor power supply.	✓	✓
15	Difficulty with preserving digital materials.	**x**	**X**
16	Dissatisfaction of users of MIS development in Agricultural extension	**x**	**X**
17	Inadequate attention paid to new IT achievement for MIS development in Agricultural extension.	**x**	**X**
18	Negligence in reviewing MIS program with all managers of the Agricultural extension programs	✓	**X**
	Specify others		

✓ **= Available** **x = Not Available**

Table 4.7 reveals that the NAERLS was faced with so many challenges in the implementation and use of MIS and its facilities. The most evident challenges include power supply, lack/ shortage of specialist's personnel for development program for MIS, Inadequate resource allocation for maintaining communication networks, Poor Internal communication network between the management & other sections directly handling information and inadequate infrastructure. It is also evident from table 4.7 and was also

clarified during the interview that all other challenges are tied around the fact that management does not give its full support for one reason or the other in terms of MIS. This is in line with the findings of ISNAR (2007) that MIS adoption and implementation has been limited and has not had the full support of Agricultural Institution management and staff. It was further stated that even straight forward accounting systems need major improvements in many National Agricultural Research Institutions (NARI's).

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CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summaries of the study and findings from which the recommendations were made.

5.2 Summary of the Study

The purpose of the study was to assess the use of MIS in Agricultural Extension Programs of the Ahmadu Bello University, Zaria. These Agricultural Extension Programs are in the NAERLS, NAPRI. The study tried to find out the MIS facilities that are available and used the sources of information for the MIS, how information is channeled to the managers and the types of reports generated. In addition, the contributions of MIS were also examined and the problems encountered in the use of MIS.

In order to achieve the objectives of the study, six research questions were formulated. This study adopted the case study and qualitative methodology approaches. The population of the study was made up of the staff of Agricultural Research Institutes in Ahmadu Bello University, Zaria. The subjects of the study were the staff of the IT unit, heads of research/ extension programmes and the senior management staff. Purposive sampling method was used to draw a sample of the two Agricultural Research Institutes that have a functional IT/MIS unit and with specific mandate by law to conduct research in agricultural extension methodologies, with extension research and teaching responsibilities as Institutions that are part of the University system.

The instruments used to collect the needed data was the interview guide. A set of two separate semi- structured interview guide was designed and administered to a focus

group of two staff of the IT unit and 9 heads of programmes respectively. The interview guide covered all the research questions which sought to find out the use of MIS for enhanced activities in the selected Institutions. This was administered to the heads of programmes was used during the interview sessions with the senior administrative staff of the Agricultural research Institutes. The interview sessions elicited responses from senior administrative staff to clear some gray areas from the top management.

5.3 Summary of Major Findings

The summary of the findings include the following:

1. The study discovered that the most available out of the MIS facilities for the activities in the two Institutions were the computer, scanner, printer, digital cameras, generator, projector and internet service. These facilities were used more for statistics generation, report, research and training and not for decision making. Even though the Institutions are connected to the internet, they do not have facilities like the intranet and extranet that will serve as a linkage between the MIS, management staff and the other Research Institutes to facilitate trans-border data flow.
2. The sources of information for the MIS staff were more of external than internal sources. There was no information passed from the Agricultural Extension programmes to MIS, which is a crucial internal source of information. Research findings from individual researchers and the internet were the internal sources of information for the MIS staff.
3. The study revealed that the channel of information provision used includes the E-mail, phones, prints and paper files. There existed no intranet, extranet, integrated

database, interactive website or a specific discussion forum for the Agricultural Extension programme heads.

4. The type of reports generated include the on-demand, summary and the scheduled/periodic (i.e. Annual and quarterly reports). No exception report was generated.
5. The contributions were indicated to include the following: Increased access to information, improved generation of information and dissemination, improved communication networking between colleagues and other Institutions and availability of consistent data. All these contributions have little or no relation with decision making.
6. The challenges include power supply, lack/ shortage of specialist's personnel for development program for MIS and inadequate infrastructure. All other challenges are tied around the fact that management does not give its full support for one reason or the other in terms of MIS

5.4 Conclusion

Arising from the findings of the study, it could be concluded that the Use of MIS in these Agricultural Research Institutions is very low and the facilities are not fully used for enhancing decision making, being the essence of an MIS. Therefore there is the need for an integrated MIS to be implemented and adopted, that will address the lapses identified in the findings of this study. There is a need for a carefully planned and organized information system that will channel timely information to these managers, hence effective decision making to promote Agriculture, National growth and Development.

5.5 Recommendations

Based on the findings of this study and the conclusion reached, the following recommendations are made.

1. A separate structure for MIS should be provided with expanded facilities to include: The Intranet, extranet and an integrated database alongside competent staff to operate and maintain these facilitates.

2. The major source of information for the MIS should be the data from the Agricultural Extension/ research Programmes which are the basic internal sources, while all other sources will serve as a supportive source.

3. The channeling of information by MIS to the managers should be majorly through the intranet, extranet and database files for as long as the managers are within the premises of the Institutions. This will block out all unauthorized traffic and users. The other channels come in handy when urgent information needs to be passed across outside the Institution premises. Collaborative and interactive team work should be encouraged by creating/developing interactive websites, blogs discussion forums and chats.

4. The exception and push reports should be considered as the major type of report generated by the MIS staff for the managers. While the on- demand, summary and schedule come in as required.

5. The MIS unit put in place should be to provide information strictly for all levels of management, for effective decision making. This MIS unit should work hand in hand with the planning, monitoring and evaluation unit, since their duty is to monitor the research programmes. The Institutes should have separate MIS units. The MIS unit in

IAR and NAPRI should report to the MIS in NAERLS as occasion demands, being the foremost Research Institute with the National mandate.

6. The Management should ensure that full support is given to the adoption, implementation and the entire staff of MIS by incorporating one or two MIS staff into the managerial board and reviewing the annual budget allocation given to the MIS for adequate running and maintenance.

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
AHMADU BELLO UNIVERSITY, ZARIA.

ce Chancellor: **Prof. Abdullahi Mustapha**, B.Sc (Hons) Pharm (ABU), Ph.D (London), FPSN
ead of Department: *Abdullahi Ibrahim Musa, Ph.D (Emporia, USA), MBA, MLS, PGDPA, PGDM, BA (LS)*

Ref: MSC/EDUC./09619/2010-2011 Your Ref: Date: 20th March, 2014

TO WHOM IT MAY CONCERN

I write to introduce the bear of this letter **ADEDOKUN, OLUBUKOLA ADERONKE** a postgraduate student of the Department of Library and Information Science, Faculty of Education, Ahmadu Bello University, Zaria, with registration No. **MSC/EDUC./09619/2010-2011**. She is administering her questionnaires for her project.

Kindly assist her.

Thank you.

Yours Faithfully,

Mrs. A. O. Kalunta-Eke(JP)

For: Head of Department.

Department of Library and Information Science,

Faculty of Education,

Ahmadu Bello University Zaria,

March, 2014.

Dear Respondent,

I am an Msc student of the above mentioned department. I am conducting a study on the 'Use of MIS in Agricultural Extension Programmes of ABU Zaria. Your kind response(s) to the questions in the attached interview guide will provide data for this study.

All responses will be treated with all confidentiality. Thank you for the anticipated cooperation.

Yours Sincerely

Adedokun, Aderonke. O

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APPENDIX I

Department of Library and Information Science,

Ahmadu Bello University, Zaria.

INTERVIEW GUIDE ON THE USE OF MANAGEMENT INFORMATION SYSTEM IN AGRICULTURAL EXTENSION PROGRAMS IN AGRIC/VET COMPLEX OF ABU ZARIA.

(MIS/IT PROFESSIONALS)

Please tick ( ) as appropriate

SECTION A

Staff IT/MIS Knowledge/Training

1. Name of Institution a) NAERLS b) IAR c) NAPRI
2. Educational qualification please tick the highest qualification) i) OND/HND ( ) ii) Bsc ( ) iii) Msc ( ) iv) PhD ( ) v) others specify

3. Which of the following field(s) do the MIS/ IT staff have their degrees in?
   a. Information Technology [ ]
   b. Computer Science [ ]
   c. Electrical Engineering [ ]
   d. Computer Engineering [ ]
   e.Others, please specify……..

   ……
   …….
4. Have you received any special training on MIS or a MIS related training?
   a. Yes [ ]
   b. No [ ]
5. If yes, pls indicate below the trainings you have had in relation to MIS since the last 5yrs
   ……..
   ……
   ……
   …….

6. If No, which of the following best explains why you have not attended any specialized training in digital preservation a. Lack of funds [ ]
   b. Lack of availability of such training in Nigeria [ ]
   c. Lack of awareness of the a place for training [ ]
   d. Lack of support from management [ ]
   e. Lack of Interest to attend such training/workshop [ ]
   f. Others, please specify.....

   .....
7. Managerial Knowledge: i) High ( ) ii) Partly High ( ) ii) Partly Low ( ) iv) Low ( )
8. What types of reports are generated a) On- demand report(managers request) b) Scheduled report (periodic) c) Summary report d) Push report(unusual) e) Exception report(An urgent occurrence)
9. Information sharing: i) over network ( ) ii) Manually(files) ( ) iii) both ( )

10. How many staff is involved with MIS or IT in your institution? a.) 1 – 5 ( ) b. 5 – 10 ( ) c. 10 – 15 ( ) e. 15 - 20 ( ) f. others specify ……..
11. In your estimation, is the MIS or IT staff available? A. sufficient ( ) b. more than sufficient c. Insufficient ( )

SECTION B: AVAILABLE INFRASTRUCTURE FOR MIS

1. Which of the following MIS facilities are available in and for your Institution?

S/N	**Available facilities**	**Available**	**Not Available**
1	Networked Computers		
2	Server		
3	Communication satellite		
4	Telex		
5	Telephone		
6	Fax		
7	Files		
8	Scanner		
9	Printer		
10	Internet Service (www)		
11	Extranet		
12	Intranet		
13	Digital cameras		
14	Multimedia(power point projector		
15	Inverter		
16	Generator		
17	MIS structure/ building		
18	Institutes website		
	Others (specify)		

2. How frequently do you make use of these facilities?

AU = Always Used FU = Frequently Used, RU = Rarely Used, NU= Never Used, NC = No comment

Utilization of Facilities	**AU**	**FU**	**RU**	**NU**	**NC**
Networked Computers					
Server					
Communication satellite					
Telex					
Telephone					
Fax					
Files					
Scanner					
Printer					
Internet Service (www)					
Extranet					
Intranet					
Digital cameras					
Multimedia(power point projector)					
Inverter					
A standby generator					
Institutes Website					
Others (specify)					

3. What do you use the infrastructure for?(Tick as many as possible)
   a) Report generation ( )
   b) Research Work ( )
   c) Official Work ( )
   d) Training purpose ( )
   e) Statistics generation ( )
   f) Situation Analysis(field/ farm) ( )
   g) Record keeping ( )
   h) Regular Program document review ( )
   i) Surveys ( )
   j) Budget Analysis ( )
   k) Specify others ……..
      ……
      ……

      ……..

SECTION C: SOURCES OF INFORMATION (Tick as many are applicable)

1. What are the sources of information for MIS?

S/N	Sources of information	
1.	Workshop/Seminar/Conference	
2	Extension agents	
3	Contact Farmers	
4	Colleagues	
5	Personal experience	
6	Observations from neighborhood	
7	Radio	
8	Television	
9	Existing literature	
10	Other research institutes/ university	
11	Agricultural news	
12	Internet	
13	Other Agric. Extension Institutions	
14	Policy makers/ policy decisions	
15	Marketers of Agricultural inputs	
16	Library	
17	Research findings	
18	Non-governmental Organisations	
19	Government Statistics	
20	Account records	
21	Reports from Regular meetings	
22	Social contacts	
23	External Agricultural reports/ newsletters	
24	Legal documents	
25	Data from extension programs	
	Others (specify)	

SECTION D: PROVISION OF INFORMATION

1. How do you Channel information to the management?

AU= Always Used, FU= Frequently Used, RU= Rarely Used, NU= Never Used, NC= No comment

S/N	Channels of information provision	AU	FU	RU	NU	NC
1	E- mails					
2	Chat					
3	Instant messaging					
4	Video/ Tele conferencing					
5	Mobile Phones(via bluetooth/ bulk sms)					
6	Office Paper					
7	Office files					
8	Prints (written reports)					
9	Database files					
10	Social media eg facebook, twitter					
11	Wikis					
12	RSS feeds					
13	mashups					
14	Cell phones/ smart phones					
15	Networked Computers					
	Others specify					

SECTION E: CHALLENGES WITH THE USE OF MIS

(Please tick as many as are applicable)

1. The Principles of the organization don't tally with the MIS. ( )
2. Top Management not involved with the design of the MIS. ( )
3. Inadequate IT or database knowledge by management in relation to extension work. ( )
4. IT Specialists not adequately informed about managerial functions. ( )
5. Poor Internal communication network between the management and other sections directly handling information. ( )
6. Inadequate database knowledge in relation to extension work. ( )
7. Inadequate Infrastructure. ( )
8. Lack/ Shortage of specialist's personnel for development program for MIS.
9. Lack of adequate understanding of the role and possible contributions of an automated MIS. ( )
10. No guarantee of the use of an automated MIS. ( )
11. Inadequate resource allocation for maintaining communication networks. ( )
12. Use of complex software. ( )
13. Lack of trainings/ organizational learning's on the use of MIS. ( )
14. Poor power supply. ( )
15. Difficulty with preserving digital materials. ( )
16. Dissatisfaction of users of MIS development in Agricultural extension. ( )
17. Inadequate attention paid to new IT achievement for MIS development in Agricultural extension.
18. Negligence in reviewing MIS program with all managers of the Agricultural extension programs

APPENDIX II

Department of Library and Information Science,

Ahmadu Bello University, Zaria.

INTERVIEW GUIDE ON THE USE OF MANAGEMENT INFORMATION SYSTEM IN AGRICULTURAL EXTENSION PROGRAMS OF ABU ZARIA.

(MANAGEMENT STAFF)

SECTION A:

Please tick ( ) as appropriate

1. Educational qualification please tick the highest qualification) i) OND/HND ( ) ii) Bsc ( ) iii) Msc ( ) iv) PhD ( ) v) others specify
2. IT Knowledge: i) High ( ) ii) Partly High ( ) ii) Partly Low ( ) iv) Low ( )
3. Resource allocation for MIS: i) High ( ) ii) Medium ( ) iii) Low
4. Do you make use of any on- line collaboration platform? Yes ( ) No ( )
5. If yes, which of the following does your institution make use of a. RSS feeds b. wiki c. Instant messaging d. discussion forum e. blogs f. E- mail g. specify others …….
6. If No, which of the following best describes your reason
   a. The institute does not make use of it
   b. Lack of interest in making use of it
   c. Lack of awareness of its use or relevance to research
   d. Phobia for computers and its peripherals
   e. Others specify ……..
7. Does your institution have an MIS structure/ building? Yes ( ) No ( )
8. How many staff is involved with MIS or IT in your institution? a.) 1 – 5 ( ) b. 5 – 10 ( ) c. 10 – 15 ( ) e. 15 - 20 ( ) f. others specify ……..
9. In your estimation, is the MIS or IT staff available? A. sufficient ( ) b. more than sufficient c. Insufficient ( )
10. Are the staff qualified and competent? Yes ( ) No ( )
11. How competent are the staff? a.) Very competent b.) Competent c.) Not competent d.) Undecided
12. What types of reports are generated
    a) On – demand report
    b) Scheduled report
    c) Summary report
    d) Push report
    e) Exception report
13. Who prepares the report for you?
    a) MIS staff
    b) Secretaries
    c) Others specify
14. How is the report channeled to you?
    a) On- line
    b) Manually
    c) Copied on CD/ Flash drive/intranet
    d) Others, specify ……

THE ROLE OF MIS IN ENHANCEMENT OF AGRICULTURAL EXTENSION PROGRAMS

How has MIS enhanced the activities in your Institution?

(Please tick as many as possible)

1. Enhancement in choosing between allocation of resources ( )
2. Improved choosing alternate course of action( )
3. Improved the day- day control and planning of operations ( )
4. Increased your access to information(online or otherwise)
5. Integration of information made possible across various extension programs. ( )
6. Generation of information and dissemination has improved ( )
7. Improved communication networking between colleagues and other institutions ( )
8. Minimized information overload ( )
9. Free flow of Information within and across Institutes ( )
10. Speed and accuracy of performance is enhanced ( )
11. Provision of timely information has been achieved ( )
12. Decision making is made easy ( )
13. Availability of consistent data ( )